UNIVERSITY OF SOUTHAMPTON

FACULTY OF ENGINEERING, SCIENCE AND MATHEMATICS

School of Civil Engineering and the Environment

Virtual Mobility: Its Implications for Personal Travel and Social Exclusion

by

Susan Louise Kenyon

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ABSTRACT

FACULTY OF ENGINEERING, SCIENCE AND MATHEMATICS
SCHOOL OF CIVIL ENGINEERING AND THE ENVIRONMENT

Doctor of Philosophy

VIRTUAL MOBILITY: ITS IMPLICATIONS FOR PERSONAL TRAVEL AND SOCIAL EXCLUSION

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At the outset of this research, two fields of transport research were in the ascendant. The first reflected technological change, considering the growth of new information and communications technologies and their impacts for transport systems and travel behaviour. The second reflected social change, considering the growth in inequality and disadvantage and the contribution of transport systems and travel behaviour to the same. Traditionally, these fields have been considered separately. However, there is a potential link between the two. The substitution of the need to travel through the provision of an alternative mode of access to activity participation, hypothesised in the first field of research, could alleviate the disadvantage caused by too little physical mobility, identified in the second.

This thesis investigates this potential link, exploring the hypothesis that virtual mobility, via the Internet, could provide a viable alternative to physical mobility in reducing mobility-related social exclusion. The thesis presents conceptual, empirical and methodological investigation and analysis, to this end. Part 1 presents a literature review, considering the concepts of social exclusion, mobility-related exclusion and virtual mobility. New definitions and conceptualisations of each are offered, before the influences of each upon the other are discussed. Part 2 presents a qualitative study, a series of six focus groups with participants traditionally considered to be vulnerable to social exclusion. The study confirms and clarifies the experience of mobility-related exclusion, its causes and consequences and the nature and effects of Internet use, including its effects for social exclusion. Part 3 presents the second empirical study, a quantitative, longitudinal, panel-based diary study. A novel methodology is presented and its efficacy is assessed. Empirical analysis considers both primary and secondary (multitasked) activities, exploring the impact of Internet use upon travel and activity participation through the examination of changes in behaviour over time.

The research supports the hypothesis that virtual mobility can provide a viable alternative to physical mobility in reducing aspects of mobility-related exclusion. Furthermore, there is no evidence in this research to support a link between physical mobility and virtual mobility; and no evidence to suggest a negative effect of virtual mobility for sociability.

Table of contents: Volume I

Chapter 1. Introduction **1**
1.1 Background to the research 1
1.2 Research questions 2
1.3 Structure of the thesis 2
1.3.1 Part 1: literature review 3
1.3.2 Part 2: focus groups study 3
1.3.3 Part 3: diary study 4
1.3.4 Part 4: discussion and conclusions 4

Part 1. Literature review and development of a conceptual framework

Chapter 2. Social exclusion **7**
2.1 Introduction 7
2.2 Understanding disadvantage: poverty 8
2.3 Understanding disadvantage: social exclusion 11
2.4 Social exclusion: discussion of definitions 12
2.5 Defining social exclusion 16
2.6 Social exclusion: discussion of dimensions 17
2.7 Dimensions of exclusion 20
2.7.1 Economic 22
2.7.2 Living space 23
2.7.3 Mobility 25
2.7.4 Personal 25
2.7.5 Personal political 26
2.7.6 Organised political 26
2.7.7 Social networks 27
2.7.8 Societal 27
2.7.9 Temporal 28
2.8 Social exclusion: discussion of measurement 29
2.9 Social exclusion: conflict 32
2.10 Summary 35

Chapter 3. Mobility-related exclusion **36**
3.1 Introduction 36
3.2 Developing a conceptual framework 37
3.3 Accessibility 39
3.4 Linking mobility and social exclusion 40
3.4.1 Education 43
3.4.2 Employment 44
3.4.3 Health 45
3.4.4 Social networks 46
3.4.5 Summary 47
3.5 The causes of mobility-related exclusion 47
3.5.1 Person-type factors 48
3.5.2 Transport factors 49
3.5.3 Spatial factors 52
3.5.4 Summary 55
3.6 Policy responses to mobility-related exclusion 55
3.7 Mobility-related exclusion: conflict 57
3.8 Summary 59

Chapter 4. Virtual mobility 60
4.1 Introduction 60
4.2 Defining virtual mobility 61
4.3 Rethinking accessibility 63
4.4 Virtual mobility in the nine dimensions of social exclusion 65
4.4.1 Economic 65
4.4.2 Living space 67
4.4.3 Mobility 69
4.4.4 Personal 70
4.4.5 Personal political 71
4.4.6 Organised political 72
4.4.7 Social networks 74
4.4.8 Societal 77
4.4.9 Temporal 78
4.4.10 Summary 79
4.5 A 'virtual mobility-related dimension' to social exclusion? 79
4.5.1 Negative mobility effects 79
4.5.2 Negative social effects 83
4.5.3 The 'digital divide' 86
4.6 Summary 88

Chapter 5. Linking social exclusion, personal travel and Internet use 90
5.1 Introduction 90
5.2 Summary of the literature review 90
5.3 Identification of the direction of future research 91

Part 2. The focus groups study

Chapter 6. The focus groups study 94
6.7 Introduction 94
6.2 Aims and objectives 94
6.3 Why focus groups? 95
6.4 Methodology 97
6.5 Method of analysis 100
6.6 Research findings 101
6.6.1 Exploring the links between transport and social exclusion 101
6.6.1.1 The experience of mobility-related exclusion 101
6.6.1.2 Causes of mobility-related exclusion 105
6.6.1.3 Summary: confirming and clarifying the nature of mobility-related exclusion 110
6.6.2 Exploring the nature and effects of Internet use 111
6.6.2.1 Current Internet use 111
6.6.2.2 Communications activities 113
6.6.2.3 Daily chores: shopping 114
6.6.2.4 Daily chores: information search 115
6.6.2.5 Education 117
6.6.2.6 The benefits of virtual mobility 118
6.6.2.7 Summary: the nature and effects of Internet use 118
6.6.3 Barriers to the use of virtual mobility to overcome mobility-related exclusion: Internet concerns 120
6.6.3.1 Availability 120
6.6.3.2 Usability 121
6.6.3.3 Negative social effects 122
6.6.3.4 The quality of online activities 124

6.6.3.5 Summary: considering the acceptability, accessibility, affordability and availability of virtual mobility 125
6.7 Conclusions: could virtual mobility alleviate mobility-related exclusion? ... 126

Part 3. The diary study

Chapter 7. The diary study: introduction and overview 132
7.1 Introduction 132
7.2 Overview 134

Chapter 8. Methodology 135
8.1 Introduction 135
8.2 Choice of methodology 136
8.3 Diary studies: an overview 140
8.4 Four diary traditions 142
8.5 The accessibility diary 144
8.5.1 Column 1: What did you do? 148
8.5.2 Activity codes 148
8.5.3 Start time, end time 151
8.5.4 Where did you do it? 152
8.5.5 Did anyone do this with you / Was anyone around at the time? 152
8.5.6 What else were you doing? 152
8.6 Minimising attrition 153
8.7 Summary 154

Chapter 9. Sample strategy and composition 156
9.1 Introduction 156
9.2 Sample strategy 156
9.2.1 Income 157
9.2.2 Internet experience 158
9.2.3 Travel mode availability and use..... 159
9.2.4 Residential location 160
9.2.5 Socio-demographic variables 164
9.2.6 Sample size 164
9.2.7 Consequences of the sampling approach for the analysis 165
9.3 Sample method 165
9.4 Sample profile 167
9.4.1 Income 168
9.4.2 Internet experience 170
9.4.3 Travel mode use 172
9.4.4 Residential location 174
9.4.5 Socio-demographic variables 174
9.4.5.1 Age.....174
9.4.5.2 Education 175
9.4.5.3 Ethnicity 175
9.4.5.4 Gender 176
9.4.5.5 Household composition 176
9.5 Summary 177

Chapter 10. Results and discussion: primary activities 178
10.1 Introduction 178
10.2 Data preparation 179
10.3 Examining change: over time 182
10.3.1 Whole sample analysis 183
10.3.1.1 Longitudinal trends 187

10.3.1.2 Interpreting the lack of a clear longitudinal trend 188
10.3.2 Whole sample analysis: summary 193
10.3.3 Disaggregating the sample by key variables 194
10.3.4 Disaggregating the sample by online/offline participation 195
10.3.5 Subgroup analysis: summary 195
10.3.6 Implications of the lack of a longitudinal trend in the data and direction of further analysis 196
10.4 Examining change: exploring difference 200
10.4.1 Introduction 200
10.4.2 Constructing a composite database from the longitudinal data 202
10.4.3 Considering the influence of online participation: disaggregating the5 sample by extent of Internet use 203
10.4.3.1 All online activities 207
10.4.3.2 Education, employment information and paid work activities 208
10.4.3.3 Information search activities 208
10.4.3.4 Shopping activities 209
10.4.3.5 Social networks activities 209
10.4.3.6 Travel activities 210
10.4.3.7 Summary 211
10.4.4 Considering the influence of key variables upon the above findings 211
10.4.5 Considering the influence of online participation: within-activity differences 212
10.4.5.1 Education activities 214
10.4.5.2 Information search, shopping and social networks activities 216
10.4.5.3 Summary 217
10.4.6 Within-activity differences: subgroups analysis 217
10.4.7 Probing the causal relationship: an email survey of participants 218
10.4.7.1 Methodology 218
10.4.7.2 Results and discussion: question (1) 219
10.4.7.2.1 Communications/social networks activities 220
10.4.7.2.2 Education activities 220
10.4.7.2.3 Information search activities 221
10.4.7.2.4 Shopping activities 221
10.4.7.2.5 Summary 222
10.4.7.3 Results and discussion: open text responses 222
10.4.7.4 Summary 223
10.4.8 Section summary: examining change by exploring difference 223
10.5 Conclusion: could virtual mobility alleviate mobility-related exclusion? 226

Chapter 11. Results and discussion: secondary activities 231

11.1 Introduction 231
11.2 What is multitasking? 232
11.2.1 Defining multitasking 232
11.2.2 Multitasking: a brief literature review 233
11.2.3 Multitasking, activity participation, physical mobility and virtual mobility 235
11.2.4 Summary 237
11.3 How prevalent and important is multitasking? 238
11.3.1 The prevalence and importance of multitasking 238
11.3.2 The importance of multitasking 242
11.3.3 The prevalence and importance of multitasking: summary 246
11.4 Examining change: over time 247
11.5 Examining change: exploring difference 2501

11.5.1 Considering the influence of online participation: disaggregating the sample by extent of Internet use 251
11.5.2 Considering the influence of online participation: within-activity differences 254
11.5.3 Section summary: examining change by exploring difference 256
11.6 Conclusions 258

Part 4. Discussion and conclusions

Chapter 12. Summary and discussion 262
12.1 Introduction 262
12.2 Thesis summary 262
12.3 Discussion of key findings: the contribution of the research 265
12.3.1 Transport and social exclusion 266
12.3.2 Transport and virtual mobility 268
12.3.3 Virtual mobility and social exclusion 269
12.4 Discussion of methodological challenges 271
12.5 Recommendations for further research 274
12.5.1 Further analysis of the existing dataset 275
12.5.2 Secondary activities 276
12.5.3 Methodological development 278
12.6 Summary 279

Chapter 13. Conclusions 280
13.1 Introduction 280
13.2 Hypotheses 280
13.2.1 Hypothesis 1. Virtual mobility can provide a viable alternative to physical mobility in reducing aspects of mobility-related exclusion 280
13.2.2 Hypothesis 2(a). Secondary effects of virtual mobility: physical mobility 281
13.2.3 Hypothesis 2(b). Secondary effects of virtual mobility: sociability .. 281
13.3 Other technical findings 282
13.3.1 Theoretical advance 282
13.3.2 The links between transport and social exclusion 282
13.3.3 Multitasking 283
13.3.4 Methodological conclusions 283
13.4 The importance of the research 284
13.5 Recommendations for further research 284

Part 5. Appendices 285
Appendix contents 286
Appendix 1. Meetings with community informatics professionals and visits to online community centres, August/September 2001 287
Appendix 2. Focus groups composition 289
Appendix 3. Focus groups topic guide 299
Appendix 4. Focus groups visual aids 300
Appendix 5. The online survey 303
Appendix 6. The diary instructions 311
Appendix 7. The information booklet 313
Appendix 8. Study locations: further detail 330
Appendix 9. Screening questionnaire 334
Appendix 10. Risk assessment and safety procedures 339
Appendix 11. Inception questionnaire 342
Appendix 12. Prevalence Tables 350

Appendix 13. Supporting Tables and Figures: Chapter 10 354
Appendix 14. Supporting text for Section 10.3.3. Considering the influence of key variables upon the results presented in Section 10.3.1 373
Appendix 15. Supporting text for Section 10.4.4. Considering the influence of key variables upon the results presented in Section 10.4.3 376
Appendix 16. Supporting text for Section 10.4.6. Considering the influence of key variables upon the results presented in Section 10.4.5 379
Appendix 17. Questionnaire to probe the impact of Internet use 388
Appendix 18. Supporting Figures: Chapter 11 393
Appendix 19. A technical appraisal of the accessibility diary 397

Part 6. References 402

List of Figures and Tables

List of Figures

Figure 1.1 Structure of the thesis 5
Figure 3.1 Diagram to demonstrate the role of mobility in social inclusion 56
Figure 6.1 Timeline of Internet activity 112
Figure 8.1 The Accessibility Diary 147
Figure 8.2 Diary cover design 147
Figure 8.3 Activity codes 150
Figure 9.1 Study areas 162
Figure 9.2 UK households with access to the Internet, 1998-2004 171
Figure 10.1 Minutes spent in education activities: whole sample 185
Figure 10.2 Minutes spent in employment search activities: whole sample 185
Figure 10.3 Minutes spent in information search activities: whole sample 185
Figure 10.4 Minutes spent in paid work activities: whole sample 186
Figure 10.5 Minutes spent in shopping activities: whole sample 186
Figure 10.6 Minutes spent in social networks activities: whole sample 186
Figure 10.7 Minutes spent in online and travel activities: whole sample 187
Figure A13.1 Depicting the variation in individual behaviour for all online activities, each line representing an individual 358
Figure A13.2 Depicting the variation in individual behaviour for shopping activities, each line representing an individual 359
Figure A13.3 Depicting the variation in individual behaviour for social networks activities, each line representing an individual 360
Figure A13.4 Depicting the variation in individual behaviour for all travel activities, each line representing an individual 361
Figure A13.5 Minutes spent in offline and online education activities, by nature of participation 363
Figure A13.6 Minutes spent in offline and online education activities, by nature of participation 363
Figure A13.7 Minutes spent in offline and online education activities, by nature of participation 363
Figure A13.8 Minutes spent in offline and online shopping activities, by nature of participation 364
Figure A13.9 Minutes spent in offline and online shopping activities, by nature of participation 364
Figure A13.10 Minutes spent in offline and online shopping activities, by nature of participation 364
Figure A13.11 Minutes spent in offline and online social networks activities, by nature of participation 365
Figure A13.12 Minutes spent in offline and online social networks activities, by nature of participation 365
Figure A13.13 Minutes spent in offline and online social networks activities, by nature of participation 365
Figure A18.1. Total minutes spent in education activities per week (n=69) 394
Figure A18.2. Total minutes spent in employment information search per week (n=69) 394
Figure A18.3. Total minutes spent in information search activities per week (n=69) 394
Figure A18.4. Total minutes spent in paid work activities per week (n=69) 395
Figure A18.5. Total minutes spent in shopping activities per week (n=69) 395
Figure A18.6. Total minutes spent in social networks activities per week (n=69) 395

Figure A18.7. Total minutes spent in online and travel activities per week (n=69) 396

List of Tables

Table 2.1 Important distinctions between poverty and social exclusion 12
Table 2.2 Dimensions of exclusion identified in the literature 18
Table 2.3 Dimensions of social exclusion 21
Table 3.1 Accessibility, mobility and social exclusion 42
Table 3.2 Conceptualisation of the causes of mobility-related exclusion 47
Table 4.1 Virtual mobility in the economic dimension of social exclusion 67
Table 4.2. Virtual mobility in the living space dimension of social exclusion ... 68
Table 4.3 Virtual mobility in the personal dimension of social exclusion 71
Table 4.4 Virtual mobility in the personal political dimension of social exclusion 72
Table 4.5 Virtual mobility in the organised political dimension of social exclusion 74
Table 4.6 Virtual mobility in the social networks dimension of social exclusion 77
Table 4.7 Virtual mobility in the societal dimension of social exclusion 78
Table 6.1 Focus groups: composition and timing 98
Table 6.2 Internet activities 112
Table 9.1 Criteria for the selection of study sites 163
Table 9.2 Stated reasons for attrition between the waves 168
Table 9.3 Income profile 169
Table 9.4 Income profile by analysis variables 170
Table 9.5 Internet experience (years since first ever use/first home use) 171
Table 9.6 Changing access to the Internet between sampling waves 172
Table 9.7 Vehicle availability (1): number of vehicles in the household 173
Table 9.8 Vehicle availability (2): vehicle always available 173
Table 9.9 Mode use: longitudinal sample 173
Table 9.10 Residential location 174
Table 9.11 Age profile 175
Table 9.12 Educational profile 175
Table 9.13 Household composition: children in the household 176
Table 10.1 Composite activities and associated activities 181
Table 10.2 Minutes spent participating in key activities per week, in each wave: descriptive statistics for the whole sample (n=69) 184
Table 10.3 Correlation coefficients for inter-wave behaviour, where correlations are significant, with indication of statistical significance (n=69) 190
Table 10.4 Creating an aggregate database: comparing total mean minutes per week spent in each key activity for different combinations of waves (n=69) 204
Table 10.5 Assessing the effect of extent of Internet use upon activity participation (mean minutes per week) 206
Table 10.6 Assessing the effect of extent of Internet use upon activity participation: difference in mean minutes per week between subgroups, with indication of statistical significance 207
Table 10.7 Mean duration of activity participation per week, by nature of participation, with indication of statistical significance 214
Table 10.8 Participants' stated effects of online participation upon the amount of time spent in offline participation, in four key activities .. 219
Table 11.1 Incidence of multitasking: percent of days during which multitasking takes place 239
Table 11.2 Mean number of minutes spent in secondary activities per day 239

Table 11.3 Highlighting the variability in recorded multitasking for the composite sample (n=96) 240
Table 11.4 Minutes spent in secondary activities per week, by weekly Internet use quartile (n=96) 241
Table 11.5 Assessing the importance of multitasking: mean minutes per week spent in primary and secondary activities (composite database) 242
Table 11.6 Percentage of primary activity time involving multitasking, by activity category and offline/online status (wave 1) (n=86) 244
Table 11.7 Mean total minutes in key activities per week (n=69) 249
Table 11.8 Assessing the effect of extent of Internet use upon activity participation (mean minutes per week) 252
Table 11.9 Assessing the effect of extent of Internet use upon activity participation: difference in mean minutes per week between subgroups, with indication of statistical significance 253
Table 11.10 Mean duration of activity participation per week, by nature of participation, with indication of statistical significance 255
Table A5.1. Respondents' Internet activities 305
Table A12.1 Rank order of primary activities, total minutes per week: wave 1 ... 351
Table A12.2 Rank order of primary activities, total minutes per week: wave 2 ... 352
Table A12.3 Rank order of primary activities, total minutes per week: wave 3 ... 353
Table A13.1 Minutes spent participating in key activities per week, in each wave: descriptive statistics for the subgroup 'Those participating in the activity' 356
Table A13.2 Percentage change in participation in key activities over time, by subgroups, with indication of statistical significance 357
Table A13.3 Creating an aggregate database: correlations between different combinations of waves (n=69) 362
Table A13.4. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of total Internet use 366
Table A13.5 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of Internet experience 367
Table A13.6 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of type of access to the Internet 368
Table A13.7. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of car availability 369
Table A13.8 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of frequency of car use 370
Table A13.9 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of residential location 371
Table A13.10 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of gender 372
Table A15.1 Composition of Internet use quartiles by key variables: number of participants 378
Table A16.1 Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of income 381

Declaration of authorship

I, Susan Louise Kenyon, declare that the thesis entitled: 'Virtual Mobility: Its Implications for Personal Travel and Social Exclusion' and the work presented in it are my own. I confirm that:

This work was done wholly or mainly while in candidature for a research degree at this University;

Where any part of this thesis has previously been submitted for a degree or any qualification at this University or any other institution, this has been clearly stated;

Where I have consulted the published work of others, this is always clearly attributed;

Where I have quoted from the work of others, the source is always given. With the exception of such quotations, the thesis is entirely my own;

I have acknowledged all main sources of help;

Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

Parts of this work have been published as:

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Definitions and abbreviations

ACORN	A Classification of Rural Neighbourhoods
DETR	Department for the Environment, Transport and Rural Affairs
DfT	Department for Transport
DTLR	Department for Transport, Local Government and the Regions
EPSRC	Engineering and Physical Sciences Research Council
EU	European Union
FBE	Faculty of the Built Environment
FIT	Future Integrated Transport
GP	General Practitioner
ICT	Information and Communications Technology
IMD	Index of Multiple Deprivation
IT	Information Technology
LETS	Local Exchange and Trading Scheme
MUD	Moral Underclass Discourse
MRA	Manor Residents' Association
NHS	National Health Service
NRU	Neighbourhood Renewal Unit
OFA	Opportunity For All
ONS	Office for National Statistics
PAT	Policy Action Team
PC	Personal Computer
PMT	Passenger Miles Travelled
RED	Redistributionist Discourse
SEU	Social Exclusion Unit
SID	Social Integrationist Discourse
SIFC	Stockton International Family Centre
SOA	Super Output Area
SRB	Single Regeneration Budget
STAT	Space Time Accessibility Theory
UWE	University of the West of England, Bristol
VMT	Vehicle Miles Travelled

'... even the smallest aspect of social reality is infinite in its complexity.'

Adam, 1995: 35.

Chapter 1. Introduction

1.1 Background to the research

At the outset of this research in 2001, two fields of transport research were in the ascendant. The first reflected technological change, considering the growth of a new information and communications technology and its impacts for transport systems and travel behaviour. Whilst there had been debate about the impacts of information and communications technologies (ICTs) for travel for some time (for example, Salomon identifies more than thirty papers on this subject in his 1986 review), the rapid growth in access to and use of the Internet in the late 1990s provided added stimulus to this debate. This excited debate for two reasons: because of the advanced capabilities of the Internet, unique amongst other ICTs; and because of its widespread adoption. For the first time, there was a technology truly capable of providing access to everyday activities, from education and employment to shopping and participation in social networks, without recourse to physical mobility by the individual undertaking the activity; and the Internet was truly popular and universally available (or, at least, statistics suggested that it was becoming so), entering homes, schools, the workplace and community venues.

The second reflected social change, considering the growth in inequality and disadvantage in society and the contribution of transport systems and travel behaviour to the same. The Labour government had popularised and prioritised the alleviation of social exclusion since its election in 1997. The publication by the Department for Environment, Transport and the Regions (DETR) in 2000 of a report into the links between social exclusion and the provision and availability of public transport placed transport firmly on the social exclusion agenda. A consultation into the links between transport and social exclusion was launched in 2001, both reflecting and promoting increased academic interest in the area.

The author recognised a potential link between the two: that the substitution of the need to travel through the provision of an alternative mode of access to activity participation, hypothesised in the first field of research, could alleviate the disadvantage caused by too little physical mobility, identified in the second. The research reported in this thesis sought to investigate this potential link, exploring the hypothesis that virtual

mobility, via the Internet, could provide a viable alternative to physical mobility in reducing mobility-related social exclusion. This thesis presents conceptual, empirical and methodological investigation and analysis, to this end.

1.2 Research questions

Ultimately, the aim of the research was to investigate the following research question:

- Can virtual mobility provide a viable alternative to physical mobility in reducing mobility-related exclusion?

Within this, there were two objectives:

- To investigate the extent to which virtual mobility can provide the same function as physical mobility or, at the least, fill the gap that a lack of physical mobility leaves; and
- To assess whether or not virtual mobility has any negative mobility or social effects that might worsen social exclusion, reducing the benefits for mobility-related exclusion.

As the research developed, further aims concerning conceptual and methodological advance emerged as important in enabling the above empirically-focused aims to progress. These are detailed in later chapters.

1.3 Structure of the thesis

There are four main parts to this thesis. Part 1 considers the literature review, laying the foundations for the empirical research. Part 2 discusses the first empirical study, the focus groups. Part 3 presents the second empirical study, a longitudinal panel-based diary study. Part 4 unites the different strands of the thesis, presenting a discussion and conclusion. An overview of each follows. Figure 1.1 depicts the structure of the thesis in diagrammatic form.

1.3.1 Part 1: literature review

In order to understand the role of transport in social exclusion, we must first understand the concept of social exclusion. Therefore, Chapter 2 presents detailed critical analysis of the literature with regard to the definition of social exclusion, its conceptualisation in terms of dimensions and its measurement. The review finds the lack of a single clear, comprehensive definition or conceptualisation of social exclusion, which could confidently be used to inform this study. In consequence, a definition and a nine-dimensional conceptualisation developed by the author are introduced. Chapter 3 reviews the concept of mobility-related exclusion. Whilst no definitions of mobility-related exclusion are identified, two key themes, or discourses, emerge, which shape the field of study regarding mobility and social exclusion. A definition of mobility-related exclusion for use in this research, which recognises the twin discourses of too little and too much mobility, is presented and a review of the causes and consequences of mobility-related exclusion, incorporating a discussion of the concept of accessibility, follows. Chapter 3 closes with an assessment of policy responses to mobility-related exclusion in light of the conceptual framework, alongside the introduction of the potential role for virtual mobility in the pursuit of the same.

Chapter 4 considers the concept of virtual mobility further, exploring the (potential) impacts of Internet use upon society and transport. The chapter presents the definition of virtual mobility that is used within this research and discusses the implications of virtual mobility for the concept of accessibility. Detailed appraisal of the potential role for virtual mobility in alleviating mobility-related exclusion follows, with reference to existing websites, before the potential barriers to the use of virtual mobility for the alleviation of mobility-related exclusion are considered, including an assessment of the evidence regarding the mobility effects of Internet use, the social effects and the digital divide. Chapter 5 concludes the literature review with a summary and identification of the direction of subsequent research.

1.3.2 Part 2: focus groups study

Chapter 6 presents the focus groups study. The chapter considers the reasons for the use of focus groups, before detailing the methodology and method of analysis. Discussion of the results of the study follows, with reference to: experience of mobility-related exclusion and its causes; the nature and effects of Internet use, including its

effects for social exclusion; and potential barriers to the use of virtual mobility to alleviate mobility-related exclusion, considering its acceptability, accessibility, affordability and availability. Chapter 6 concludes with examination of the implications of the focus group discussions for the hypotheses and the implications of the findings for the second study.

1.3.3 Part 3: diary study

Following an overview of the aims and objectives in Chapter 7, Chapter 8 presents the methodology, including discussion of the suitability of alternative methodologies and a review of existing diary studies. The survey instrument developed for use in this research, the 'accessibility diary', is presented and discussed in full, with reference to the aims and objectives. Chapter 9 considers the sampling strategy and sample composition. The sample method is outlined and the sample profile is presented.

Chapter 10 presents results from the primary data analysis, exploring the impact of Internet use upon travel and activity participation through the examination of changes in behaviour over time using a longitudinal database; and through the analysis of difference, using a composite database. The chapter concludes with an evaluation of the implications of the findings for the hypotheses and for further research. Chapter 11 introduces the concept of multitasking, examining the impact of the inclusion of secondary activities upon the results in Chapter 10. Following a literature review and conceptual discussion, empirical evidence is presented, which emphasises the importance of multitasking for the field of study. The analysis undertaken in Chapter 10 is repeated, using a database which incorporates secondary activities data. As above, the chapter concludes with an evaluation of the implications of the findings for the hypotheses and further research.

1.3.4 Part 4: discussion and conclusions

Chapter 12 summarises the research, before introducing discussion of the key findings, considering the hypotheses, other technical findings and methodological challenges. The chapter assesses the contribution of this research to the field(s) of study, before concluding with a discussion of the next steps for research in this area, considering further applications of the datasets and further avenues for the research. Chapter 13 concludes this thesis with an overview of the key findings.

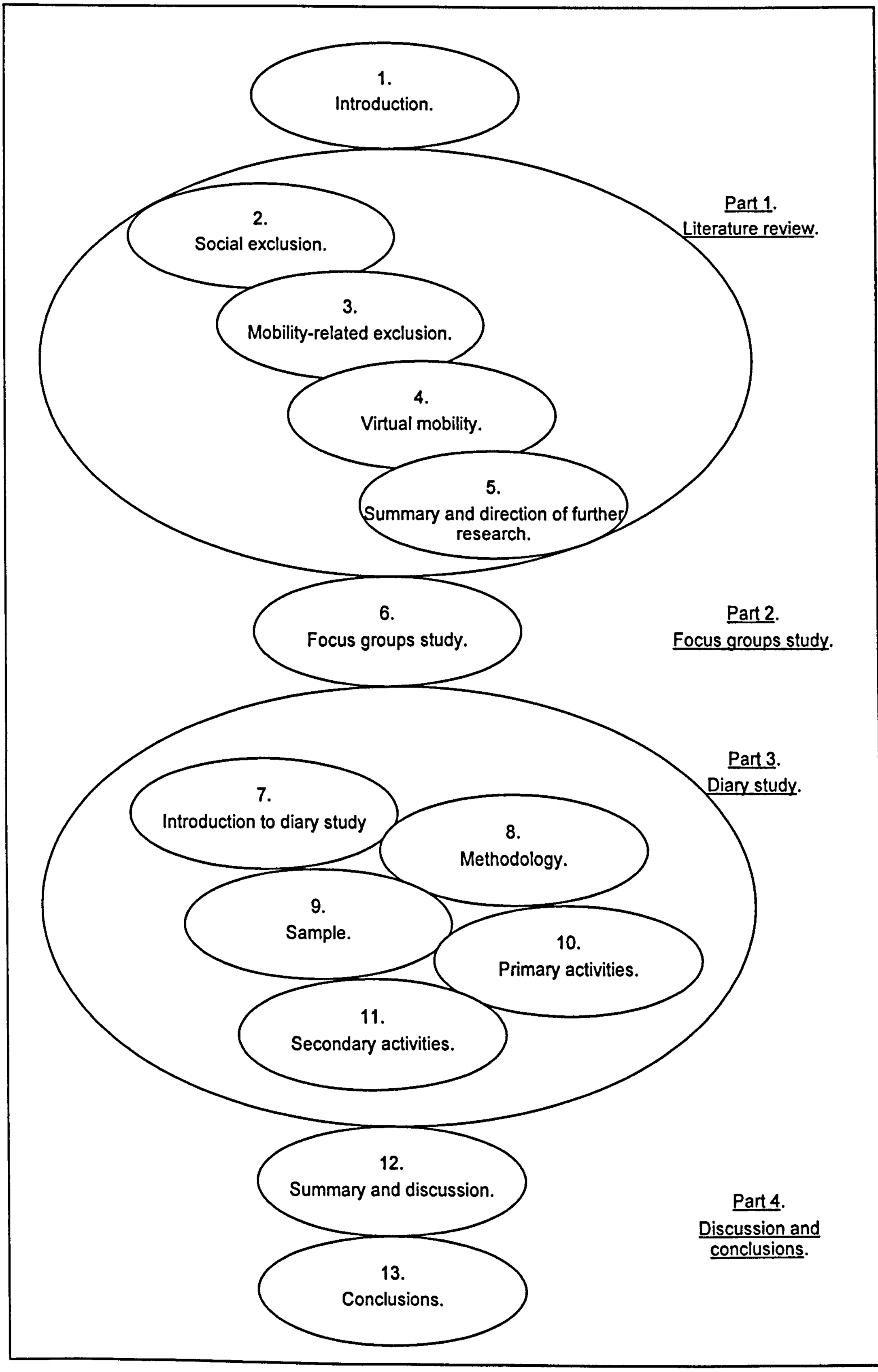


Figure 1.1. Structure of the thesis

Part 1. Literature review and development of a conceptual framework

Chapter 2. Social exclusion.

2.1 Introduction

The concept of social exclusion originated in France, underlying French welfare policy during the 1970s. The term was initially used to refer to the group of individuals who fell outside of the French system of social protection (Percy-Smith, 2000a): a group administratively excluded by the state. Room (1995) suggests that the term stems from a particularly French understanding of the concept of society. Citing Esping-Anderson, Room discusses three ideological conceptions of the state and society, each leading to different understandings of disadvantage in society and, thus, resulting in different social policies. In contrast to the dominant liberal[1], Anglo-Saxon ideological paradigm, which perceives society as a mass of atomised individuals, linked only by their relationship with the market and related to the state only through the market, the social democratic, continental tradition, which was particular to France at this time, perceives society as a collective community, towards which the state has particular responsibilities. Deeply rooted in the French Republican tradition of solidarity (Bhalla and Lapeyre, 1997) – think liberté, égalité, fraternité – this approach prompts an holistic view of disadvantage, which considers the individual's relationship with society, rather than with the market. This leads to a concept of disadvantage that addresses not just exclusion from the market, but also exclusion from society. The existence of groups falling outside of society was seen to undermine social cohesion, threatening the unity of the state and undermining the social contract upon which French society was founded (Burchardt et al, 2002a).

The concept, albeit with a restricted focus, was introduced into UK politics during the 1990s, following its adoption at the European level in the third EU anti-poverty programme (Duffy, 1999). Following initial resistance by the Conservative government, the concept was embraced in the UK in 1997 with the election of the Labour government[2], which pledged to place the reduction of social exclusion at the heart of all government policy. This was to be co-ordinated by the cross-departmental Social

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[1] The reader should note that the terms 'conservative', 'liberal' and 'social-democratic' in the context of Esping-Anderson's theory do not mirror the names of UK political parties.

[2] Please note that throughout, this thesis discusses social exclusion in the UK context. Unless otherwise stated, from this point, the use of the term 'government' refers to the UK government, under the Labour Party, from 1997 to the present.

Exclusion Unit (SEU), a body initially set up for two years but, at the time of writing, still in existence after eight.

But what exactly is social exclusion? Analysis of the literature and of government policy produces mixed messages in response to this question. This chapter will present discussion of the concept, analysing definitions, dimensions and attempts to measure social exclusion.

In seeking to understand the concept of social exclusion, it is useful to consider the process, influenced by both ideology and practice, through which the understanding of disadvantage has progressed. Thus, the first section discusses different concepts of disadvantage, from absolute poverty to social exclusion. Definitions of social exclusion, given in the literature and by government, are discussed. A full discussion of the definition of social exclusion developed by the author for use in this research follows.

In order to operationalise the concept, many authors discuss different dimensions of social exclusion. An overview of these dimensions is presented, followed by discussion of the dimensions of exclusion developed for this research. The dimensions are closely linked to attempts to measure exclusion. This chapter considers both holistic and factor-based measurements, in conjunction with reflection upon the question, 'who is socially excluded?' The chapter concludes by acknowledging conflicts within the literature regarding the discourse of social exclusion.

2.2 Understanding disadvantage: poverty

Any attempt to understand the concept of social exclusion must first begin with an analysis of previous understandings of disadvantage in society. This section examines the concept of disadvantage as poverty, discussing how the definition of poverty has changed over time in response to both changing understandings of disadvantage and political expediency. The concept maintains consistency in the causes of and ameliorative solutions to disadvantage, yet changes in the perception of the consequences, or experience, of poverty.

In 1901, Rowntree published the results of a study into poverty in York (Rowntree, 2001). In this, he defined the concept of 'primary poverty', today termed *absolute*

poverty. Rowntree estimated the average nutritional needs of adults and children in terms of physiological efficiency and then calculated the foods necessary to meet these needs. Rowntree then estimated the cash cost of providing for this. He added an estimation of the minimum cost of necessary clothing, fuel for heating, certain household sundries and housing. This was judged to be the minimum level of consumption and thus income necessary for survival. Rowntree suggested that an individual could be said to be in primary poverty if he or she lacked the minimum income needed to provide for this survival level of consumption (Townsend, 1979). The study was revolutionary in its challenge to the notion of the morally delinquent and undeserving poor, suggesting that there may be structural causes of poverty and societal benefits to its elimination, the latter in terms of defence, economic, political and social concerns (Peden, 1991).

This concept of absolute poverty has been influential in UK politics, informing the Anglo-Saxon, liberal paradigm of disadvantage, which has in turn been influential throughout the Western world (Room, 1995). When founding the welfare state, Beveridge drew upon Rowntree's work, introducing benefits to ensure a guaranteed subsistence income and fixing these benefits at the level necessary for subsistence, calculated in the way detailed above (Townsend, 1986). Whilst challenges to this model have been made, particularly during the 1970s (discussed below), the definition remains popular with right-wing political parties and was central to welfare policy during the Conservative governments 1979-97 – although the concept of the 'deserving poor' has not been as accepted. The policy prescription for tackling absolute poverty is the provision of a 'safety net' income, which will guarantee individuals' physiological survival (Miller, 2003).

The advantages of this understanding of poverty include the following. Firstly, it is seen to be a scientific and objective, precise calculation of need, therefore not open to challenge – a benefit for anti-poverty campaigners in ensuring government assistance, yet also to governments, as it dictates a level at which assistance can justifiably end. Secondly, it is easily measurable, leading to clear policy solutions and, theoretically, to the ability to end poverty, a politically attractive proposition (Burden, 2000).

Writing four decades later, Rowntree stated: 'My primary poverty line represented the minimum sum on which physical efficiency could be maintained. It was a bare standard of subsistence, rather than living' (cited in Barnes, 2002). It is in Rowntree's second sentence that we find the key to the principal objection to absolute definitions of

poverty. In his seminal 1979 text, Townsend was highly critical of both the methodological and ideological bases of absolute poverty. Commenting that the scientific assessment and cash equivalency of basic needs was fundamentally flawed, he also questioned the definition of need as 'subsistence, rather than living'. Townsend discussed the concept of *relative poverty*, a subjective understanding of deprivation, in which people are deemed to be in poverty when they are unable to afford to live a standard of life that is appropriate to the place and time in which they live:

> Individuals, families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or are at least encouraged or approved, in the societies to which they belong... they are, in effect, excluded from ordinary living patterns, customs and activities.
> Townsend, 1979.

Thus, relative poverty describes disadvantage in terms of inability to attain the standards of living that are enjoyed by the society in which the individual currently lives, due to insufficient income. The following elements of this definition are critical. First, that the concept of 'need' extends beyond subsistence, to quality of life; second, that the definition of need is relative to the standards enjoyed by the community in which the individual lives; and third, that need is relative also to the time in which the individual lives. In this sense, lack of access to a car is considered to be a characteristic of poverty today, featuring in the majority of deprivation indices (Foley, 1999; PAT 18, nd). Car ownership would not have been an appropriate measure of poverty 30 years ago when, or in a society where, car ownership was more restricted, the lack of access to a car less stigmatising and culture and the urban environment less influenced by the assumption of car ownership, such that car ownership were a less necessary instrument of social and economic participation.

A number of studies, including the twice-run 'Breadline Britain' survey (Gordon and Pantazis, 1997) and 'Poverty and social exclusion in Britain' (Gordon et al, 2000), have operationalised this definition and developed indicators of poverty based upon socially-perceived necessities. Beresford et al (1999) similarly, in presenting oral histories of poverty, discuss socially-based needs; and Walker and Park (1998) discuss the extension of the concept of poverty beyond minimal private consumption to encompass wider material goods, alongside non-material goods including dignity and autonomy.

Relative poverty 'is a value judgement' (Orshansky, cited Townsend, 1979) – a judgement of material and social necessities, measured at the familial, local, national and international levels, as appropriate (Chanan, 2000). For example, Burden and Hamm (2000) identify different concepts of poverty by ethnic group; Chapman and Shucksmith (1996) provide evidence that suggests that poverty should be conceptualised differently in urban and rural areas; and Heady and Room (2002) conclude that definitions of poverty differ by country. This flexibility and scope has brought criticism from some authors, who question the extent to which relative poverty is a matter more of taste than of need (including Piachaud, cited Desai, 1986; Sen, cited Barnes, 2002). However, the understanding of poverty as relative to the place and time in which the individual is situated is incorporated into the majority of European governments' anti-poverty policies, via the EU (Duffy, 1998; Foley, 1999) and is embraced by the UK government (see, for example, the understanding of poverty underlying policies discussed in DSS, 1999).

Some authors have drawn a distinction between poverty and *deprivation* (including Barnes, 2002; Garner, in Chapman and Shucksmith, 1996; Oppenheim, 1998; Hirshfield, in Foley, 1999). However, following analysis of definitions and common usage in both policy and indices, this thesis rejects such a distinction, seeing deprivation and multiple deprivation as extensions of the concept of relative poverty. Indices of multiple deprivation are discussed below.

This section has described the ways in which concepts of poverty have developed over time. Absolute poverty identifies a consistent, objective, subsistence need. Relative poverty identifies subjective material and social needs, which differ according to place and time. The focus is income and consumption, or resources and lifestyle, respectively.

2.3 Understanding disadvantage: social exclusion

Whilst both absolute and relative definitions differ in their understanding of the *consequences* of poverty and the nature of disadvantage, they have in common their identification of the *cause* of disadvantage – the lack of sufficient monetary resources to all participation in the style of life of the community. In consequence, both identify a distributional policy solution – providing sufficient income to move individuals and groups up a vertical indicator of material well-being. The concept of poverty is focused

upon outcomes – the outcomes of material deficiency. Thus, changes in the numbers of people in poverty are easily quantifiable.

Disadvantage is perceived very differently when conceptualised as social exclusion, as highlighted in Table 2.1. The concept of social exclusion removes the *economic* and *material* focus, refocusing upon *place* and *participation* in society. Poverty has at its heart the recognition of *economic rights*; social exclusion, of *citizenship rights*. Where poverty centres upon the *outcomes* of unequal access to material resources, social exclusion centres upon the *processes* of unequal access to participation in society. Where poverty is primarily distributional, social exclusion is *relational*, with a focus upon resource and power relationships between individuals, groups and the state. Policies to alleviate poverty focus upon moving people *up* an income scale; social exclusion upon moving people who are excluded from *out*, to *in*.

Poverty	*Social exclusion*
Material resources	Participation in society
Distributional	Relational
Outcomes	Processes
Economic rights	Citizenship rights
Up from down	In from out
Uni-dimensional	Multiple dimensions
Easily quantifiable	Difficult to quantify

Table 2.1. Important distinctions between poverty and social exclusion

This chapter now turns to discuss the concept of social exclusion more fully. The concept is analysed in three ways, through discussion of: definitions of social exclusion; dimensions of exclusion; and indicators of exclusion in common usage.

2.4 Social exclusion: discussion of definitions

As Burchardt et al (2002) suggest, definitions of exclusion are 'legion'. Many definitions are in use, in both the academic and the applied (policy) literature. The lack of a commonly accepted definition highlights the disagreements amongst analysts and policy makers regarding the state, or experience, of exclusion. It also suggests that the concept is slippery and can be used expediently. The following discussion presents a

number of definitions of exclusion, highlighting key elements and areas of contention, before introducing the definition of exclusion developed for use in this research.

The present government has defined social exclusion in the following way:

> ... a short-hand label for what can happen when individuals or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, high crime environments, bad health and family breakdown.
> DSS, 1999.

The above definition underlies government policy and emphasises the multi-dimensionality of the concept – common in all definitions and expanded in Section 2.7, below. It also recognises that social exclusion can be experienced by individuals and whole areas – that it can be both scattered and clustered (Hine and Grieco, 2003).

Whilst a critique of government social policy is outside the scope of this thesis, by highlighting the key reasons behind criticism of the government's approach we can move towards a fuller understanding of the concept. Contentions include the outcome, or end-state based approach to exclusion that is implied in this definition and, within this, a focus upon specific manifestations of exclusion. Whilst the definition states that these manifestations are linked, the focus is upon single outcomes rather than upon exclusion as an holistic concept. This approach can clearly be seen in the government's policy responses to social exclusion, which have focused upon particular factors of exclusion, in defined policy areas, rather than upon exclusion in its entirety[3]. Alongside this, there is a focus upon material, income and work-related manifestations, demonstrated in the use of the dyad 'poverty and social exclusion' in official reports (see, for example, DWP, 2003); and the focus upon causes and consequences at the individual, rather than societal, level, suggesting a 'performative' idea of social exclusion, leading to questionable notions of agency (Levitas, 2002). It has been suggested that this misrepresents the concept in a number of ways, including its continued poverty focus and its ignorance of factors including agency, citizenship, processes, rights, social relationships and other unquantifiable, qualitative indicators, which are embodied in the majority of understandings of the concept (see, for example Barnes, 2002; Colley and Hodkinson, 2001; Duffy, 1999; Levitas, 1998, 2001; Lister, 2001; Williams, 2001, 2004). In this sense, the government's official definition of social exclusion has been termed little more than deprivation repackaged which, it has been

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[3] A full list of government research areas is available via www.socialexclusionunit.gov.uk.

suggested, is reflected in the policies that have been implement thus far (Hills, 2002; Percy-Smith, 2000a).

The following definition is interesting, because it was given by the Prime Minister at the start of his Premiership, prior to the official definition, given above. It addresses a number of the above shortcomings:

> Social exclusion is about income but it is about more. It is about prospects and networks and life-chances. It's a very modern problem, and one that is more harmful to the individual, more damaging to self-esteem, more corrosive for society as a whole, more likely to be passed down from generation to generation, than material poverty.
> Blair, 1997, cited Duffy, 1999.

Here, Blair discusses the qualitative aspects of exclusion that cannot be quantified, including self-esteem, a concept central to the discussion in Oppenheim (1998). Crucially, the definition above moves beyond material expressions of disadvantage. It also moves beyond individual-level manifestations, to suggest societal level effects. Blair points towards the dynamic nature of exclusion, stating that it has long-term effects in reducing life-chances.

The dynamic nature of exclusion is similarly highlighted by Philip and Shucksmith (2000) and here, by Walker (1997):

> [Social exclusion is] a more comprehensive formulation which refers to the dynamic process of being shut out, fully or partially, from any of the social, economic, political and cultural systems which determine the social integration of a person in society. Social exclusion may, therefore, be seen as the denial (or non-realisation) of the civil, political and social rights of citizenship.

In this definition, Walker not only highlights the dynamic process of exclusion, similarly emphasised by Gaffron et al (2001) and Giddens (2000), but resists the identification of social exclusion as a list of individual symptoms, suggesting a more holistic approach. The definition also considers the issue of agency, defined as choice and culpability. Here, the individual does not choose to be excluded, nor is exclusion the result of individual failings. Rather, the individual is denied participation, by an external force. In this sense, social exclusion is seen to occur as a result of structural forces, which are beyond the individual's control. The recognition that people who are socially excluded are actively locked out of the economic, political and social mainstream then

changes the notion of culpability for disadvantage, placing responsibility for action to alleviate exclusion firmly with structural agencies, rather than with the individual.

Agency, power and control are likewise central to definitions given by authors including Goodin (1996), Mulgan (1998) and Murray (1998). Whilst some authors, including Barry (2002), Burchardt et al (1999) and Giddens (1998), suggest that it is possible to self exclude, they additionally highlight the fact that self exclusion can be involuntary, to the extent that the decision to self exclude is made on the basis of an imperfect or incomplete choice set. Self exclusion is seen to be as damaging to both the individual and society as involuntary exclusion, undermining social solidarity and reinforcing inequality and difference.

In the definition above, Walker also highlights issues of citizenship and rights, which are similarly central to definitions offered by Bhalla and Lapeyre (1997), the European Community (cited Percy-Smith, 2000a) and Goodin (1996), who discusses the evolution of concepts of citizenship from legal, to political, then economic, now social rights. The ability to enforce these rights is equally as important and is emphasised by Burchardt et al (2002b).

Walker also highlights disconnection, or alienation from social relationships and society as a whole. It is in this sense that Touraine describes exclusion as being not about movement 'up' or 'down' a vertical line, which is how many depict poverty, but about a quite different geographical shape: it is about being 'in' or 'out' of a circle, a circle that represents society (cited Burchardt et al, 2002a). This *feeling* of belonging, connection, or 'social solidarity' (Barry, 2002), is highlighted by authors including Burden and Hamm (2000), Putnam (1995), Room (1995) and in the following definition, which simply states:

> Exclusion springs from the desire to belong while not being able to.
> McCluskey, cited Raje, 2003.

As mentioned above in relation to Blair's definition, the identification of these non-material causes and consequences of deprivation is central to the concept of social exclusion.

Finally, analysis of the definitions reveals a focus on activities, participation and relativity. Whilst the concept of social exclusion incorporates consideration of exclusion from ownership of material goods, the principal focus is upon exclusion from activity

participation and the consequences of activity-based exclusion (Barry, 2002; Church et al, 2000; Sanderson, 2000). The activities from which the individual is seen to be excluded are those that are common to the society in which the individual belongs, defined both spatially and in time. Thus, in the concept of social exclusion, the construct of need is relative to both the society and the historical time frame in which one lives (on society see, for example, Bhalla and Lapeyre, 1997; Chanan, 2000; Gaffron et al, 2001; on time, see Burchardt et al, 2002b; Mulgan, 1998).

This focus, on activities, participation and relativity, is demonstrated in the following definitions:

> An individual is socially excluded if he or she does not participate in key activities of the society in which he or she lives.
> Burchardt et al, 2002b.

> Social exclusion is a process, which causes individuals or groups, who are geographically resident in a society, not to participate in the normal activities of citizens in that society.
> Hine and Mitchell, 2001.

2.5 Defining social exclusion

The above discussion has highlighted the many definitions of social exclusion in use today. It has discussed the key features of the concept, which are also presented in Table 2.1.

Analysis of existing definitions revealed the lack of a single clear, comprehensive definition of social exclusion, which could confidently be used to inform this study. In light of this, the following definition has been developed by the author to underlie this research:

> Social exclusion is a multi-dimensional concept, the process of the interplay of a number of factors, unique to the individual or group, the consequence of which is the denial of access to the opportunity to participate in the economic, political and social life of the community. This process results not only in a diminished material and non-material quality of life, but also in tempered life chances, choices and a reduced level of citizenship.

The following factors, some overlooked in the literature, are embraced in this single, comprehensive definition:

- Multi-dimensionality and an holistic understanding;
- Social exclusion as a process, with the rejection of an outcome- or end-state-based approach;
- The variability of the experience such that it may not be appropriate to talk of 'social exclusion', but 'social exclusions';
- That exclusion can be experienced by both the individual and group – that it can be both clustered and scattered;
- The notion of agency;
- A focus on participation, rather than ownership;
- A greater focus on exclusion from activities;
- Acknowledgement of the relativity of the concept, in space and time;
- Recognition of both material and non-material consequences;
- The dynamic nature of exclusion, with present and future consequences; and
- Recognition that exclusion means reduced citizenship.

2.6 Social exclusion: discussion of dimensions

The above sections have considered the concept of social exclusion with reference to the ways in which it has been defined in the literature. This section discusses the second way in which we can seek to understand the concept: in terms of its dimensions.

Whilst it may not be possible to quantitatively measure social exclusion, the development of an understanding of the dimensions of exclusion can create a framework of understanding of the concept. A number of authors have used the concept of dimensions of exclusion, enabling them to operationalise the concept, in terms both of policy prescriptions and identification of the individuals or groups who are likely to experience exclusion. A selection of the different dimensions identified in the literature is given in Table 2.2.

Author(s)	*Dimensions*	*Components/indicators*
Burchardt et al,	Consumption	goods, services
1999	Political	voting, membership of parties/groups
	Production	paid employment or formal training
	Savings[4]	savings, pensions, home ownership
	Social	interpersonal relationships
Burden and	Cultural	outside 'normal' cultures
Hamm, 2000	Economic	paid work, consumption
	Political	lack of political and social rights
	Social	personal factors: disability, gender, race
Commins, cited	Civic	democratic and legal system
Philip and	Economic	paid work
Shucksmith, 2000	Interpersonal	family and community relations/integration
	Social	wider concepts of social welfare
Gordon et al,	Labour market	paid work
2000	Resources	financial resources
	Services	access to utilities, public and private services
	Social relations	family, friends, participation in social activities
Percy-Smith,	Economic	paid work, income
2000a	Group	characteristics-based
	Individual	education, health, confidence
	Neighbourhood	physical environment, services, community
	Political	disempowerment, rights, turnout, disorder
	Social	family structures, crime, disaffection
	Spatial	physical concentration of vulnerable groups

Table 2.2. Dimensions of exclusion identified in the literature

As Table 2.2 illustrates, the number of dimensions identified in the literature varies. The majority of authors also discuss indicators or components within each dimension and these have been included in the table, to the right of each dimension.

Table 2.2 highlights the variability in choice of dimensions, thus in conceptions of exclusion; and in the *meanings* of dimensions, when considered alongside the

indicators. All include economic and social dimensions, although varyingly named. In some cases, the economic and social dimensions are merely sub-divided, to indicate additional dimensions. In others, additional dimensions, unrelated to economic or social factors, are included. Table 2.2 shows that the economic dimension commonly refers to income-based exclusion, including paid work and/or consumption. Burchardt et al (1999) and Gordon et al (2000) have subdivided the economic dimensions into, respectively, consumption/production/savings and labour market/resources/services. All bar Gordon et al have a political dimension, although Commins (in Philip and Shucksmith, 2000) terms this the civic dimension and includes legal exclusion, which is not specified within the other dimensions.

For Burchardt et al and Gordon et al, 'social' refers solely to interpersonal relations, rather than to attributes of wider society. Commins, however, has two dimensions within the social sphere: interpersonal, relating to relationships and social, which refers to aspects in wider society. Percy-Smith (2000a) similarly separates social relations from characteristics of the social environment; and identifies two dimensions to acknowledge the exclusionary aspects of the physical environment, which she terms 'neighbourhood' and 'spatial'. She is alone in identifying environmental and spatial aspects. Percy-Smith and Burden and Hamm (2000) identify personal characteristics, at the group and individual levels, as exclusionary dimensions. Burden and Hamm are alone in their consideration of a cultural dimension.

The identification of multiple dimensions by each author restates the key difference between concepts of poverty and social exclusion identified during discussions of definitions of exclusion in Section 2.4, above. However, as with the definitions of exclusion, whilst there is some common ground in the literature, the dimensions and components that different authors use to conceptualise exclusion vary greatly, both in breadth and depth. Thus, Burchardt et al and Gordon et al present largely economic dimensions, whilst Commins sees social exclusion more in terms of social and interpersonal aspects. Burden and Hamm cast the net more widely than these authors to include individual attributes alongside economic, political and social dimensions. Percy-Smith identifies a more comprehensive set of dimensions, incorporating many dimensions that are not considered by others and including, notably, dimensions that cannot easily be quantified. However, each of the sets of dimensions given above fail to fully acknowledge the range of factors that are discussed in the literature as being

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[4] Interestingly, the savings dimension is not included in the later definition provided by Burchardt et al (2002b), although this omission is not explained.

contributors to social exclusion, including the roles of accessibility, mobility, space and time.

Thus, analysis of existing dimensions reveals a lack of a clear, comprehensive set of dimensions of social exclusion, which could confidently be used to inform this study. As such, this study has developed nine dimensions of exclusion, which are in some ways similar to those identified above, but incorporate additional aspects of exclusion that are important, not only in developing a full and holistic understanding of the concept, but also in operationalising the concept for the purposes of this study.

2.7 Dimensions of exclusion

The author has identified nine dimensions of exclusion, which underlie this research: economic; living space; mobility; personal; personal political; organised political; social networks; societal; and temporal. These dimensions have been developed for two reasons. Firstly, because they provide a fuller, more comprehensive understanding of the concept of social exclusion; and secondly, to ensure a solid theoretical basis for the purposes of this study into mobility-related exclusion. Within each dimension, there are 'potential exclusionary factors'. It is the contention of the author that an individual or group is likely to feel excluded where they experience one or more of these factors to be exclusionary. This is presented in Table 2.3. The potential exclusionary factors are indicative, not exhaustive and the reader should note that many dimensions can be experienced at the individual, group and area levels. The dimensions overlap in some instances, reflecting the nature of the concept. For example, unemployment is identified in the economic, personal and social dimensions. However, unemployment has a different impact in each dimension.

Dimension	*Discussion*	*Potential exclusionary factors*
Economic	Factors affecting and arising from access to money.	Production and consumption factors: income poverty; labour market factors, inc. casualisation, low pay, unemployment; lack of access to credit facilities.
Living space	Factors in the local environment, which may disadvantage the individual or group.	Physical factors: anti-social behaviour; crime; ecological environment; housing; services and facilities. Social factors: community togetherness.
Mobility	Factors affecting and arising from too little or too much mobility.	Financial, personal, spatial and temporal constraints upon mobility: inadequate access to private and public transport; poor physical accessibility of opportunities, services, social networks and other goods; negative experience of externalities from transport.
Personal	Individual characteristics influencing position in society and attitudes towards the self.	Age; class; culture; disability; education; employment; ethnicity; gender; health; language; religion; self-esteem; sexuality; skills.
Personal political	The ability to make decisions over one's own life.	Self-determination: powerlessness; restricted choices.
Organised political	The ability to influence decision making at an organised level.	Rights: citizenship, legal and political rights/freedoms. Participation: low participation in elections, groups/organisations.
Social networks	Factors arising from access to and relations with others.	Isolation; loneliness; low participation in social activities; relationships with friends, family, community.
Societal	Social factors at a societal level.	Issues: anti-social behaviour; crime; education; employment; healthcare; housing and homelessness; inequality; poverty. Social solidarity: common beliefs, experiences, goals.
Temporal	Factors causing and arising from time pressures.	Insufficient time to access and/or participate in cultural, economic, political, social activities.

Table 2.3. Dimensions of social exclusion

The factors are likely to interact and influence each other – thus, it can be suggested that the experience of exclusion in one dimension can lead to a greater likelihood of the

experience of exclusion in another. For example, Oppenheim (1998) suggests that 'the impoverished cannot be active, participating citizens', linking the economic, personal political, organised political and social dimensions. In addition, we can see that the incidence of unemployment increases in parallel with the number of the following factors, from a number of dimensions, which the individual experiences: lone parenthood; having low qualifications; disability; being over 50; being from a minority ethnic group; and living in a neighbourhood where there is high unemployment (SEU, 2004). This said, it should be noted that these dimensions and factors are not intended to be additive, or to be used to measure exclusion. Thus, exclusion is not necessarily seen to increase as more exclusionary factors are experienced. Rather, it is the ways in which the dimensions and factors interact that influences the experience of social exclusion. As Percy-Smith (2000a) demonstrates: 'to assume that, because a young person from an ethnic minority group is unemployed, she or he is also socially excluded is to grossly oversimplify. He or she may have had a good education and be supported by strong social and kinship support networks which overcome the disadvantage of [ethnicity and] being unemployed'.

This chapter now turns to discuss the dimensions of exclusion as conceptualised in this research.

2.7.1 Economic

Section 2.3 has discussed the key differences between poverty and social exclusion and has emphasised that social exclusion is not reducible to economic, or material, causes or consequences alone. However, whilst recognising that being poor does not necessarily mean that one is excluded and, conversely, that one can be excluded without being poor, the concept of social exclusion retains an economic element. As such, the economic dimension recognises the contribution of income poverty to the experience of social exclusion, given its role in reducing access to participation in the activities and consumption patterns of the society in which one lives. This said, the dimension is about more than income poverty, including the processes that both affect and arise from access to money. Thus, in this conceptualisation, the economic dimension incorporates many of the indicators identified by the authors cited above, including those of income, production and consumption.

The economic dimension includes consideration of the social and power relations that lead to income poverty. Labour market factors are important in this dimension and

include not only unemployment, but also aspects regarding the structure of the labour market, including: pay levels; job security (Paugham's 'precarious employment' (cited Bhalla and Lapeyre, 1997)); increasing casualisation; changes in employment sectors and corresponding changing skills requirements; reduced trade union rights; and globalisation (for employment-related aspects of social exclusion, see for example Cahill, 1994; Campbell, 2000; McKnight, 2002; Robinson, 1998; SEU, 2004).

Other key factors include low levels of access to bank accounts and to credit, not only in terms of mortgages, loans, or credit cards, but also to basic credit, such as telephone accounts, accounts for utilities, or discount schemes which are bank account or credit dependent, leading to exclusion from basic services (Affleck and Mellor (2006) term this 'financial exclusion'; see also Sanderson, 2000; Toporowski, 1986; Yunnus, 1998). Conversely, indebtedness is also an increasing problem in UK society. Finally, income poverty contributes to social exclusion by reducing the accessibility of both activity participation and consumption in relation to four key areas: opportunities, services, social networks and other goods. Dasgupta terms this 'economic disenfranchisement' (cited Bhalla and Lapeyre, 1997).

2.7.2 Living space

The living space dimension considers factors in the local environment, which may disadvantage the individual or group. The government terms this 'liveability' (DWP, 2003).

Hutchinson (2000) discusses 'environmental determinism' – the ways in which the look and feel of an area can influence both the quality of life and the outlook of its residents – when he suggests that 'the daily sight of physical decay reinforces residents' own experiences of decline and abandonment'. This theme is echoed throughout the literature, as authors consider the impact of both the physical and social structure of an area upon the life chances of its inhabitants.

Whilst living in a certain area does not necessarily cause exclusion, the evidence suggests that the two are certainly interrelated. Richardson and Mumford (2002) outline the key debates regarding the influence of area upon exclusion. The existence of the government's Neighbourhood Renewal Unit (NRU)[5], charged with implementing

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[5] The NRU has a web site, available at www.neighbourhood.gov.uk.

the neighbourhood renewal strategy (SEU, 2001a), highlights the concentration of poor/vulnerable groups in certain areas, which tend to share similar physical characteristics. These are identified by the NRU and in the literature as: low levels of service provision, including healthcare, jobs, leisure, schools, transport and utilities; high levels of crime; poor housing; and over-stretched public services (DWP, 2003; Hawtin and Kettle, 2000; PAT 18, 2000; Sanderson, 2000). Whilst the NRU focuses upon urban areas, living space exclusion occurs in both urban and rural areas which, beyond first glance, can be seen to share many similar features. Low levels of service provision in turn link to low levels of activity participation.

People within these areas tend to share similar characteristics, which the NRU identifies as: income poor; low levels of skills, education and training; poor health; and high levels of worklessness. It is suggested that the spatial concentration of exclusion links to factors in the local environment in two principal ways: firstly, the local environment have a causal or reinforcing role, due to the intrinsic characteristics of the local area; and secondly, the characteristics of the population can reinforce the degradation of the local environment (Chanan, 2000; Lupton and Power, 2002). Exclusion is further reinforced by externally applied stigma, including postcode discrimination (Hutchinson, 2000). And Giddens (2000) highlights that people living in these areas are not only separated from wider society in terms of access to services, or characteristics, but they are often physically removed from wider society by virtue of residence in these areas.

The local ecological environment is little mentioned in the social exclusion literature, but can affect quality of life and life chances, in a number of ways, including pollution, noise, availability of safe and clean green space for exercise and relaxation, road traffic, each of which can affect physical and mental health. The local environment can also affect accessibility as it links to willingness and ability to move between spaces, the former in terms of safety and perception of risk, the latter linking to the physical condition of the environment. Finally, the living space dimension also considers aspects of the non-physical, social environment, including the vibrancy of the community, not only in terms of the formation of local social or political groups, but also 'softer' factors, including association, well-being, responsibility and unity (Chanan, 2000; Putnam, 1995; Richardson and Mumford, 2002).

2.7.3 Mobility[6]

This dimension does not refer to the transport-related poverty indicators used in many deprivation indices, but to financial, personal, spatial and temporal constraints upon the level of mobility necessary to enable participation in society. It considers factors affecting and arising from too little mobility, both motorised and non-motorised, including the adequacy of access to private and public transport and the extent to which the physical environment is conducive to non-motorised travel. In addition, it incorporates consideration of the negative effects of mobility, for the individual and community.

Sections 2.4 and 2.5 illustrate the centrality of access to participation in the concept of social exclusion. The opportunities, services, social networks and other goods in which participation is necessary are located in specific locations, at specific times. The individual's ability to traverse space and time, enabling them to be in the right place at the right time to allow participation is, to a great extent, dependent upon the ability to physically move to the appropriate location, at the appropriate time. Thus, mobility is a key determinant of access in modern society, affecting and often determining participation. The need for mobility is referenced in the social exclusion literature with regard to exclusion and: employment (Campbell, 2000); health (Moran and Simpkin, 2000); the living environment (Burchardt et al, 1999; Lupton and Power, 2002); physical and social isolation (Giddens, 2000; Hutchinson, 2000); political participation (Percy-Smith, 2002b); poverty (Chapman and Shucksmith, 1996); services (Sanderson, 2000); and social solidarity (Barry, 2002). However, it is rarely discussed alone as an exclusionary factor in and of itself.

2.7.4 Personal

Personal characteristics, of the individual or group, can be linked to exclusion in terms of both societal attitudes/discrimination and the individual or group's ability to participate in necessary activities (Burden and Hamm, 2000).

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[6] The mobility dimension of exclusion is central to this research and is discussed in full in Chapter 3. As such, the mobility dimension will only be outlined here, in relation to the social exclusion literature. The accessibility and transport-related social exclusion literatures are considered in Chapter 3.

Personal characteristics, including age, class, culture, disability, ethnicity, gender, health, language (inc. dialect or accent), religion, self-esteem and sexuality, can influence the position of the individual vis-à-vis society – that is, with regard to both the attitudes of members of the dominant (in terms of critical mass, or power) culture, which influence the extent to which the individual is both allowed and able to participate. In this context, both ability to participate and denial of access to participation are linked to aspects of the individual's character. Education, employment and skills are included within the personal dimension.

2.7.5 Personal political

This dimension is under-discussed in the literature and in policy, yet refers to a central aspect of social exclusion: self-determination, or the ability to make decisions over one's own life. Whilst a number of authors discuss power in relation to organised or group politics, powerlessness and restricted choices on a personal level do not feature in definitions, dimensions, discussions or indicators. Personal political exclusion can be experienced, for example, in relation to healthcare professionals, social workers, the police or legal profession, or even other members of the community in which one lives. It can be suggested that certain central and local government policies, particularly those related to increasing employment amongst vulnerable groups, for example, lone parents, or people with disabilities, are working against self-determination, forcing individuals to take up paid work, or face reduced state support. Important aspects of this dimension include personal characteristics, in terms of both prejudice and skills; and social networks, which can support and inform the individual.

2.7.6 Organised political

Distinguished from the personal political dimension, this refers to the ability to influence decision making and the way one lives, at an organised level. This operates on a number of levels, including international, national, regional, local and micro-local, for example the local school, or perhaps the residents' block.

The organised political dimension can be conceptualised in terms of rights and participation. Political rights incorporate citizenship rights (Goodin; 1996), civil and legal rights (Giddens; 1998) and include: rule of law; freedom of expression and association; right to vote; and right to stand for election (Bhalla and Lapeyre, 1997).

Percy-Smith (2002b) defines these rights in three ways: firstly, the right to have a voice; secondly, the right to be heard; and thirdly, the right to have ones opinions acted upon. Political participation is conceptualised in ways including: voter registration; turnout; and membership of political parties, pressure groups, trade unions and community groups (Putnam, 1995; Richardson and Mumford, 2002). Lack of participation can be linked to lack of participation rights, but also to self-exclusion, perhaps through choice, but also through disempowerment, on a number of levels, including access to education, information, social networks and belief in the democratic process. Barry (2002) considers the reality of 'choice' and states: '... genuine opportunity to engage in politics on equal terms has certain material preconditions. Such preconditions are not met, for example, in the case of an unemployed single mother on an out-of-town housing estate who cannot afford costs of political activity such as babysitting, transport and meals out'. Exclusion in the organised political dimension has been linked with other forms of exclusion, including anti-social behaviours.

2.7.7 Social networks

Social networks are our inter-personal relations with others. They can be both formal, for example, relations with officials, social workers, or healthcare professionals, or informal, which refer to relationships with family, friends and community members. The social networks dimension, therefore, refers to factors that arise from access to and relations with others. For Oppenheim (1998), positive social networks are central to the concept of social exclusion and Burchardt et al (2002a) discuss the need for social support, someone who will 'listen, comfort, help in crisis, relax with, really appreciate you'. Breakdown in these networks can lead to loneliness and isolation – social exclusion in its most literal sense. Social networks have also been linked with other dimensions of exclusion, influencing employment opportunities (Hanson, 2000) and participation in organised politics (Barry, 2002).

2.7.8 Societal

The societal dimension incorporates many of the factors that were central to the concept of social exclusion, as originally conceived, in terms of both the idea of society as a cohesive whole and the societal issues that challenge this cohesion. Whilst the social networks dimension considers inter-personal relations between individuals, the societal dimension emphasises social relations, both within society and between

society and the state. It is in this sense that Barry (2002) discusses the concept of social solidarity which, he suggests, must underlie all attempts to understand and tackle social exclusion.

Issues at the societal level are those that threaten to undermine social solidarity and include many aspects of what has come to be known as social policy. Initially, social policy was concerned with alleviating Beveridge's 'five evils', at a societal level. These 'evils' – disease, ignorance, idleness, squalor and want – led to social policy in healthcare, education, employment, housing/homelessness and poverty, respectively. The societal dimension additionally embraces wider social issues such as: crime; the breakdown of traditional family structures; social care; and social disorder, or anti-social behaviour. Furthermore, inequality is included for it is suggested that society cannot be cohesive and individuals cannot share a feeling of citizenship where inequality is prevalent (Barry, 2002; Giddens, 1998; Oppenheim, 1998) .

2.7.9 Temporal

The final dimension identified in this research is the temporal dimension. Researchers, particularly in the field of accessibility research (most notably Hagerstrand, 1970) have become increasingly aware of the impacts of time pressures upon people's ability to participate in economic, political and social activities, yet time-based exclusion is little discussed in the social exclusion literature. This dimension recognises the temporal barriers to access to participation in each of the dimensions identified above, including restricted participation in education, employment, leisure, the political process and social networks, due to factors including alternative time commitments and the location of the activity in space and time.

This chapter has thus far discussed the concept of social exclusion in two of three ways, firstly in the context of definitions of exclusion and secondly, in the context of its dimensions. The chapter turns now to discuss the concept in the third and final way, considering attempts to measure social exclusion.

2.8 Social exclusion: discussion of measurement

A number of attempts have been made to measure exclusion, both in terms of its individual components and holistically, with the purpose of answering two questions: who, or where, is socially excluded?; and, which policies to tackle social exclusion are making a difference? This section presents the key components of a selection of measures, which can enhance understanding of the concept of social exclusion. As with other sections, this section will begin with a discussion of government social exclusion indicators, before turning to consider indicators in the wider literature. The section concludes by sounding a cautionary note regarding the quantification of social exclusion.

The government presents an assessment of its progress towards the eradication of social exclusion annually, in the Opportunity for All (OFA) reports (DSS, 1999, 2000; DWP, 2001, 2002, 2003, 2004, 2005). These reports closely reflect aspects of the Indices of Multiple Deprivation (IMD) (ODPM, 2004), further highlighting the government's perception of exclusion as deprivation, as discussed in Section 2.4, above[7]. The indicators can be grouped into five broad categories, the first four measuring exclusion at the individual level, the fifth assessing exclusion at community level:

- Education-related: number of 16-18 year olds in learning; results in Key Stages 1, 2, GCSE; school attendance.
- Health-related: deaths by suicide; infant mortality; life expectancy at birth; living independently; registrations on child protection register; road accident casualties; serious injury; smoking rates; teenage pregnancy; use of class A drugs.
- Income-related: fuel poverty; low income; pension receipt.
- Work-related: children in workless households; employment rates for different areas and socio-demographic groups.
- Community-related: crime and fear of crime; housing and homelessness.

In the OFA reports, the government does not attempt to develop a composite, or holistic, measure of exclusion. A similar single-manifestation centred approach is taken by Howarth and Kenway (1998) and Howarth et al (1999; the same study has been repeated and reported in Rahman et al, 2000; Rahman et al, 2001), who identify

a series of single-outcome variables to indicate the occurrence of the experience of social exclusion in Britain. Howarth et al include 50 indicators, which are grouped into 14 categories, which focus upon income and employment measures but also include: measures of health and well being; education; social stability; access to services; social cohesion; crime; and housing. Burchardt et al (1999), likewise, attempt to measure the extent of social exclusion in society, using a number of indicators related to their dimensions of exclusion (presented in Section 2.6), including: employment; home ownership; income; political participation; savings; and social isolation.

By contrast, some authors attempt to develop a composite measure. Composite approaches are taken when measuring deprivation, using deprivation indices. This involves the identification of factors that are seen to represent deprivation, followed by the assignment of weights to these factors, in terms of perceived importance. Thus, in the IMD, income and employment factors are weighted more strongly than living environment factors, because the former are perceived to lead to greater deprivation than the latter. The factors are measured, weighted and added. Areas (as opposed to individuals) then receive a score, which suggests how deprived they are. Areas can be compared with other areas and scores can be monitored over time, to assess the extent to which areas are becoming more or less deprived. Foley presents a comprehensive discussion of the various indices of deprivation in use in the UK today (Foley, 1999; see also PAT 18, nd).

Some authors have applied this approach to social exclusion. Indeed, Hobcraft (2002) questions the viability of the concept of social exclusion, if it cannot be measured:

> 'Theory' that does not have empirical underpinnings and that cannot be subjected to reasonably rigorous testing (including exposure to alternatives) is speculation and does not deserve the label of theory.

In his research into adult experiences of exclusion, Hobcraft identifies the following factors, to be used in a composite way to indicate social exclusion: young parenthood; extramarital births; three or more co-residential partnerships; a high malaise score; living in social housing; receipt of non-universal benefits; adult homelessness; lack of qualifications; and low income and employment, the latter for men only. It is important to note that this study was intended as an initial exploration of the viability of composite

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[7] It is recognised that these indicators may relate to achievable policy goals, rather than to ignorance on the part of the government.

measures and that Hobcraft is modest about his achievements. And CERC (cited Bhalla and Lapeyre, 1997) have developed a composite method using indicators of employment, poverty and social vulnerability to enable categorisation of vulnerability to exclusion, at the individual level.

Awareness of the factors of social exclusion that are measured, both in relation to decision makers and in the literature, help to further enhance understanding of the concept of social exclusion. However, the reader may recall that, in Section 2.3, it was suggested that a key aspect of the definition of social exclusion and a key distinction between exclusion and poverty is the notion that it cannot be quantified. Whilst recognising that many individual potential exclusionary factors can, to an extent, be measured, the author is sceptical about the use of such measures to indicate the prevalence of exclusion and rejects the notion that social exclusion can be measured at a composite level.

The reasons for this are many and include the following. Indices are necessarily outcome focused, providing a snapshot of the extent of exclusion. However, social exclusion is conceptualised as a process. Social exclusion is a complex phenomenon and the experience of exclusion is highly variable, between individuals and places and in time. As suggested earlier in this chapter, social exclusion is not an additive experience. The experience of three potentially exclusionary factors does not mean that one is more excluded than someone experiencing two. Indeed, two people experiencing similar 'scores' of exclusion can feel very differently, because of the interplay of different aspects in their lives.

This raises the question of what should be measured and included in indices. As Foley (1999) states, 'latching onto one or a few items as basic necessities risks overlooking others'. This is echoed by DeWilde (2003), who questions the judgements and motives behind selection of factors, questions which can similarly be asked of the weighting applied. In addition, many aspects of exclusion, for example, the ecological environment, fear of crime and self-esteem, cannot (easily) be quantified and as such, could not be included in indices (Judge, 1995).

The combination of factors into a composite measure suggests that exclusionary factors are related. However, in assessing the development of an holistic social exclusion indicator, Foley (1999) suggests: there are 'a number of distinct and separate dimensions of social exclusion... The significant finding is that none of these

characteristics have anything to do with one another'. This is echoed by Heady and Room (2002) in their study examining the links between different factors of exclusion. Burchardt et al (1999) reach a similar conclusion:

> ... there is no distinct group of socially excluded individuals... treating different dimensions of exclusion separately is preferable to thinking about social exclusion in terms of one homogeneous group.

Thus, whilst we can learn about perceptions of social exclusion from analysis of its measurement, an awareness of the limitations of measurement is critical to an understanding of the concept. As Foley (1999) states:

> The inevitable conclusion is that the future development of measures of social exclusion must rely on separation rather than consolidation. The search for a single measure of multiple deprivation is in vain, since deprivation and social exclusion are not single, identifiable, homogeneous constructs.

The inability to measure social exclusion of course leads to methodological difficulties in assessing the extent of social exclusion and any change therein. This finding is reflected in the methodologies chosen for this study.

2.9 Social exclusion: conflict

Whilst the concept of social exclusion has been embraced by government and many social policy analysts, there are a number of authors who question the use of the term. These concerns are not unrelated, but should be seen as separate, to critiques regarding the implementation of the concept in government policy. This chapter now turns to acknowledge these concerns, focusing upon three of the areas of contention:

- The concept of social exclusion detracts from the most important issues.
- Social exclusion does not represent a new focus.
- The redefinition of disadvantage as social exclusion actively reinforces exclusion in society.

The first critique centres around the ability of the concept to act as a smoke screen, disguising wider issues. There is concern that talking about social exclusion downplays the significance of poverty. For such authors, the concept of social

exclusion serves to distract from this single most important influence upon life chances (Sen, in Barnes, 2002). In this sense, social exclusion is seen as part of Inglehart's post-materialist politics of affluence (Guha and Martinez-Alier, 1997), in which society turns to satisfy post-materialist desires. However, the continued existence of poverty challenges the validity of this approach. Bhalla and Lapeyre (1997) write:

> In poor societies, economic exclusion is at the heart of the problem of exclusion. Any claim in these societies to income has a greater relative weight than a claim to political and civil rights... When people are excluded from the main sources of income, their first priority is survival and a basic livelihood.

Barry (2002) suggests that the concept of social exclusion distracts attention from inequality, which he suggests is fundamental to disadvantage and social solidarity. Goodin (1996) suggests that the concept removes attention from wider social problems:

> ... as long as they are on the 'right side' of the line there is nothing in this language, or in the logic standing behind it, that would help us address our larger concerns about social marginality.

It is in this sense that Chanan (2000) suggests that the term 'implies that there is a mainstream form of society and that the only thing wrong with it is that some people aren't in it'.

Whilst this could be an unintended consequence of policy made by well-meaning governments, it has also been suggested that the concept of social exclusion is attractive because it removes government responsibility for tackling inequality and income-based disadvantage (Burden, 2000). Indeed, the acceptance of the term at the European level by liberal governments during the 1990s may have been precisely because it removed the need to talk about poverty. Levitas (2001) suggests something more sinister: that the concept of social exclusion, far from leading to transformative social policy, is a way of maintaining the status quo and, more specifically, the capitalist society (see also Barry, 1998; Miller, 2003). It is in this sense that Lister (2001) suggests that the concept allows ignorance of wider, structural causes of disadvantage in society.

The second critique considered in this chapter centres around the work of Ruth Levitas (1998, 2001, 2002). Levitas identifies three discourses of social exclusion in both the

literature and in government policy: the redistributionist discourse (RED); the social integrationist discourse (SID); and the moral underclass discourse (MUD). She describes the differences between the discourses thus: 'In RED they have no money, in SID they have no work and in MUD they have no morals' (1998). Levitas uses these concepts to challenge the suggestion that social exclusion represents a new concept of disadvantage in society, suggesting that it is merely a fashionable way of talking about poverty, whilst distracting from the negative implications of poverty.

The final critique considered in this chapter is that which questions the nature of the non-exclusive society. It is suggested that, by its very nature, social exclusion reinforces difference. Thus, Goodin (1996) suggests that:

> the problem of exclusion is that there *is* an inclusive community, be its catchment broad or narrow. And if that is the problem, then the solution is not to make our communities more inclusive but rather to change their nature – making them at one and the same time both less exclusive and less inclusive.

In other words, the concept of exclusion involves the notion of boundaries, between out and in. Whilst decreasing exclusion sounds positive, it reinforces its own existence. As Levitas (cited Burden and Hamm, 2000) suggests, 'it is important to recognise that the inclusion of some is predicated on the exclusion of others'.

It is in this sense that Chanan (2000) questions whether or not the vision of society implied within the discourse of social exclusion is desirable. Burden and Hamm (2000) and Lister (2001) note that the vision is very much one of conformity and sameness, based upon compulsion and punishment. Levitas (2001) suggests that visions of an inclusive society must imply major structural changes, rather than the nudging across the boundary to inclusion that the believes the social exclusion discourse implies. And Barry (2002) and Judge (1995) suggest that exclusivity can be desired and that the conformity, which they feel is inherent in this discourse, should be rejected. In this sense, the authors question the concept of exclusion as necessarily bad and the suggestion that inclusion is necessarily good.

Whilst it is important to acknowledge the above objections, they do not detract from the importance of the concept in describing disadvantage in modern society. In drawing attention to the aspects of disadvantage that go beyond living standards to consider quality of life, social exclusion as a concept allows fuller recognition of the causes and consequences of disadvantage than has previously been possible.

2.10 Summary

This chapter has detailed the definition and understanding of the concept of social exclusion that has been developed for and used within this research. In so doing, the chapter has presented the contextual and theoretical grounding for the research.

Following discussion of the concept of poverty, a clear distinction between the notions of poverty and social exclusion was drawn. The concept of social exclusion was discussed in three ways. First, the chapter presented an examination of existing definitions of exclusion. Critical analysis of these definitions revealed none that could confidently be used to inform this research. Thus, a definition of exclusion for use in this research was given and discussed with reference to the existing literature. Secondly, the idea of social exclusion was further considered in terms of its dimensions. Following discussion of the dimensions identified within the literature, the idea of nine dimensions of social exclusion, developed by the author following critical analysis of the literature, was presented and discussed. Third, the chapter considered attempts to measure social exclusion. It was suggested that social exclusion is an unquantifiable concept and a critique of attempts at quantification followed. For completeness, the chapter concluded with an acknowledgement of three main areas of opposition to the concept of social exclusion, before concluding in favour of the concept as a valuable theory, which is successful in furthering the understanding of disadvantage in UK society.

The conceptualisation of social exclusion presented above informs the direction of the research presented in this thesis. The dimensions structure the debate in the subsequent literature review chapters, informing the hypothesis and therefore the design, conduct and analysis of the empirical research.

This chapter has identified a mobility dimension to social exclusion and it is to a focus upon this dimensions that this thesis now turns.

Chapter 3. Mobility-related exclusion.

3.1 Introduction

Chapter 2 introduced a mobility dimension to social exclusion. This chapter explores this concept more fully, to illustrate the role that mobility can play in both causing and reinforcing social exclusion[1].

In 1998, the Social Exclusion Unit (SEU) launched a programme of research and consultation to inform their national strategy for neighbourhood renewal, which aimed to uncover the underlying causes of and solutions for social exclusion in Britain's most deprived areas (SEU, 1998, 2000a). Transport and accessibility were not a focus of the research. However, physical isolation emerged as a key factor contributing to social exclusion in deprived neighbourhoods, influencing access to activities, facilities and services. Policy Action Team (PAT) 1 considered access to jobs; PATs 2, 11 and 12, access to education and skills; PAT 10, arts and sport; and PAT 13, access to shops and basic services (SEU, 2000b). In transport policy, the 1998 White Paper (DETR, 1998) recognised the social policy impacts of transport policy. This led to a comprehensive government study of inadequate public transport and the experience of social exclusion (DETR, 2000). Responding to these findings and to a growing body of research by academic and community organisations, the government launched a two-year consultation into the links between transport and social exclusion (SEU, 2001a). The subsequent report (SEU, 2003) combined qualitative and quantitative research to confirm the role of transport in both causing and reinforcing social exclusion in today's mobility-dependent society[2].

But how are mobility and social exclusion linked? Why does mobility-related exclusion happen? Who is affected – and what should be done to alleviate mobility-related exclusion? This chapter presents a review of the literature, which seeks to address these questions. The chapter develops through seven sections. Firstly, a conceptual

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[1] This discussion refers primarily to UK society and much of the literature reviewed takes a UK perspective, reflecting the more advanced position of UK policy and research in this field, vis-à-vis that of other nations (illustrated in Lucas, 2004a).

[2] Interestingly, however, despite this body of evidence, transport and accessibility are not discussed in the Opportunity for All reports (DSS, 1999, 2000; DWP, 2001, 2002, 2003), or in the SEU's review of progress in understanding and tackling social exclusion (SEU, 2004).

framework and the definition of mobility-related exclusion developed for use in this research are presented. Next, the concept of accessibility, used in this research, is outlined. The chapter then turns to consider the evidence for mobility-related exclusion, in relation to the nine dimensions of social exclusion, before assessing its causes. Next, policies to tackle mobility-related exclusion are considered. The chapter concludes by acknowledging conflicts within the literature regarding the concept of mobility-related exclusion.

Firstly, a note on terminology. Review of the literature highlights common use of the term 'transport-related exclusion'. This thesis refers to *mobility*-related exclusion. 'Mobility' is used in place of 'transport' because the former is taken to refer to *movement*, by both motorised and non-motorised modes of transport. The term 'transport' is perceived to have a more functional, *systems-related* definition. Thus, mobility-related exclusion reflects restricted movement between activity spaces, within which there is consideration of restricted access to/use of modes or systems.

3.2 Developing a conceptual framework

The way in which mobility-related exclusion is understood influences the nature of the initiatives that are developed to tackle the problem. As suggested in Chapter 2 with regard to our understanding of disadvantage in society, inadequate understanding of the causes and effects of mobility-related exclusion could result in initiatives that are inappropriately targeted, or which could worsen the situation. This section explores the dominant themes within the literature before presenting a two-tiered definition of the concept.

Whilst no definitions of mobility-related exclusion have been identified in the literature reviewed, two key themes, or discourses, emerge, which shape the field of study regarding mobility and social exclusion. The themes have in common their recognition of mobility dependence within society. However, their assessment of the experience of mobility-related exclusion, its causes, consequences and thus the policy prescriptions to alleviate it, are quite different[3].

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[3] There is on occasion overlap within studies between these two discourses and as such, the author is wary of imposing a false dichotomy. Indeed, *Making the Connections* (SEU, 2003) recognises the issues of both too little and too much mobility. However, there are sufficiently significant differences within the bulk of the literature to justify the suggestion of such a division.

Within the first discourse, which is dominant within the transport literature, authors discuss the negative impacts of too little mobility. There is a focus upon the exclusion (of both people and areas) from transport systems, focusing upon the inadequacies of these systems in meeting people's accessibility needs. Such literature highlights uneven mobility patterns within society, linking this with uneven patterns of access to certain modes, focusing primarily upon the inadequacies of public transport, which act to exclude people from their use. From this, the literature considers the types of activities from which people are excluded as a result of their exclusion from transport systems, linking the resultant lack of participation with social exclusion. This discourse is a logical progression of activity-based theories of travel behaviour, which situate travel within its activity context, rather than as an activity in itself (Axhausen and Garling, 1992; Jones et al, 1983; McNally, 2001; for a critical appraisal of this approach, see Doherty, 2003).

The first discourse thus links the nature of transport systems with reduced access to mobility; low mobility to reduced activity participation; and reduced activity participation to social exclusion. The second discourse, which emerges primarily in literature from the disciplines of geography and sociology, moves beyond the concept of inadequate mobility to identify the negative effects of too much mobility. This literature considers the negative externalities arising from transport systems, examining the negative community, environmental, health and social effects. Within this theme, there is also recognition of the negative spatial effect of mobility which, it is suggested, has acted to reduce immediate accessibility and, in consequence, to increase the mobility burden. Despite their focus upon different externalities, the literature within this discourse are linked through their underlying perception not of inadequate mobility, but of mobility itself, as a cause of social exclusion.

The recognition of these twin discourses is fundamental to this thesis. It is embodied in the following definition of mobility-related exclusion, developed by the author to inform this research:

> Mobility-related exclusion refers to the twin-effects of too little and too much mobility in a society and built environment that are structured around the assumption of high mobility. It is the process by which people can be prevented from participating in the cultural, economic, political and social life of the community, because of the reduced accessibility that results from inadequate mobility; and it is the process by which the negative community, environmental, health, mobility and spatial effects of high mobility can act to further exclude the individual from the society in which they live.

This definition recognises the accessibility (and therefore activity participation) deficit that can result from inadequate access to mobility, at the individual level. In this sense, too little mobility can cause social exclusion. However, it also perceives the underlying cause of the negative effects of too little mobility to be too much mobility, at the societal level. This paradoxical relationship exists as a result of the complex interaction between cultural, mobility and spatial trends, which have increased the accessibility burden in society. This has increased the mobility burden and, in consequence, the negative effects of low mobility. The recognition of this more complex relationship between mobility and social exclusion has important implications for policy interventions to tackle the phenomenon.

Before a more in-depth review of the literature, the following section introduces the concept of accessibility, presenting the definition of accessibility that underpins the understanding of mobility-related exclusion.

3.3 Accessibility

The concept of mobility-related exclusion is intimately related to the notion of accessibility. At its simplest, accessibility refers to the 'get-at-ability' of a destination at which an activity takes place (Hillman et al 1973, cited Hine and Grieco, 2003), or 'the ability of people to engage with activities and facilities' (Farrington et al, 2004). Individuals and the opportunities, services, social networks and other goods that they need or desire to reach in order to participate fully in society are separated by space, to varying degrees. The opportunity that individuals have to access and participate in these activities is dependent upon their ability to overcome the space between their location and the location of the activity in which they wish to participate. It is in this sense that Couclelis (2000) describes accessibility as 'the geographic definition of opportunity': a geographic expression of the individual's ability to access the activities which will allow them to participate, culturally, economically, politically and socially, in the society in which they live[4].

The geo-spatial definition of accessibility defines space as the physical segregation of individuals and destinations. However, space and thus accessibility are not merely

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[4] Additional influences upon accessibility and their impacts for mobility-related exclusion are acknowledged in Section 3.7.

about physical proximity. In his 1970 paper, Hagerstrand emphasises the role of *time* as an additional constraint upon accessibility, developing space-time accessibility theory (STAT). Hagerstrand suggests that, no matter how physically close an activity is, if the individual does not have the time to travel between their origin and the destination of the activity, they will not be able to participate. To illustrate, Hagerstrand develops space-time paths, which depict movement through space *and* time; and space-time prisms, which depict the set of all locations (and therefore activities) that are available to the individual, given their current location, the time available and the maximum speed at which the individual can travel.

In so doing, Hagerstrand shows the importance not only of space and time in determining accessibility, but also of *mobility*. For Hagerstrand, the key way in which accessibility can be extended is through faster, more efficient movement through space and between activities. This has traditionally been achieved through improvements in, or extended access to, motorised mobility[5]. Using time-space prisms, Hagerstrand is able to show that those able to move faster and more effectively possess access not only to a wider geographical area (and thus a wider range of activities) but also a greater number of 'potential path spaces' – a greater number of potential paths through space and thus greater choice of potential activity chains. In sum, STAT reveals that a greater *number* and a greater *choice* of places – and thus activities – are accessible to individuals if they have access to faster mobility. Conversely, fewer activities and reduced choice are accessible to those without access to such mobility. As such, those with low mobility can experience an 'accessibility deficit' vis-à-vis others in society. A clear hierarchy of accessibility and thus activity participation emerges, which has mobility at its root.

3.4 Linking mobility and social exclusion

There is a considerable literature providing both qualitative and quantitative evidence linking low mobility and low accessibility of the activities, facilities and services that are considered essential for well being and quality of life for citizens in modern society. These include: banking facilities; childcare; community activities; educational facilities; employment and employment services; family and friends; healthcare facilities; holidays; information services; leisure and recreational activities; legal services;

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[5] Consideration of an increase in accessibility by moving activities closer to the individual, in space and time, alongside the role of ICTs in accessibility, is reserved for Chapter 4.

libraries; political participation; the post office, for pensions and postage; religious centres; safe spaces in which to play; shops and supermarkets; sports facilities; youth services; and welfare/benefits offices.

There is similarly a considerable literature linking mobility to negative community, environmental, health and social effects. For example, crime has been linked to high levels of mobility. Deserted streets, the result of the removal of pedestrians because of busy traffic and popular car use, are more conducive to crime; and the anti-social behaviour of youths has been linked to boredom arising from the low accessibility of activities (DETR, 2000). Mobility has also been linked to economic decline of communities (linked to the flight of opportunities and services, discussed in Section 3.5.3). For Barry (2002), the most significant impact of high mobility has been the impact upon social solidarity, as members of society are isolated by the individualism inherent in mass car-based mobility and, with reduced integration, less tolerant of others (also Crawford, 2002; Schaeffer and Sclar, 2003). Gershuny (2003) highlights the time pressures faced by those travelling long distances, by all modes. Gershuny also discusses the decline of free time as a result of the decline of the public transport sector, which has resulted in a greater proportion of time devoted to transporting others (a trend that can also be linked to changing spatial patterns, discussed in Section 3.5.3). Authors including ACRE (2001) highlight the deprivation by expenditure that can result from mobility, highlighting the sacrifices that are made so that mobility needs can be met. Additional authors emphasise the exposure to accidents of car users and pedestrians and the negative mental and physical health and well-being impacts of air/noise/land pollution and other environmental degradation, which tend to impact to a greater extent upon poorer members of society. There are also health disbenefits to users of motorised mobility, including reduced fitness and increased obesity (particularly amongst children), increased stress as a result of worsening driving conditions and increased social isolation (Acheson, 1998; Davies, 2005; Hillman, 2002; Jain and Guiver, 2001; Stewart, 2001).

Aside from this brief overview, this thesis is primarily concerned with the accessibility consequences of mobility-related exclusion. Whilst at first sight it may seem that this focus considers only the first of the discourses outlined in Section 3.2, it shall be shown that inadequate accessibility is intimately linked to notions of both too little and too much mobility.

Table 3.1 places the accessibility consequences of mobility-related exclusion in context. Illustrating the connections between low mobility, poor accessibility and social exclusion, Table 3.1 presents examples of the influence of low mobility and reduced accessibility in the nine dimensions of social exclusion.

Dimension of exclusion	*Influence of low mobility and the resultant reduced accessibility: illustrative examples*
Economic	Unemployment – inability to take a job because of lack of adequate access to interview and to place of employment.
Living space	Geographical isolation and low level of service provision locally – lack of mobility reinforcing isolation and low accessibility of key services, including education, food shopping and healthcare.
Mobility	The acceptability, accessibility, affordability and availability of public transport and private transport acting as inhibitors to accessibility; negative externalities influence inaccessibility and social exclusion.
Personal	Ignorance and discrimination linked to lack of integration, itself a result of poor intra-community accessibility.
Personal political	Personal disempowerment – linked to low levels of knowledge, often as a result of the poor accessibility of information and support networks.
Organised political	Low participation – linked to inaccessibility of participation opportunities, e.g. travel to meetings, which are often in the evenings in centralised locations.
Social networks	Loneliness and isolation – lack of adequate access to family and friends, or to social opportunities to meet new friends.
Societal	Poor educational opportunities – inaccessibility of learning venues. A problem for young and old potential learners.
Temporal	Time poverty – the time taken to travel between activity spaces reduces time for participation in activities, a problem for private and public transport users alike.

Table 3.1. Accessibility, mobility and social exclusion

Reflecting the dominant social policy concerns of government[6] and the focus of much of the literature, the following sections expand upon Table 3.1 to further illustrate the influence of mobility upon social exclusion, with a focus upon four key areas: education; employment; health; and social networks.

[6] The social policy focus of central government is given in Chapter 2. *Making the Connections* (SEU, 2003) and in guidance on accessibility planning (DfT, 2004) reflect these policy concerns, as do the measures of deprivation and the key services listed in the Index of Multiple Deprivation (ODPM, 2004). Authors including Burke (2004), Carson (2004), Grant (2004), Kane (2004), Preston (2004) and Westwood (2004) report initiatives implemented at the local level, analysis of which suggests that local governments share this common focus.

3.4.1 Education

'Difficulties with transport can prevent people from participating in learning or restrict their choice of the quality, subject matter or type of learning they attend' (SEU, 2003). This can affect access to education at all levels, including pre-school, school, further and higher education, adult learning and job-related training (SEU, 2003). For example, the government's policy on parental choice in schooling betrays an implicit mobility dependence. Only those able to travel outside of the local area can express this choice. A consequence of this policy can be the flight of mobile pupils from underperforming schools. Those without mobility can thus be concentrated in these schools and can receive poorer quality education as a result. The reduction of educational choice, such that less mobile pupils can only study the courses offered at their local school, can result in restricted educational and employment horizons. In addition, children are influenced by the example set by their peers. Just as employment chances are linked to ones social networks (Hanson, 2000), so children's educational attainment and aspirations can be influenced by their parents and the community in which they live. Children who are confined by low mobility to underperforming schools or to deprived areas in which low levels of education are the norm can therefore be disadvantaged vis-à-vis those in the company of more highly educated social groups.

Extra-curricular, informal learning opportunities, including before and after school homework clubs, subject-specific additional learning and sports, can influence attainment, attitude and attendance (SEU, 2003). However, studies including ACRE (2001) and Carson (2004) highlight children's reduced participation in extra-curricular activities because of low mobility. The Central Council of Physical Education (cited SEU, 2003) reports that 40-45 percent of pupils in one study area were unable to attend after-school activities, because of transport constraints. This is a particular problem for children who are traditionally vulnerable to social exclusion, including those from poorer households and those in care. In addition, there is evidence to suggest that distance to school is inversely correlated with student achievement. This is in part related to reduced participation in extra-curricular activities and in part to the fact that pupils with long commutes have less time for homework (Talen, cited Clifton and Lucas, 2004).

With respect to post-16 education, the SEU finds that one in five students have considered dropping out of their studies because of the burden of travel costs. 6

percent of students have missed college at some point in the past academic year, because they could not afford to travel; and 6 percent of 16-24 year olds, 3 percent of those aged 25-44 and 2 percent aged 45-64 have turned down further education or training in the past year, because of transport difficulties (SEU, 2003). Dibben (2003) finds that government social policy is made impotent as a result of inadequate mobility. Focus group participants discuss the evening courses that were established, free of charge, to help people with low levels of education back to work. However, the provision of free education is insufficient in itself, for the courses are not free of charge when the cost of transport is considered. Without free transport, many find that participation in the courses is denied.

3.4.2 Employment

Mobility has been strongly linked to employment chances. Low mobility can influence access to information about jobs, through reduced access to job centres and employment agencies. It can limit contact with people in employment, who are valuable sources of information about employment opportunities, identified by SEU (2003) to be a particular problem for residents of deprived estates. It can restrict travel to interview; and difficulties travelling can prevent people from applying for or accepting a job, because of the location of employment, or the hours of work. 52 percent of job seekers believe that a lack of private transport has inhibited them in getting a job. 23 percent have been prevented from getting a job because of poor public transport (DETR, 2000). 12 percent of jobseekers believe that a lack of available transport has stopped them from attending interviews. 5 percent have been offered a job, but have turned it down because of transport problems – rising to 10 percent for jobseekers living in low-income areas (SEU, 2003; see also ACRE, 2001; DfT, 2004; Farrington et al, 2004; Gaffron et al, 2001; Kane, 2004; Lucas et al, 2001).

Furthermore, low mobility has been linked to low pay, because it restricts travel horizons, enforcing a localised existence and thus influencing choice of employment. For example, Hine and Mitchell (2001b) find a relationship between mode used to travel to work and household income, indicating that those with higher mobility are able to access more highly paid jobs. ACRE (2001) illustrates how rural dwellers without transport are restricted to local work, which is largely low paid and seasonal. DETR (2000) shows the restricted employment options of women, who are often spatially confined to a certain area by their partner's job and by their domestic and caring responsibilities, or are temporally constrained to part time work or that which does not

require overtime, because of the time pressures of travelling to meet their multiple roles (also Hamilton and Jenkins, 2000; Turner and Grieco, 1998). Mobility can also be a factor in the inability to accept overtime, or employment outside of conventional hours, including shift work and part-time work; and unreliable transport can lead to late arrival at work, resulting in docked pay.

3.4.3 Health

Low mobility is linked to difficulties in accessing a wide range of healthcare services, including dentists, family planning, GPs and hospitals, particularly specialist services. We can also assume that this accessibility deficit extends to complimentary therapies. It is estimated that, every year, 1.4m people miss out on medical help because of transport difficulties (SEU, 2003). 20 percent of the population have difficulties getting to hospital (ibid); 6 percent, to their GP surgery; and 5 percent, to the dentist (DfT, 2002b). 3 percent have turned down, missed or decided not to seek medical help, because of transport difficulties (ibid), with the result that illnesses are not discovered or treated quickly, such that those with reduced mobility can have poorer health outcomes (supported by ACL, 2001; Raje, 2003). Hamilton and Gourlay (2002) examine the role of mobility in non-attended appointments and cite previous research which finds that 20 percent of missed appointments were due to transport difficulties. Their own study, focused upon ante-natal care, finds that mobility is the most significant factor causing patients to miss hospital appointments. 69 percent of those who had missed an appointment stating that this was because of transport difficulties[7]. The study finds women with children to be particularly vulnerable to reduced access to healthcare[8], because of difficulties co-ordinating (travel to) caring responsibilities with travel to healthcare, especially when clinics run late[9], or allocated appointment times are inflexible and clash with other responsibilities (a finding that is supported by Young, cited Gaffron et al, 2001).

Health can be also be affected by problems with access to other services. Poor access to healthy food shops can reinforce and perpetuate ill health (Cahill, 1994; Murdock, 1986; SEU, 2003; Wrigley et al, 2002). Deprived areas are often associated with a lack of healthy food shops, yet a prevalence of unhealthy food options, such that those with low mobility can have little option but to eat unhealthily. Low mobility can influence

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[7] The transport difficulties are not defined further in this report.
[8] Two-thirds of those missing an appointment had one or more children.

access to sports and leisure facilities, therefore physical fitness, as can low access to non-motorised mobility (DoH, 2004). Research also links access to social activities with health outcomes, suggesting that people with poor social networks have poorer health outcomes (SEU, 2003); that the ability to socialise helps people to cope with physical illness (Raje, 2003); and that access to social activities and social networks can affect mental health (DETR, 2000).

3.4.4 Social networks

Many types of social participation, including evening classes, hobbies, participation in political groups, sports, or just going to the pub or for a walk, are dependent upon mobility; and the act of travelling can be a social experience, providing social contact. Without mobility, individuals can be socially isolated from existing family and friends and can find it difficult to build new social networks. At the individual level, there are links between participation in social networks and employment (Hanson, 2000) and both physical and mental health (SEU, 2003). There is also a strong link between participation in social activities and community cohesiveness; and a link between community cohesion and many of the factors in the societal dimension of social exclusion. Thus, DETR (2000) suggests a link between low mobility, low access to social activities, boredom and anti-social behaviour amongst young people; and Jones (cited Huby and Burkitt, 2000) states that, by creating differential accessibility, transport actively performs as an instrument of social division (also Putnam, 1995).

11 percent of the population have difficulties getting to see family and friends because of transport difficulties (DfT, 2002b). 33 percent believe that better transport would improve their social lives (SEU, 2003). These findings are supported by research focusing upon specific sectors of the population. For example, Banister and Bowling (2004) find that there is a positive correlation amongst older people between those who undertake few social activities and low availability of transport[10]. A third of older people feel that their social networks are constrained by low mobility (DETR, 2001). Christie et al (2000), in their research with people with disabilities, find that loneliness is correlated with low mobility; and Hine and Mitchell (2001b) find substantially reduced participation

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[9] Unscheduled lateness.
[10] Although the direction of cause and effect is not proven in this study.

of people with disabilities in social activities, because of mobility difficulties[11]. ACRE (2001) and Dibben (2001) link inadequate transport provision in rural areas with social isolation; and DEFRA (2004) finds transport to be the key barrier to the participation of young people in rural areas in social activities. Raje (2003) finds similarly for urban dwellers; and DETR (2000) explores the impacts of mobility upon women's participation in social activities.

3.4.5 Summary

The above discussion highlights the role of low mobility in both exacerbating and causing social exclusion. As a result of reduced access to activity participation, many people experience restricted opportunities, with consequences for quality of life and well being. The following section examines the causes of this aspect of mobility-related exclusion.

3.5 The causes of mobility-related exclusion

The mobility-related causes of low accessibility have been conceptualised in a number of ways, by different authors. These are detailed in Table 3.2.

Author(s)	*Conceptualisation of mobility-related exclusion*
Church et al, 2000	Economic; facilities; fear-based; geographical; physical; spatial; time-based.
DETR, 2000	Acceptability; accessibility; affordability; availability.
Edinburgh Council[12]	External (transport system); internal (personal).
Hine and Mitchell, 2001b	Economic; physical; psychological; temporal; spatial.
Lucas, 2004b	Person-type; spatial; transport system.
Solomon, 2003	Financial; personal; spatial; temporal.

Table 3.2. Conceptualisation of the causes of mobility-related exclusion

[11] Thus, 69 percent of those with chest/breathing difficulties and 61 percent of those with a disability connected to the arms or legs did not have an evening out for social purposes (the time-frame is not specified).

This thesis, in common with Lucas (2004b), identifies three influences upon this form of mobility-related exclusion: those related to the person; those related to the transport system; and spatial factors. These factors interact, influencing each other and the impact of each on mobility-related exclusion. This section presents an overview of these factors, as a prelude to a discussion of possible policy solutions to mobility-related exclusion.

3.5.1 Person-type factors

'Transport disadvantage is not equally or randomly distributed throughout society, but follows the well-established lines of structural social inequality' (Hamilton and Jenkins, 1992). 'People with disabilities, elderly people, children and their carers, the unemployed and low paid, those living in certain areas, both urban and rural, people who are subjected to particular forms of prejudice, racist, sexist or homophobic' (Torrance, 1992), can find that they have difficulties using the current transport system[13]. As a result, they experience different levels of mobility and of accessibility[14]. This is evident in statistics concerning distance travelled, the number of trips made and the modes used by different groups in society. For example, those on lower incomes travel less far, make fewer trips and use public/non-motorised transport more than those on higher incomes. People with disabilities and those from minority ethnic groups show similar patterns when compared with non-disabled/white people respectively and with the population as a whole. Men travel further than women, using the car more and public/non-motorised transport less. Car users, a group whose composition varies according to factors including age, ethnicity, gender, household structure and income, travel further and make more trips than non-car users and they report fewer difficulties accessing work and key services than non-car users (DfT, 2005).

Whilst it is possible that reduced travel can be a positive choice, or that those who travel less have a reduced need to travel, the clear indication from the literature is that differences in mobility patterns are due more to the inadequacies of the transport

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[12] Cited Hine and Mitchell, 2001b.
[13] 'Transport system' in this thesis refers to all aspects of the door to door journey, including the walking environment, the interchange, the vehicle and the driving environment.
[14] Whilst groups may not be heterogeneous, studies show that there are sufficiently significant differences between their mobility and accessibility needs/concerns and those of their opposites (low income from high; unemployed from employed; women from men, etc.) for boundaries to be drawn.

system in meeting the mobility needs of certain groups, leading to inequitable mobility, accessibility and participation. Imrie suggests that transport systems are 'premised on a universal, disembodied, subject which is conceived of as neutered, that is, without sex, gender, or any other attributed social or biological characteristic' (cited Hine and Mitchell 2001a). More often than not, transport systems are designed in the image of their creator(s) and are thus suitable for non-disabled, middle class, conventionally employed[15], white, males, driving cars. This has not tended to produce a system which adequately meets the needs users with needs differing from those of this group, including: non-car users; people on a low income; those with mobility impairments, including people with disabilities, with young children and with heavy bags; people working outside of conventional office hours; those who feel vulnerable to abuse, including women and people from minority ethnic groups; and people with language or learning difficulties.

The following section considers factors in the transport system and how these can be experienced as exclusionary.

3.5.2 Transport factors

More and more people own cars. However, 27 percent of households in the UK do not own a car. This rises to two-thirds of single pensioner households; 60 percent of households in the lowest income quintile; 50 percent of lone parent households; and almost half of households of black origin (DfT, 2005). In addition, many in car owning households are unable to use the car as often as they would like, because of shared ownership, or the cost of travel. Thus, many people are reliant upon public transport, or upon non-motorised modes, including walking. However, the transport system has become increasingly car dominated, such that the travel and thus activity choices of those without cars have been gradually eroded[16].

Hagerstrand (1987) discusses the inequity of accessibility between car and public transport users at length, linking public transport with reduced time efficiency. Hagerstrand examines the potential path spaces of each to conclude that the additional temporal burden upon non-car users renders many spaces and thus activities

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[15] That is, working largely 9-5, not part-time or on shifts, thus travelling during peak hours.
[16] It is recognised that non-car ownership can be a positive choice, rather than a negative constraint. However, in line with the definition of social exclusion which informs the conceptual

inaccessible. Thus, those with access to cars are seen to have a spatial-temporal advantage over those who are limited to public transport or non-motorised mobility. However, reduced time efficiency is not the only disadvantage of non-car modes. The literature identifies many inadequacies of public transport, focusing upon availability, affordability, accessibility and acceptability. With regard to availability, authors consider routes, timings, the location of the interchange, reliability, inter and intra-mode integration and information. However, the availability of a service may not guarantee its usability, or its usefulness. Considering affordability, studies highlight the cost of travel by public transport, commenting upon integrated ticketing, concessionary fares and the front-loaded cost of multi-journey or multi-day fares. There is concern regarding the accessibility of public transport, not only regarding the vehicle, but also the structure, location of and routes to the interchange. Accessibility is also considered with regard to staffing; the provision of facilities including toilets, seating and refreshments; and to safety, from a whole journey perspective. The walking environment is particularly important when considering the accessibility of transport systems. Finally, mobility may be accessible, affordable and available, but if it is not acceptable, it will not be used. The acceptability of public transport is discussed with regard to each of the above, but also to factors including convenience, journey time, exposure to inclement weather, cleanliness, the atmosphere on the vehicle and at the interchange, fellow passengers and psychological perceptions. Similar concerns, although focused primarily upon acceptability, are expressed with regard to non-motorised modes, including cycling and walking.

These concerns affect many groups in society. For example, poverty restricts use of public transport (Behrens, 2004; DfT, 2004; Muir, 2003). Low income households are heavily dependent upon walking as their main mode, which increases journey times and reduces activity spaces. Safety concerns for those reliant upon walking can result in confinement to the home and reduced activity participation, following the restriction of travel to daylight hours. The accessibility needs of people with disabilities tend not to be met by current transport systems, including community transport (Christie et al, 2000; Dickins and Ford, 2001; Homer, 2003)[17]. Older people can experience similar difficulties to those by people with disabilities. In addition, they can feel threatened by other users of public space, particularly school children and those moving at speed, or

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framework for this thesis, this thesis is concerned solely with reduced car ownership/use and of reduced mobility through *denial* of choice.

[17] These studies primarily consider limb disorders which limit movement, but 'disability' includes visual and hearing impairment, learning disabilities and mental health problems. Illiteracy and innumaracy can similarly pose barriers to the use of transport systems (Williams, 1986).

unpredictably. This group can often experience sudden decline in mobility, through illness or the loss of a driving license, or of a driving partner, the latter particularly impacting upon elderly women. Such previous car users report that they are untrained in the use of public transport, that they are unfamiliar with routes and that their residential location, chosen when they were car users, is not practical without a car, each factor limiting use of public transport (ACL, 2001; Banister and Bowling, 2004; DETR, 2001; Metz, 2003).

Children and young people are the focus of studies reported by DEFRA (2004), Dibben (2003), Hillman (cited Cahill, 1998), Thomas and Thompson (2004) and Thomsen (2004). Concerns centre upon cost, safety, attitudes of bus drivers and other passengers and travel to desirable destinations, at desirable times. DfT (2002a), Raje (2003) and SRA (2003) report the particular problems experienced by minority ethnic groups which, in addition to the above, centre upon: information; language barriers; the lack of routes connecting ethnic communities to each other, to faith centres and to key services; and racism, including harassment, perceptions of risk and safety. Studies including DETR (2000), Hamilton and Jenkins (1992, 2000), Hamilton et al (2005), Law (1999) and Wajcman (1991) examine mobility from a gender perspective, focusing upon the inability of public transport to meet women's needs, particularly trip chaining. Authors including Brightwell (2003), Church et al (2000) and Solomon (2001) discuss the mobility constraints experienced by people living in deprived urban areas, including low levels of public transport provision, low car ownership, poor walking/cycling environments and high (perceptions of) crime and risk to personal safety[18]. And a number of authors consider the inaccessibility of services and the inadequacies of non-car modes in meeting the mobility needs of those living in rural areas (including ACRE, 2001; Banister and Evans, 1992; Burke, 2004; Farrington et al, 2004; Root et al, 1996).

The above discussion may suggest that this form of mobility-related exclusion affects only those without access to a car. However, car owners and users can equally experience exclusion from mobility. Car-based mobility is not necessarily always available to car users. For example, the costs of car-based mobility may be too high, the driver may be limited by confidence, or parking may be unavailable, a particular problem for people with disabilities, those with children or those encumbered by heavy bags[19].

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[18] On crime and public transport, see also Stafford, 2003.

3.5.3 Spatial factors

Finally, mobility-related exclusion is related to spatial factors, including firstly, the physical proximity of activities and secondly, environmental features, which influence the accessibility of mobility (including crime, the condition of cycle lanes, pavements and roads, street lighting, topography and weather), each of which influence the accessibility of activities. Many authors highlight the increasing distances between residential location and key services, such that mobility is increasingly necessary for participation in society. Thus, person-type factors are important only when the transport system is inadequate in meeting people's needs; and transport factors are important only when spatial factors make mobility an essential tool for participation. However, when we begin to consider spatial factors, it becomes apparent that increasing distances between individuals and the activities in which they wish to participate are greatly influenced by mobility itself. Thus, spatial factors are more appropriately considered within the conceptualisation of mobility-related exclusion as too *much* mobility and it is to this that this thesis now turns.

The cultural valorisation of mobility and, from this, car use[20], alongside the perceived economic benefits of mobility[21], have been powerful influences upon policy. In transport policy, historically, public transport has been degraded, through reduced funding and changes in the regulatory environment; and car use promoted, witnessed in road building and in vehicle and fuel taxation policies. But the influence of culture and economic theory have extended beyond transport policy, to include housing, planning, regeneration and social policies, which have, if not actively encouraged, certainly been based upon an assumption of car-based mobility, with the result that society has become increasingly organised around the car and the type, or level, of mobility and accessibility that the car can provide.

A number of authors have suggested that faster, more enduring movement through space has at once increased and decreased accessibility[22]. This literature proposes

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[19] The exclusion experienced by car users as a result of too much mobility, including financial and temporal costs of high mobility, is considered elsewhere in this chapter.
[20] There is a rich literature discussing the cultural influences upon mobility, car use and the built environment. Full discussion is outside of the scope of this thesis. As such, the reader is referred to authors including Aird (1972), Flink (1975), Freund and Martin (1993), Gartman (1994), Gorz (1979), Illich (1974), Sachs (1992) and Whitelegg (1997); also Bristow (2002), Cahill (1998), Laird (1996) and Wright and Egan (2000) for the promotion of this culture in advertisements, popular entertainment and by governments.
[21] DoT, 1989; for challenge to this theory, see Black, 2001; CPRE, 2003.
[22] Whilst the majority focus upon the car, this principle extends to all mobility technologies.

that the *ability* to travel further, faster, has developed into a *need* so to do, as an increase in the spatial range (and thus number and variety) of accessible activities has been accompanied by growing distances between these activities. For example, Couclelis (2000) considers the ways in which improved mobility has restructured land use, reducing immediate accessibility. In light of these trends, Ross (2000) is moved to suggest that accessibility and mobility are 'the yin and yang of planning' (see also Shen, 2000). Sheller and Urry (2003) highlight the role of the car in creating urban sprawl, as mobility has been culturally reconfigured to provide an alternative space in which users 'dwell'. In the following, Illich concurs with the notion that mobility creates, rather than reduces remoteness; and draws in the notion of inequity, which occurs as a result of differential access to mobility:

> Motorized vehicles create remoteness which they alone can shrink. They create distances for all and shrink them only for a few.
> Illich, 1974.

For these authors, increased mobility has acted to push the world away, decreasing immediate accessibility. This is certainly borne out by statistical evidence, which highlights the increases in average journey lengths and in distances between residential location and key services. For example, in the UK, the average length of a journey has increased by 42% since the 1970s (SEU, 2003). Average distances to key services have also increased substantially (Clifton and Lucas, 2004).

Studies including Banister and Evans (1992), Cahill (1994), Church et al (2000), DETR (1998), SEU (2003), Torrance (1992) and Turner and Grieco (1998) discuss the impacts for different groups of the changing location of services and facilities, primarily through centralisation – a decision which, whilst also based upon economic justifications on the part of the service provider, is in the main part premised upon underlying assumptions regarding the mobility of service users. Centralisation has occurred not only in privately-provided services and facilities (including banking, leisure and retail), but also in those in the public realm, encouraged by social policies concerning, for example, childcare, community facilities, education, healthcare, job centres, local government offices, post offices and prisons. As these services and facilities have become increasingly centralised, there has been a corresponding reduction in those that are locally available, such that people with inadequate mobility can experience exclusion from these facilities. For example, the amalgamation of five GP practices into one healthcare centre resulted in accessibility difficulties for 50 percent of the centre's catchment (LTT, 2003). In addition, government policies to

increase user choice of service provider, particularly in education and healthcare, potentially increase distance between the user and the service provider, increasing the accessibility burden. The concept of user choice is predicated upon assumptions regarding the user's access to adequate mobility – and their ability to exercise this choice is dependent upon their ability to travel. In each of these instances, those without mobility can be excluded from access to services; and evidence suggests that services that remain locally available can be more costly and of lower quality.

The negative effects of the location of services in hard to reach places and the linked absence of services in the local area have been exacerbated by the division of planning areas by function, leading authors including Buchanan (1992) and Huby and Burkitt (2000) to suggest that non-car users appear to have been invisible in land use planning decisions and design. Dispersed land-use patterns, in which geographical areas are clearly demarcated in terms of activity, have increased the need for travel – and these areas have steadily grown further apart. Matson (2004) discusses this phenomenon, considering education policy, healthcare, housing and suburbanisation, retail developments and the location of the workplace. She cites the embeddedness of the mobility culture in land use planning as a causal factor and laments the lack of 'spatial efficiency', which would reunite land use functions, increasing immediate accessibility to reduce mobility-related exclusion.

Case studies (DETR, 2000) provide further evidence of the negative effects of the car-oriented built environment upon accessibility, highlighting the physical isolation of entire urban estates and the severance of communities as a result of peripheral location and the construction of physical barriers, including motorways. Cahill (1994), Grayling (2001) and Wajcman (1992) similarly highlight barriers to accessibility in street design, including the siting of pedestrian crossings, the use of underpasses and poorly maintained pavements, to illustrate the mobility difficulties faced by pedestrians in the landscape that has been built around car-based accessibility.

Finally, the increasing accessibility burden following from the growing distance between activities is further enhanced by an increase in the number and range of activities in which individuals must participate in order to feel included within the society in which they live. Because more activities *can* be undertaken (by those with access to effective mobility) more activities are *expected* to be undertaken. Without effective mobility between activity spaces, fewer activities can be undertaken and the ability to participate in the activities that are necessary to feel membership of society diminishes.

3.5.4 Summary

The above sections have assessed the causes of the accessibility-related mobility-related exclusion discussed in Section 3.4 (and subsequent subsections). It has been shown that what initially appears to be simply a result of too little mobility has in fact, as its underlying cause, too much mobility. It has been suggested that mobility has itself contributed towards spatial change, such that mobility has become increasingly necessary. This has had the result that those with inadequate access to mobility, because of person-type or transport-system factors, experience reduced access to activity participation.

The following section considers the implications of such a diagnosis for policy responses to mobility-related exclusion.

3.6 Policy responses to mobility-related exclusion

When mobility-related exclusion is conceptualised as being the result of too little mobility, the ameliorative policy is simply to increase the mobility of excluded groups. For example, redesign public transport such that it is more physically accessible; introduce subsidies, for private and public transport, such that mobility is more affordable; increase ownership of private modes and amend public transport routes, to increase availability of mobility and services; make the door-to-door transport environment safer, increasing acceptability; and finally, persuade those with low mobility to increase their travel horizons, such that a greater number of activities are open to them. Indeed, many policies aim to do just this[23] (Lucas, 2004c; PTEG, 2005; SEU, 2003; TCA, 2005). Such policies are premised upon the understanding depicted in Figure 3.1, in which enhanced mobility leads to increased activity participation, greater social engagement and thus greater social inclusion.

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[23] Understandably so, for such policies are more easily and quickly implemented than longer term strategies, for example, to relocate services, or reconfigure land use.

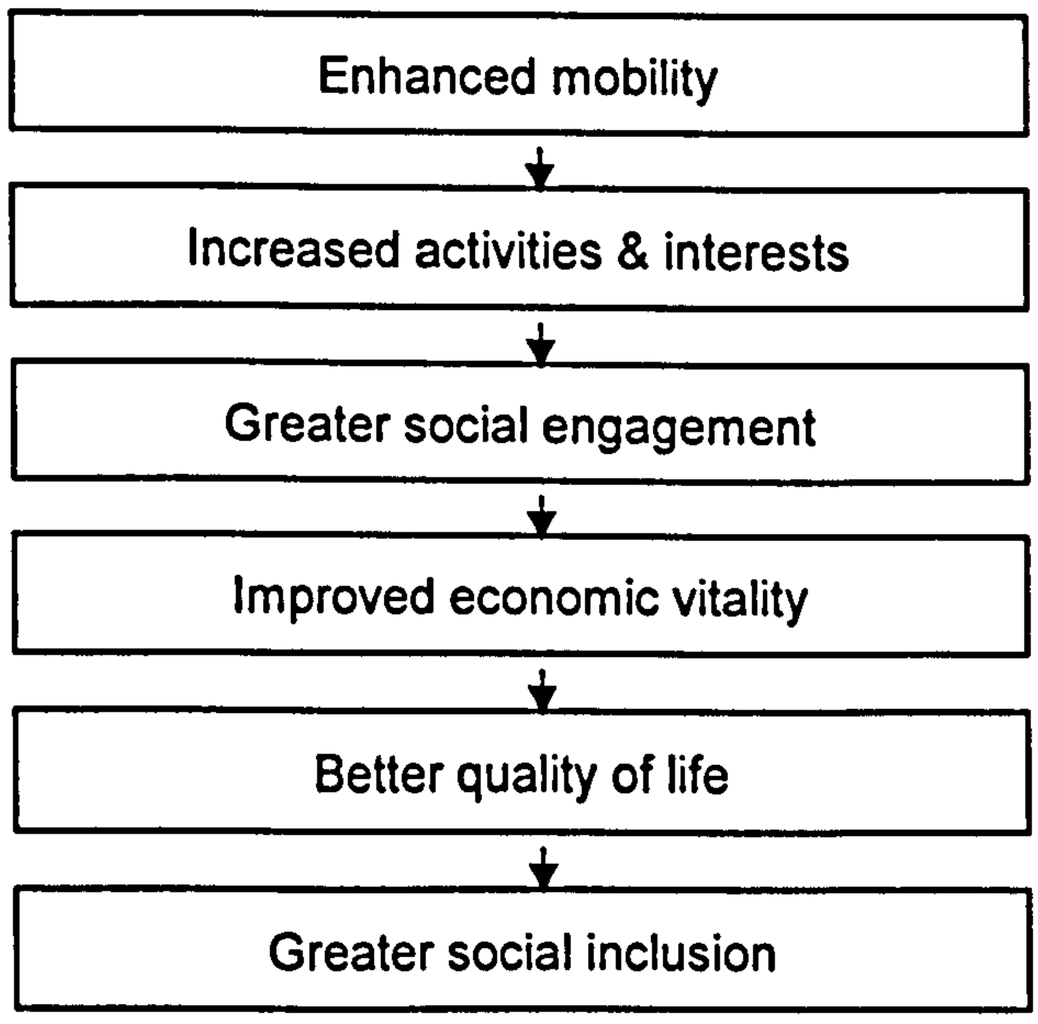


Figure 3.1. 'Diagram to demonstrate the role of mobility in social inclusion' (Troy, cited Lucas and Simpson, 2001).

However, when mobility-related exclusion is conceptualised as a two-tiered process, the result of both too little and too much mobility, increasing mobility can be seen to be an inappropriate policy response. If, as suggested in this chapter, accessibility is, in the long term, *reduced* through greater mobility, because of spatial effects of mobility, whilst other negative externalities *increase*, it may be more appropriate to examine the ways in which the accessibility of the opportunities, services, social networks and other goods that are necessary for participation in society can be increased, without recourse to an increase in physical mobility. Policies so to do could include initiatives to reconfigure the built environment, reuniting planning areas and bringing services closer to their users, advocated by authors including Matson (2003) and, to an extent, by the government as part of the accessibility planning process (SEU, 2003). However, accessibility could also be improved through their delivery to the user's door, using *virtual mobility*.

'Virtual mobility' has been with us for many years – in fact, for as long as technology has allowed people to communicate and exchange in ways other than face to face, through the printed word, by telegraph, telephone, fax or mail. More recently, communication and exchange have become possible through the Internet, using email and the world wide web. This thesis hypothesises that virtual mobility, via the Internet, could act as a supplement to physical mobility, enabling accessibility without recourse to physical mobility by the person undertaking the activity. Thus, virtual mobility could

reduce social exclusion by reducing mobility-related exclusion, whilst avoiding the negative externalities associated with policies which increase mobility to achieve these ends.

For virtual mobility to reduce social exclusion, however, it must provide the same function as physical mobility or, at least, fill the gap that a lack of physical mobility leaves. In addition, it must avoid any negative social or mobility effects, which could worsen mobility-related exclusion, or social exclusion in general. The following chapter considers the possible mobility and social effects of virtual mobility, examining its possible utility as a tool in the fight against mobility-related social exclusion. Firstly, however, this thesis turns to acknowledge conflict within the literature regarding the concept of mobility-related exclusion.

3.7 Mobility-related exclusion: conflict

Whilst the concept of mobility-related exclusion has been embraced by government and policy analysts, for completeness, it is important to acknowledge a level of conflict within the literature, with regard to: the concept of accessibility; the extent to which accessibility necessarily equates to inclusion; and challenge to the concept itself.

Just as social exclusion is a contested concept, so is accessibility, to the extent that, in their discussion of the concept, Couclelis and Getis (2000) are moved to suggest that it is unlikely that there will ever be a single accepted definition of accessibility, or a single accepted measure. Theoretical debates are undertaken by authors including Batty and Miller (2000), in which constraint-based, attraction-based and benefit-based definitions of accessibility are explored; by Couclelis (2000), outlining the diverse spatial, functional and economics perspectives on accessibility; and by Hanson (2000), whose definition of accessibility as 'reachability, obtainability [and] attainability' encompasses consideration of the role of individual characteristics, including culture, education and information, in accessibility. Occelli (2000) outlines a number of definitions of accessibility before turning to explore the 'junction role' of accessibility, linking the concept with and assessing its role within the Post-Fordist society; and Scott (2000) examines the role of accessibility in urban form, perceiving accessibility as variously an attribute, a process and an outcome. Robinson (1998) suggests a four-fold definition of space, in which cognitive distance, economic distance, social distance and time distance are considered as components of accessibility. And Hagerstrand recognises

three constraints upon accessibility in STAT: capability constraints, which are discussed above; coupling constraints, which consider the difficulties of co-ordinating activities in space and time; and authority constraints, in which the impact of power relations upon participation are considered.

Related to these concerns regarding the concept of accessibility, authors including Hine and Grieco (2003) question the extent to which physical accessibility necessarily equates to participation. Thus, one may have access to the workplace, but without qualifications, one cannot participate in the workforce; one may have access to a social club, but without friends, one would not feel a sense of belonging. Finally, Sutton (cited Cahill, 1994) raises the question of levels of demand as a function of accessibility, in which the third level is that in which demand is suppressed to such an extent that a desire to participate is not even considered.

That there are additional factors constraining accessibility does not devalue the benefits of providing greater physical access. In addition, this research is primarily concerned with one dimension of social exclusion, within which the spatial/temporal definitions of accessibility as physical access are most appropriate. This said, this thesis acknowledges competing interpretations of accessibility and the limitations of merely providing physical access to activities in attempts to tackle social exclusion.

Finally, Thomsen (2004) questions the extent to which we impose immobilised identities upon groups or areas, which in fact are not felt by these groups. Thomsen examines the extent to which children feel immobilised by the auto-centric environment and finds that children do not feel constrained, in danger, or isolated, as they are labelled in the literature. Whilst at this time a lone voice in challenging the underlying assumptions of mobility-related exclusion, Thomsen's work is of significance in raising the dangers of imposing undue homogeneity of experience and the importance of challenging one's conceptual framework. This concept is further discussed in Chapter 6, which reports focus group discussions in which the concept of mobility-related exclusion was explored from an inductive perspective, to guard against the imposition of a concept that in reality is inappropriate to popular experience.

Whilst acknowledging the above dissention regarding the theory presented in this chapter, the chapter concludes in favour of mobility-related exclusion as a valuable concept, which can be demonstrated using empirical evidence and which is successful in furthering the understanding of disadvantage in UK society.

3.8 Summary

Chapter 2 presented the concept of social exclusion, detailing the definition and understanding of the term developed for and used within this research. Social exclusion was conceptualised in terms of nine dimensions. This chapter has built upon this conceptual framework, with a focus upon the mobility dimension of social exclusion. The interaction between the dimensions has been illustrated through a discussion of the consequences of low mobility for activity participation in each of the nine dimensions, with a detailed focus upon reduced access to activity participation in four areas that are key to social policy: education, employment, health and social interaction.

Analysis of the literature has revealed mobility-related exclusion to be a two-tiered process. Thus, the definition of mobility-related exclusion developed for and used within this research finds it to be the result of both too little and too much mobility, which combine to reduce access to activity participation across many aspects of life. This has been illustrated in the above discussion of its causes. The centrality of the spatio-temporal conceptualisation of accessibility to this definition has been stressed, alongside consideration of person-type and transport-system factors, which can leave individuals and groups vulnerable to mobility-related exclusion.

The understanding of mobility-related exclusion presented in this research has important consequences for policy. The focus of the majority of policy is upon mobility-related exclusion as too little mobility, leading to policy solutions to increase mobility. However, this chapter has suggested that, when the role of mobility in declining accessibility is considered, whilst beneficial at the individual level and in the short term, these policy solutions are likely to worsen mobility-related exclusion at the system level and in the long term. Thus, it has been suggested that an alternative to increasing physical mobility to alleviate mobility-related exclusion may be appropriate. The chapter has introduced the concept of virtual mobility, which can provide access to activity participation without recourse to physical mobility by the individual undertaking the activity. This concept is taken forward into the next chapter, where the concept of virtual mobility and its possible role in alleviating mobility-related exclusion within each of the nine dimensions of social exclusion is considered.

Chapter 4. Virtual mobility.

4.1 Introduction

Chapter 3 introduced the possibility that virtual mobility may be effective in the alleviation of mobility-related social exclusion. This chapter explores this possibility more fully.

The Internet has become an integral part of daily life for many in modern industrialised societies. Just over ten years after Netscape's Mosaic browser was made universally available for free (which Rainie and Horrigan (2005) consider to be 'the dawn of the popular Internet'), two thirds of the UK adult population are Internet users (ONS, 2005a). More than half of all homes in the UK are connected to the Internet (ibid), almost half of which now have permanent connections (ONS, 2005b); and, with the expansion of community online centres, the extension of Internet access to all schools and public libraries (Teachernet, nd; People's Network, nd) and growing use in the workplace, almost all members of the UK population are said to have ready access to a place from which they can access the Internet[1]. In the words of Haythornthwaite and Wellman (2002), Internet use 'is being pervasively incorporated into people's lives'. Everyday activities, from education and employment to shopping and participation in social networks, increasingly have the potential to be carried out (at least in part) online, without recourse to physical mobility by the individual undertaking the activity. As Internet use weakens the traditionally strong links between activity, place and time, questions regarding the impacts of Internet use for accessibility and thus activity participation and travel have been raised.

Internet use has potentially important consequences for travel behaviour. Internet enabled accessibility, or 'virtual mobility' (defined below), provides an alternative to reaching opportunities, goods, services and social networks, providing access without physical travel. In so doing, Internet use may also enable (or enhance opportunities for) the simultaneous conduct of activities, which may further reduce the need for travel. Thus it is that Internet use may reduce aspects of mobility-related exclusion.

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[1] 99.5% of households are within 10km of an public internet access point, 95% within 5km and 89% within 3km (Office of the e-Envoy, 2003). Furthermore, 96% of the UK population are aware of a place where they could go online (OII, 2003).

Equally, however, it has been suggested that virtual mobility will increase physical mobility, as a result of widened travel horizons, an increase in time available for travel, the productive use of travel time and the intrinsic value of travel as an activity in itself. It has additionally been suggested that Internet use can have negative social effects, including the worsening of social isolation, an increase in deception and the decline of community. Should these be the case, virtual mobility has the potential to worsen mobility-related exclusion and social exclusion in general. A third school of thought questions whether or not there will be *any* observable effect.

Whichever perspective is correct, it is clear that Internet use could have important implications for transport and social policy, including policies to tackle mobility-related exclusion. Building upon the theoretical framework presented in Chapters 2 and 3, this chapter presents a review of the literature, which explores the (potential) impacts of Internet use upon society and transport. In so doing, the chapter defines the key research questions informing this thesis.

The chapter develops through four sections. The first presents the definition of virtual mobility that is used within this research. A discussion of the implications of virtual mobility for the definition of accessibility used within this research follows. Section 4.4 examines the potential role for virtual mobility in alleviating mobility-related exclusion in each of the nine dimensions of social exclusion. Finally, section 4.5 presents the potential barriers to the use of virtual mobility for the alleviation of mobility-related exclusion, including an assessment of the evidence regarding the mobility effects of Internet use, its social effects and the digital divide.

4.2 Defining virtual mobility

The term 'virtual mobility' has not been widely used, in the academic or government sectors. Indeed, at the outset of this research in 2001, a review of the literature revealed just two previous uses of the term in published work (Adams, 2000; van der Kroon, 1999)[2] and no published definitions[3]. This reflects the novelty of the Internet at

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[2] At the time of writing in 2005, search of the Transport database revealed 14 instances of the use of the term; search of the ASSIA database revealed one use (the author's own).

[3] The author's own definition, published in 2002, is one of only two definitions of which she is aware. HOP Associates (nd) (published after the author's definition) define virtual mobility thus: "'Virtual Mobility" refers to the use of the new Information and Communications technologies (ICT) as an alternative to physical mobility. That is, it is about using ICT as the means of

this time and the tendency of research and policy to focus upon individual applications of Internet-enabled accessibility/activity participation. Whilst a number of studies have examined the mobility impacts of Internet use with regard to specific Internet applications – most commonly, teleworking and e-shopping (including Mokhtarian, 1997, 2003; Farag et al, 2006) – few studies to date have assessed the impacts of Internet use upon activity-travel patterns in a more *comprehensive* sense (a trend similarly highlighted by Kwan and Ren, 2004). Studies of the social impacts of Internet use have similarly tended to be focused upon individual applications, in particular, the use of the Internet for healthcare (including Nettleton and Burrows, 2003; Silber, 2003) and in the development and maintenance of social relationships (for example, Kraut, 1998, 2002).

In light of the lack of a definition of virtual mobility that could be used in this study, the following definition has been developed by the author for use in this research:

> Virtual mobility is a shorthand term for the process of accessing activities that traditionally require physical mobility, but which can now be undertaken without recourse to physical travel by the individual undertaking the activity. Thus, virtual mobility creates accessibility opportunities, both substituting for physical mobility and enabling access where previously there was an accessibility deficit.

Virtual mobility is not a new phenomenon. It has been possible for many years, with communications technologies that have allowed us to communicate without being face to face, allowing people to, for example: talk with friends and family and access goods firstly by postal mail, then by telegraph, telephone and fax; receive news or other services by radio, or television; or participate in leisure activities or education in the home, through the printed word. A number of authors discuss these forms of virtual mobility. For example, Standage (1998) presents a lively account of the evolution of the telegraph, discussing the cultural, economic and social impacts of this form of virtual mobility[4]; and the community, economic and spatial impacts of the telephone are considered by Aronson (1977) and by contributors to a comprehensive volume edited by Pool (1978).

"getting to" activities that would previously have required transport - or would have been impossible to do.'

[4] Standage does not use the term 'virtual mobility'.

More recently, virtual mobility has been possible via the Internet[5]. The Internet is unique amongst the communications media considered above, in a number of ways. It provides instant, aural and visual communications, independent of space and time. Communication via the Internet can be multidirectional; and it can be active. The Internet allows the exchange not only of information and money, but also the direct and instantaneous exchange of (dematerialised) goods. In addition, the Internet is distinctive in the sheer volume of communications and information that are accessible; and in the speed at which these goods can be accessed. Finally, the Internet is alone amongst these communications technologies in being introduced at a time and into a culture of mass personal transportation in the UK. As such, virtual mobility, via the Internet, is likely to have different impacts upon both society and transport than virtual mobility through other media. Thus, it is upon this form of virtual mobility that this thesis is focussed and, from this point, reference to virtual mobility is to Internet-enabled virtual mobility alone.

4.3 Rethinking accessibility

Just as there is a considerable literature discussing the conceptualisation, representation and measurement of accessibility[6], so too is there substantial debate regarding the nature of accessibility in the information age[7]. Whilst full discussion is outside the scope of this thesis, this section briefly considers the implications of virtual mobility for three concepts that are central to traditional, geo-spatial definitions of accessibility[8], namely *distance*, *place* and *time*, before highlighting the attendant implications for mobility-related exclusion.

The geo-spatial conceptualisation of accessibility recognises that accessibility is a function of physical proximity and the friction of distance. Accessibility is (largely) determined by: the location of activities (place); the physical distance between locations; and the individual's ability to overcome this distance, using spatial (mobility)

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[5] In fact, Gershuny (2002) suggests that the Internet is not an object of consumption, but is a tool of accessibility, for both virtual and physical activities (the latter referring to the organisation and co-ordination of offline activities via the Internet).
[6] Reviewed in Chapter 3.
[7] This is exemplified by a volume edited by Janelle and Hodge (2000), in which discussion of the approaches to the theory and analysis of accessibility in the information society spans twenty chapters and almost 400 pages. In addition to contributions in this volume and to those mentioned in the text, see Couclelis (forthcoming) for an interesting adaptation of the concept of time-space prisms to incorporate virtual mobility.

technologies to effectively decrease the distance between locations (termed 'time-space convergence'). Accessibility, spatial interaction and participation are therefore structured by distance, place and time and are highly dependent upon physical mobility. As seen in Chapter 3, where physical mobility is lacking, so accessibility and thus activity participation decline, which can result in mobility-related exclusion. However, with virtual mobility, spatial interaction becomes less important for accessibility to and participation in an increasing range of activities. As a result, distance, place and time become less important in determining accessibility, in the following ways.

Distance. Kwan (2000) suggests that, when we access opportunities, services, social networks and other goods via the Internet, 'space-time convergence is literally complete'. The speed at which distance between activity locations can be overcome when using the Internet is so fast[9] that the physical distance between locations is effectively annihilated. In consequence, the physical separation between activity locations has little impact upon the accessibility of the activity and the role of distance in structuring spatial interaction is substantially demised (Couclelis, 2000).

Place. Just as distance declines in importance in determining accessibility, so too does place. Virtual mobility breaks the correspondence between place and function. Couclelis (2004) writes: 'It used to be that the location of a person in daily urban space was a reliable proxy for the activity that person was engaged in at the time... Tell me where you are and I'll tell you what you are doing'. This changes with virtual mobility, such that many activities can be undertaken in any location – and any location can host any activity[10]. Correspondingly, the need for physical movement to change activities is removed and the costs[11] of switching between activities are reduced.

Time. With virtual mobility, time becomes less of a constraint upon accessibility. With time-space convergence and the reduced importance of place, the time taken to travel between activities declines. This has implications not only for the number and range of activities that are temporally accessible, but also for scheduling and for the temporal continuity of each activity. In addition, when conducting activities virtually, it is possible

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[8] Identified in Chapter 3 as the principal conceptual framework underlying the concept of mobility-related exclusion.
[9] Of course, speed of access is determined by the user's connection. With high speed connection, distance is covered almost instantaneously. However, the principle can hold true with slower connections.
[10] If the activity can be undertaken at least in part online.
[11] Including time costs.

for the individual to effectively be in more than one place at one time, conducting more than one activity at a time[12], such that this 'capability constraint' (Hagerstand, 1970) upon activity participation declines.

Thus, virtual mobility loosens the traditionally close links between activity, space and time, such that Kwan (2001) suggests that the Internet renders many activities 'placeless and timeless': able to be conducted anywhere, at any time. As the relationships between accessibility, space and time are changing, so is the relationship between accessibility and physical mobility. Virtual mobility reduces the centrality of physical mobility in the conceptualisation, representation and measurement of accessibility, with attendant implications for mobility-related exclusion. Accessibility and the ability to participate may no longer be contingent upon the ability to physically travel. Virtual mobility can enable access to activity participation without recourse to physical mobility by the individual undertaking the activity. In consequence, virtual mobility could reduce mobility-related exclusion, by both supplementing and substituting for physical mobility.

The following sections illustrate this hypothesis, drawing upon the literature to examine the possible impacts of virtual mobility for mobility-related exclusion in each of the nine dimensions of exclusion[13].

4.4 Virtual mobility in the nine dimensions of social exclusion

4.4.1 Economic

Improved access to employment has been the main focus of both policy and research in the economic dimension of social exclusion. The literature demonstrates that virtual mobility can have an impact upon all stages of the employment process, from the development of skills to the conduct of the job itself.

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[12] Termed 'multitasking'. The concept of multitasking and its importance for this thesis are discussed in full in Chapter 11.

[13] The examples given in each dimension are illustrative, not exhaustive. It is not the intention of this chapter to suggest that the provision of access and opportunity necessarily equates with use, rather to highlight the potential for participation that arises through virtual accessibility. Furthermore, it is not intended to suggest that *all* aspects of exclusion can be alleviated through the provision of virtual mobility, rather, to highlight factors that can be alleviated.

Braithwaite and Johnson (2000), Chow et al (2000) and Robson (2001) each present case study evidence of the role of virtual mobility in improving *skills* and employability, by extending access to learning opportunities. The same sources highlight the importance of virtual mobility for providing *information* about jobs, which can substantially cut the monetary and time costs of the job search, by eliminating the need to physically travel to job centres. In their review of the government's Job Centre Plus web site, McQuaid et al (2003) identify this to be a particular benefit in rural areas. The same source identifies a role for such online services in building social networks through which employment information can be distributed, reflecting the importance of social networks in employment chances (supported by Hanson, 2000). People can gain advice about their job *application*, including the format of their curriculum vitae.. The ability to apply for jobs online can simplify and speed the job search process – and can give people who are homeless a permanent 'address' at which they can be contacted (Grieco et al, 2000). The *interview* can also be conducted virtually, using teleconferencing facilities.

Finally, a number of authors highlight the benefits of virtual mobility in increasing the accessibility of the *job itself*, by removing spatial and mobility barriers to employment:

> Granted, if you make pizzas you need to be close to the dough; if you're a surgeon you must be close to your patients (at least for the next two decades). But if your trade involves bits (not atoms) you probably don't need to be anywhere specific - at least most of the time.
> Negroponte, cited BT, 2004.

A review of the Cybermoor Wired Up Community[14] (Cybermoor, 2004) found that 8 people gained employment as a direct result of being able to telework. The benefits of the Internet in facilitating self employment and the development of small businesses are also supported by the Cybermoor experience (see also Golob, 2001; PAT 15, 2000; The Planning Exchange, nd).

Virtual mobility also enables access to alternative forms of credit and exchange. In addition to access to information and purchase from conventional banks and shops, without recourse to physical mobility, virtual mobility gives access to informal markets, allowing people to sell their own products online. Recent research by CEBR suggests that 50,000 people in the UK currently buy and sell in online auction sites and that

selling on such sites can boost average household income by £3,000 per annum. 1.3 percent of total UK retail sales is now through auction site eBay (reported in BBC, 2005a). In addition, online local exchange and trading schemes (LETS) allow the exchange of both material and immaterial goods in non-monetary exchange. Credit can be obtained through credit unions and other, informal, schemes, opening up the possibility of credit to those who would be unable to access or afford credit from conventional lenders.

Table 4.1 provides examples of virtual mobility in the economic dimension of exclusion, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Employment: job skills; vacancies posted; applications; employment advice and training.	www.learndirect.co.uk; www.jobcentreplus.gov.uk; www.manpower.co.uk.
Credit: alternative forms of credit and exchange.	www.letslinkuk.org; www.zopa.co.uk; www.ebay.com.

Table 4.1. Virtual mobility in the economic dimension of social exclusion

4.4.2 Living space

The principal way in which virtual mobility can overcome social exclusion in the living space dimension is through the provision of virtual access to services that are not accessible or available in the local environment. Banking, education (at all levels, from basic skills to higher degrees), employment services, entertainment, healthcare, hobbies, religion, shopping (for all types of goods), social support groups – all are accessible online. The benefits of e-services for people living in deprived urban communities are highlighted by authors including Hellawell (2001); in rural areas by authors including The Countryside Agency (2002); and for scattered populations of social exclusion by Hine and Grieco (2003) (each in addition to the case studies mentioned in the economic dimension, above). Taking the example of healthcare and health support services, Silber (2003) discusses the application of virtual mobility to overcome spatial and temporal barriers to healthcare 'across the whole range of functions that affect healthcare, from diagnosis to follow up'. Silber discusses

[14] The majority of the 938 homes in the remote rural town of Alston, Cumbria, were given free

examples, from both the patient and healthcare professionals' perspective, of online: consultation; diagnosis; administration of prescriptions; medical information and patient education; medical training; networks of patients; networks of professionals; and 'telemonitoring' of patients[15]. This is supported by examples given in SEU (2005), for example, sexual health outreach to young women and the use of the Internet by ambulance staff to consult with hospital staff. It is even possible to receive *treatment* online (Fearfighter.com, nd). Whilst many of these services are not yet universally available in the UK, because of both technological and legal barriers (Future Health Bulletin, 2002), Martinez (2000) suggests that 20 percent of the Spanish population will be diagnosed from home by 2010. Outside of formal healthcare provision, more and more people are accessing informal health support online. Thus, Fox (2005) finds that 80 percent of the online population in the USA have accessed online healthcare information and support. Studies including Burrows et al (2000) and Nettleton and Burrows (2003) examine the efficacy and role of online healthcare support groups, finding a positive role for the same in supporting positive health outcomes.

Finally, should virtual mobility reduce present levels of physical mobility, or stem future increases, the local ecological environment is likely to benefit, with less pollution, reduced land take and safer streets encouraging greater sociability and safer play.

Table 4.2 provides examples of virtual mobility in the living space dimension of exclusion, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Overcoming the lack of local services: education, entertainment, religion, shopping.	www.learndirect.com; www.gala-bingo.co.uk; www.allsouls.org; www.tesco.com.
Healthcare: formal and informal healthcare information and advice.	www.nhsdirect.nhs.uk; www.ovacome.org.uk; www.fearfighter.com.

Table 4.2. Virtual mobility in the living space dimension of social exclusion

computers with Internet access as part of the Government's Wired Up Communities scheme.
[15] Silber cites examples of teledermatology, telepsychiatry, telecardiology, teleradiology and telesurgery.

4.4.3 Mobility

The role of virtual mobility in enhancing accessibility (thus addressing the problem of too *little* mobility) is considered within the other dimensions of social exclusion. This section considers the potential impact of virtual mobility upon the problem of too *much* mobility.

Whilst the impacts of virtual mobility upon physical mobility are unclear, a number of sources support the suggestion that virtual access leads to a decrease in both passenger/vehicle miles travelled (PMT/VMT) and trips made per person, per year[16]. A comprehensive review of the literature regarding the impact of ICTs upon travel and freight (DTLR, 2002) found evidence for a reduction in travel in terms of both PMT and VMT as a consequence of the use of ICTs. Since this review, BT (2004) have found that teleworking, business mileage and personal business mileage could lead to an overall reduction in car mileage (should each of these services be used to their maximum benefit) of six percent for the UK population as a whole. Choo et al (2005) support the suggestion that telecommuting reduces VMT. Their analysis finds a reduction in annual VMT for the US population in 1998 of 0.8 percent, attributable to teleworking, a figure that is likely to have increased in the intervening years with greater telecommuting take up. De Graff (2004) finds, not only that teleworking does not act as a generator of travel demand, but that it causes a drop in total travel demand, leading to a reduction in PMT and VMT that is not offset by additional trips, or trips made on non-teleworking days. Such aggregate studies are supported by individual case study evidence. For example, the Cybermoor evaluation study suggests that 20 percent of households believe that they are reducing the amount that they travel because of their increased use of their computers (Cybermoor, 2004).

A reduction in VMT is likely to reduce the negative externalities of transport, including environmental and spatial disbenefits, which is likely to positively impact upon quality of life in many of the dimensions of social exclusion, as discussed in Chapter 3.

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[16] Despite the following, it should be noted that the varying quality of methodologies and thus data collected, including the use of cross-sectional data, analysis at an aggregate rather than an individual level, the nature of the participants in studies and the comparison of incompatible datasets, renders it difficult to conclusively state that virtual mobility leads to a reduction in physical mobility. This will be seen in Section 4.5.1 of this chapter.

4.4.4 Personal

The benefits of virtual mobility in the personal dimension involve the overcoming of the limitations imposed by individual characteristics[17], which influence our position in society and other people's attitudes towards us. This thesis suggests a number of ways in which this is possible:

- Using virtual mobility to mask the characteristic;
- Using virtual mobility to overcome physical accessibility problems related to the characteristic;
- Using virtual mobility to overcome the characteristic itself, or the limitations thereof; and
- Using virtual mobility to provide access to others with similar characteristics.

Society's attitudes towards personal characteristics can be exclusionary. Discrimination on the basis of gender, for example, is widely recognised as a continuing problem in British society, in all areas of life[18]. Masking these characteristics may lead to greater equality in personal and professional interactions and greater access to participation. Mowbray (2001) writes: 'Gender masking.. [can] lead to greater freedom from harassment and from stereotyping' – an observation that may also apply for other characteristics, including age, disability and ethnicity. Watt et al (2002) discuss the ability of virtual mobility to conceal 'stigmatised identities', enabling more equitable interaction, with consequent benefits for self esteem. Thus, a participant in a study by Pilling et al (2004) states: 'People on the other end do not know I'm disabled', thus enabling him/her to participate, personally and professionally, on an equal footing.

As discussed in Chapter 3, personal characteristics can reduce physical accessibility. Virtual mobility can overcome these accessibility difficulties. Thus, Pilling et al (2004) present questionnaire and focus group evidence for the use of virtual mobility in overcoming difficulties in physical accessibility for people with disabilities. Hellawell (2001) discusses the role of virtual mobility in increasing accessibility for people with

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[17] Not only by the characteristics themselves, as is the case for example with education, but also by societal attitudes towards individual characteristics, including class, disability and sexuality.

[18] It is important to note that discrimination can be both active, in which the perpetrator consciously discriminates, or it can be passive, in which discrimination is subconscious, born out of cultural norms, rather than chosen beliefs.

childcare responsibilities. Age Concern (2001) find the same for older people. Virtual mobility can overcome the characteristic itself, for example, in the case of education and skills, by providing access to the same or by raising self esteem and confidence (CLES, 2003). Cummings et al (2002) discuss the use of the Internet as a tool for participation by people with hearing loss, Graham (2002) by homeless people, Hellawell (2001) by former prisoners and The Planning Exchange (nd) by those with language and literacy problems, each using virtual mobility to overcome the constraint to participation in activities that is imposed by their personal characteristic(s). Finally, virtual mobility is also used to overcome the isolation experienced by people with personal characteristics uncommon in their physical environment. For example, for homosexual men, particularly those in rural areas, '[b]eing attached to the whole global village that is Gaydar means they aren't so isolated' (McLean, 2002).

Table 4.3 provides examples of virtual mobility in the personal dimension, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Overcoming limitations: new opportunities for participation.	www.rnib.org.uk; www.parkinson.org; www.gayyouth.co.uk; www.geocities.com/heartland/prairie/4727/bhnew.htm.

Table 4.3. Virtual mobility in the personal dimension of social exclusion

4.4.5 Personal political

The principal way in which virtual mobility can influence the personal political dimension – the ability to make decisions over one's life – is in providing access to information. Thus, Hanson (2000) suggests that information is the key, ultimately, to equality and inclusion. With virtual mobility, she suggests, geography is no longer a limit to the accessibility of this information.

A number of authors highlight the role of the Internet in empowering people through information, primarily, healthcare information. Nettleton and Burrows (2003) discuss the role of healthcare information in supporting reflexivity, suggesting that healthcare is 'escaping' the control of professionals. During this process of de-professionalisation,

the line between expert and non-expert is blurred, resulting in the greater democratisation of healthcare and popular empowerment. Case studies by Hellawell (2001) highlight the role of the Internet in providing access to information and advice for children in care, mothers with mental illness and muslim women. The same author stresses that such groups use the Internet not only to gather information, but to provide a voice, where previously their concerns and viewpoints were concealed, if not suppressed. Finally, empowerment is not only vis-à-vis professionals, or other groups in society: Pastore (nd) examines the role of information in empowering parents within their own family.

Table 4.4 provides examples of virtual mobility in the personal political dimension, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Empowerment through access to information: single issue support groups; legal information.	www.prisonersfamilies.org.uk; www.raisingkids.co.uk; www.adviceguide.org.uk; www.justask.org.uk.

Table 4.4. Virtual mobility in the personal political dimension of social exclusion

4.4.6 Organised political

Beardon and Whitehouse (1993) highlight a number of ways in which virtual mobility can influence organised politics:

- Enhancing access to information;
- Enhancing access to participation; and
- Increasing the efficiency of public administration.

Just as information is empowering within the personal political dimension, so it is in organised politics. Cerf (cited in Holcomb et al, 2003) asserts: 'Information is the torch of truth, and its free flow is the bloodstream of democracy', enabling citizens to more effectively interact with and challenge government.

Virtual mobility enables more effective participation in a number of ways: providing access to information; supporting citizen associations and pressure groups; and

providing access to representatives. Klein (1999) discusses the role of the Internet in supporting the development and maintenance of citizen associations. Drawing on Tocqueville, Klein highlights the essential role of citizen associations in democracy, before considering the accessibility barriers to participation in such forums and the ability of virtual mobility to overcome these barriers:

> Participation in forums suffers from numerous barriers, however, such as the need to meet in one common place, the need to meet at one common time, and the potentially high costs of participation. Online forums on the Internet avoid many of these barriers, and thus they hold the promise of facilitating the formation and operation of citizen associations.
> Klein, 1999.

This is supported by Horton (2004) in his study of the use of the Internet by environmental activists as a tool for information, lobbying and organising and by contributors to a conference on the use of the Internet by young people for participation in organised politics (CIRA, 2005). A number of authors provide case study examples of community action, facilitated by virtual mobility. For example, Mele (1999) details the fight by the citizens of Jervay to gain control of the redevelopment of their housing estate. Using the Internet, residents were able to join together and act collectively, gaining access to: decision makers; information; support from people fighting similar battles in other neighbourhoods; sympathisers offering skilled support; and each other (see also Katz and Rice, 2002; Loader and Keeble, 2004). Online organised politics is not only effective at the local level. In their edited text, McCaughey and Ayers (2005) present discussion of the use of the Internet for the promotion of democratisation in Mexico, the promotion of human rights and protest against the World Bank. Gibson et al (2002) find that new populations not previously involved in (offline) political activity are attracted to activism and engagement, as a result of increased awareness, the ease with which they can access information and the ease of participating and exerting political pressure through virtual mobility. Improved communication with elected representatives through virtual mobility is discussed by Coleman (2001) and Horrigan (2004). The provision of government services online can boost the accessibility of these services, improving the efficiency of service delivery (Hudson, 2003; Office of the e-envoy, 2003; Selwyn, 2003). Thus, recent government research suggests that low income groups who have Internet access make more use of public services than those who do not (PMSU, 2005).

Of course, the provision of access to tools for political participation does not in itself ensure participation. As is the case for all opportunities, services, social networks and other goods detailed in this chapter, the provision of access must be accompanied by factors including ability and desire to participate. However, it remains the case that virtual mobility can and does provide access to many tools for political participation, without recourse to physical mobility, extending the opportunity to participate in the exercise of democracy.

Table 4.5 provides examples of virtual mobility in the organised political dimension, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Enhanced democratic participation: participation in the political process through political parties, pressure groups.	www.labour.org.uk; www.foe.gov.uk; www.headsup.org.uk; www.petitiononline.com.
Enhanced contact with government: government consultations, contact with political representatives, online form filling, government information provision.	www.airconsult.gov.uk; www.faxyourmp.com; www.inlandrevenue.gov.uk; www.parliament.gov.uk.

Table 4.5. Virtual mobility in the organised political dimension of social exclusion

4.4.7 Social networks

A review of research into the social impacts of Internet use suggests that virtual mobility, through bulletin boards, chat rooms, email and instant messaging, can have positive effects for both offline and online social networks; and that it can support the maintenance of existing social networks, whilst also facilitating the development of new relationships.

A number of authors report the beneficial effects of virtual mobility for geographical communities. Evaluation studies of community Internet facilities discuss the increase in community cohesion and integration following the provision of both physical and virtual space in which community members can meet, talk and interact[19]. Hellawell (2001) discusses the value of community networks, or Intranets, which provide

[19] References for the evaluation of community Internet facilities are given in Section 4.4.8 and are not listed here, to avoid repetition.

discussion space for the geographical community. Highlighting the Redbricks initiative, where residents on the Bentley House estate in Manchester established a community initiative to provide Internet access to all homes for just £3 per week, Hellawell explores the development of community online, following the provision of public space in cyberspace. Hellawell suggests that the Internet provides a 'virtual garden fence' for residents, increasing interaction and building social networks. Following a two-year ethnographic study of the wired-up suburb of 'Netville', in which high-speed Internet access was provided free of charge to many residents, Hampton (2002a, 2002b, 2003) found beneficial effects of the community network for offline public participation, community involvement and the growth of local social networks, leading him to conclude that community networks could challenge the decline in social capital documented by Putnam (1995):

> Compared to non-wired residents, wired residents recognized three times as many of their neighbors, talked to those neighbors twice as often, visited them 50 percent more often, made four times as many local phone calls, and further boosted their local communication with neighbors through the use of email.
> Hampton, 2002a.

The above studies suggest that virtual mobility is effective in *generating* social networks. However, virtual mobility is also effective in *preserving* social networks, boosting contact (both online and offline) with existing social networks, outside of these community-based initiatives, through email, messenger and chat room services and through web sites dedicated to reuniting family and friends. For example, Boneva et al (2001) find that virtual mobility supplements contact with offline social networks, reviving communications with distant ties, both family and friends, enabling individuals to maintain contact with people who would otherwise be lost from the social network. Davies (2003) finds that virtual mobility enables greater contact with offline social networks, such that these networks are made stronger. Davies suggests that virtual mobility is effective in transforming weak ties to strong ties, by increasing the ease, speed and thus volume of contact within social networks. Haythornthwaite and Wellman (2002) similarly find that contact with existing friends and with family, particularly those who are geographically distant, increases with Internet use, suggesting that virtual mobility fulfils a latent demand for contact with geographically distant social networks[20]. This is supported by Watt et al (2002), who find that 94

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[20] Chow et al (2000) find that this is especially valuable for families of asylum seekers; Age Concern (2001) reports particular benefits for elderly people, enabling them to keep in touch

percent of users find that virtual mobility makes keeping in touch with existing social networks easier. Finally, a recent substantial study by Boase et al (2006) highlights the role of the Internet in maintaining social networks, supplementing rather than replacing other forms of contact with both core and significant ties.

Virtual mobility is also effective in generating social networks in *virtual* communities, enabling people to connect in ways that they desire, but otherwise struggle to do, because of spatio-temporal barriers[21]. Thus, individuals can interact with others, anywhere and at any time, regardless of geographical location, mobility and time of day. There are numerous examples in the literature of the success of virtual communities in providing access to social interaction and social support. Amongst these, Rheingold (2000) discusses the WELL, a virtual community to which he belongs:

> People in virtual communities use words on screens to exchange pleasantries and argue, engage in intellectual discourse, conduct commerce, exchange knowledge, share emotional support, make plans, brainstorm, gossip, feud, fall in love, find friends and lose them, play games, flirt, create a little high art and a lot of idle talk. People in virtual communities do just about everything people do in real life, but we leave our bodies behind.
>
> Rheingold, 2000.

In addition to such broad-based communities, the Internet has enabled the creation of communities of interest. A substantial body of literature has developed around the evaluation of such communities, in particular, those that are 'problem-based' – providing contact between individuals experiencing specific difficulties. For example, Mickelson (1997) discusses a virtual support group for parents with special needs children; Nettleton et al (2002) examine online social networks built around child immunisation, debt, depression, diabetes, eczema, food safety and physical disability; Pleace et al (2000), an online self-help group for alcoholism. Muncer et al (2000) find such communities to be highly effective in providing three of the four types of social support identified by Cohen and Wills, identifying positive outcomes with regard to social companionship, informational and esteem support[22]. Similar evaluations are given by studies including Preece et al (2001), Shaw and Gant (2002), Wellman

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with their geographically distant families; and BBC (2005b) reports research into elderly use of the Internet for maintenance of distant social networks.

[21] Personal barriers to social interaction are discussed in Section 4.4.4.

[22] The authors find that such groups are less successful in providing instrumental support, that is, support which is physical or practical, such as babysitting, or gift giving, which they attribute to their virtual, non-geographic nature.

(1999a) and Wellman and Gulia (1999), each highlighting the positive social and psychological outcomes associated with online interaction.

Table 4.6 provides examples of virtual mobility in the social networks dimension, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Building offline social networks: geographically-based communities	www.redbricks.org.uk; www.beonline.org.uk; www.newham.org.uk.
Building online social networks: virtual communities of interest	www.well.org; www.icq.com; www.gaydar.co.uk.
Preserving social networks: maintaining and re-establishing contact with family and friends	www.friendsreunited.co.uk; www.redcross.org.uk; www.aim.com.

Table 4.6. Virtual mobility in the social networks dimension of social exclusion

4.4.8 Societal

Inevitably, many factors within the societal dimension – for example, civic engagement, education, employment, healthcare and social interaction – have been discussed within the other dimensions, at the individual level. However, each of these factors additionally has an impact upon society as a whole. Thus, this subsection highlights the role of virtual mobility at the societal level, with a focus upon community regeneration in deprived communities.

Many case studies present evidence of increased social capital and social integration through the use of the Internet, largely (but not exclusively) with reference to the evaluation of community Internet facilities. Thus, Braithwaite and Johnson (2000), CLES (2003), Drewe et al (2003), Hall Aitken Associates (2002), Harris and Dudley (2002), Robson (2001) and Stepulevage and Thomas (2001) each describe the positive regeneration outcomes of community Internet centres, in personal and community development. The studies highlight the positive community impact of individual development. For example, rising levels of employment tend to increase the wealth of the community, contributing towards increased provision of services and a reduction in crime. Similarly, education does not stay with the individual, it is passed on, within the family and wider social networks; and more highly educated individuals

are more likely to become involved in the community, building social capital. Authors also discuss the increased tolerance and understanding that results not only from personal development, but also from chance encounters within community facilities. Community building can be assisted through information, for example, information about school fetes, or local history; and by online interaction, including community discussion groups and online neighbourhood watch, which often lead to offline interactions. Wellman and Hampton (2003) provide in depth discussion of the use of the Internet in building local communities, through the development of social networks. Finally, just providing Internet facilities can send a powerful message to residents about self worth and trust, immediately increasing community confidence and providing a boost to the regeneration process.

Table 4.7 provides examples of virtual mobility in the societal dimension, with links to example web sites.

Exclusionary factor	*Illustrative URL*
Enhancing the community: community building, community policing, community consultation.	www.neighbourhoodwatch.net; www.bbc.co.uk/crime; www.ebvonline.org; www.edemocracy.gov.uk.

Table 4.7. Virtual mobility in the societal dimension of social exclusion

4.4.9 Temporal

As discussed in Section 4.3, time directly influences accessibility and the ability to participate in activities. By facilitating time-space convergence, virtual mobility can remove travel time, overcoming temporal barriers to participation. This has the effect not only of increasing the accessibility of activities that were previously inaccessible, as discussed in many of the above subsections, but also of reducing travel time, thus freeing up time. In addition, it may also be quicker to perform the activity itself online. The time saved through the removal of travel time and the reduction of activity time can then be reinvested in other activities (Gershuny, 2002). It is in this sense that Robinson et al (2002) suggest that virtual mobility is a 'time enhancer... allowing one to be more productive in use of time.' It is possible that time saved in this way could be traded (online) in LETS as an alternative currency – which MacGillivray and Boyle (2001) term 't-commerce'.

Whilst virtual mobility cannot *create* time, it may create additional activity participation opportunities by facilitating multitasking: increasing time *density*, such that more activities can be undertaken at one time, because of the reduced spatial and temporal dependence of activities when they can be conducted online. Chapter 11 discusses multitasking in full, including: its definition; its impact upon our understanding of time use; the influence of Internet use upon multitasking; and the impacts of this for activity participation and travel.

4.4.10 Summary

The above sections support the hypothesis that virtual mobility could alleviate aspects of mobility-related exclusion, highlighting the accessibility benefits of virtual mobility for mobility-related exclusion in each of the nine dimensions of exclusion. However, whilst there is considerable evidence supporting the contention that virtual mobility can have positive effects through its accessibility function, there is also substantial debate within the literature concerning the negative effects of virtual mobility. There are three principal concerns regarding the impact of virtual mobility for social exclusion: the potential negative mobility impacts; potentially negative social impacts; and the unequal distribution of access to virtual mobility. The following section considers each of these in turn.

4.5 A 'virtual mobility-related dimension' to social exclusion?

4.5.1 Negative mobility effects

The effects of ICTs upon transport have long been discussed. Salomon, in his seminal paper, cites more than thirty studies into the impacts of ICTs upon travel at the time of publication in 1986. In this paper, Salomon hypothesises three potential impacts of ICTs upon travel: *substitution*, where journeys are replaced as a result of the use of ICTs; *complementarity*, where technologies and transport work together and there is no trade off between the two; and *enhancement*, where the number of trips and PMT increases as a result of the use of ICTs. Whilst the technologies under scrutiny have developed apace, Salomon's framework for the analysis of change has received little modification. In 2002, in light of technological change and academic advance,

Salomon, with co-author Mokhtarian (Mokhtarian and Salomon, 2002), amended the three-fold classification of impacts to the following, four-fold typology of relationships:

(1) Substitution – the elimination or reduction of travel, as a result of telecommunications use;
(2) Generation – the stimulation of travel, as a result of telecommunications use;
(3) Modification – alteration of the time, mode, destination, route or other characteristics of a planned trip, as a result of telecommunications use;
(4) Neutrality – telecommunications use has no effect upon individual travel.

Whilst Mokhtarian and Salomon are keen to stress that the potential relationships are not mutually exclusive (with the exception of (4)), a review of the literature reveals polarisation, such that the debate has become primarily that of substitution versus generation. The hypothesis that virtual mobility will have beneficial effects for mobility-related exclusion is premised upon the further hypothesis that virtual mobility will *substitute* for, or, at least, will substitute for an increase in, physical mobility. The evidence for a substitution effect is given in Section 4.4.3. Should virtual mobility *generate* physical mobility, however, mobility-related exclusion is likely to increase, as the negative effects of too much mobility are compounded and the benefits of virtual mobility negated. The reduction in mobility-related exclusion is similarly likely to be moderated if the relationship is that of modification or neutrality.

The suggestion that Internet use will generate physical mobility is supported by a substantial body of literature. Authors including Adams (2000), Black (2001), Couclelis (2000), Graham (1998), Graham and Marvin (1999), Mokhtarian (2003, 2004), Mokhtarian and Salomon (2002) and Niles (1994) highlight the likely role for ICTs in generating travel. Such authors propose that, whilst direct, short term effects of virtual mobility may suggest substitution for physical mobility, for individual trips, indirect, long term effects are likely to increase physical mobility. For example, the use of ICTs may eliminate the primary trip purpose, but chained activities undertaken in the course of the trip, for example, escorting children to school, shopping or posting a letter, continue to require travel. Furthermore, secondary functions of the activity, for example, the social benefits of shopping, are unlikely to be fulfilled through the online activity. Thus, it is suggested that the notion of substitutable activities based solely on functional equivalence of the *primary* function may be flawed. As such, if the primary function is undertaken online, travel is likely to continue to be necessary to fulfil the secondary function. In each case, not only does virtual mobility fail to substitute for physical

mobility, it may generate it, as formerly chained activities or secondary functions are made as several separate trips.

The increased temporal flexibility attendant with virtual mobility may reduce constraints upon time available for travel, thus the timing of activities can be reconfigured to allow greater mobility. 'In effect the teleworker could begin work at 7am and work straight through until 2pm and have the remaining three and one-half to four hours for driving' (Black, 2001). Virtual mobility may increase the user's perceptual space and contact set, each in turn increasing travel horizons and thus travel. ICTs allow travel time to be used more effectively, which may enhance mobility (see also Laurier, 2004; Lyons and Urry, 2005); and ICTs allow activities to be conducted more quickly, freeing up time for travel. The productive use of travel time, alongside a reduction in the frequency and number of trips because of virtual mobility, may increase tolerance of distance and thus promote long-term changes in land use patterns, contributing towards the dissolution of cities and suburban sprawl (an observed effect of the telephone (Gottman, 1978)). This trend is supported by the fragmentation of activities and the closure of local services, each of which, authors suggest, can occur as a by-product of virtual mobility. Finally, whilst *personal* mobility may decline through virtual mobility, the opposite may be true at the aggregate level. Latent demand may be realised by other road users taking advantage of liberated road space, or by other household members, who can make use of the liberated car; those using virtual mobility may be public transport or car share users and the resultant decline in use may close services, resulting in higher car use; and freight transport is likely increase.

Many of the above hypothesised effects draw upon two related theories of travel behaviour: (1), that humans possess an intrinsic desire to travel, which is manifested in the observed constant travel time budget (Mokhtarian and Chen, 2004; Salomon, 1986); and (2), that travel is not merely a derived demand, as is suggested in activity-based theories of traveller behaviour, but has an intrinsic positive utility (Mokhtarian, 2005; Mokhtarian and Salomon, 2001; Ory and Mokhtarian, 2005). The definition of accessibility given in this thesis highlights physical mobility as an accessibility function alone. Thus, it has been suggested that virtual mobility may provide a *functional equivalence*, substituting for this accessibility function (Gershuny, 2002). However, this functionalist approach is likely to be flawed if mobility fulfils *additional* functions, suggested by the above authors to comprise positive psychological benefits and pleasures including: adventure seeking; control; conquest of nature; escape; exposure to the environment, scenery and other amenities; independence; physical exercise;

status; the provision of a barrier between activities; the therapeutic value of movement/travel; and variety seeking[23]. Such authors suggest that the inherent desire to travel and the intrinsic value placed upon physical mobility are therefore likely to influence the impact of virtual mobility, potentially influencing not only the substitution of existing physical mobility, but also the ability of virtual mobility to fill latent demand for accessibility. A separate body of literature additionally identifies habit as a central influence upon travel behaviour (including, Aarts et al, 1997; Thorgersen, 2001), which may also limit the potential for virtual mobility to substitute for physical mobility.

The hypothesis that virtual mobility is likely to generate physical mobility is supported by a number of empirical studies. For example, Mokhtarian (including 1997; 2003) finds that teleworking leads to an increase in physical mobility; Hjorthol (2001) finds links between home computer use and physical mobility; and Tayyaran et al (2003) find a positive correlation between ICT use and residential relocation to suburban areas. Mokhtarian and Salomon (2002), in their review of empirical studies, whilst accepting mixed effects at application-specific and aggregate levels, 'find the evidence for a *net* relationship of mutual complementarity between telecommunications and travel to be compelling' (emphasis in original). Furthermore, anecdotal evidence from initiatives to reduce social exclusion, alongside statistical evidence linking rising income with rising car ownership (DfT, 2005), suggests that car ownership remains a strong desire and is often a first purchase once incomes rise. Thus, should virtual mobility succeed in reducing (income-related) social exclusion, it may result in increasing car ownership.

There have been many theoretical and empirical challenges to the assertion that virtual mobility increases physical mobility and it is to these challenges that this chapter now turns. Many of the studies cited above are 'armchair exercises' (Mokhtarian and Salomon, 2002), drawing upon opinion and historical trends, rather than observed, current data. Of the empirical studies, many are: based upon data collected before the advent of (popular) Internet use; are application-specific, generally examining the impact of teleworking; are population-specific, examining behavioural change amongst early adopters and white collar (teleworking) professionals; and are based upon small sample sizes, in limited geographical areas. Many draw upon stated rather than revealed preference data; are questionnaire-based, retrospective recall studies; are cross-sectional; and use data not collected for the purpose of analysing behavioural change with regard to physical and virtual mobility. For example, Mokhtarian (1997)

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[23] This literature draws heavily upon the sociological literature discussing the car culture and ideology of automobility, including Aird (1972), Flink (1975), Freund and Martin (1993), Gartman

reports evidence from a sample of 34; Mokhtarian (2003) draws upon studies conducted in the early 1990s; and Hjorthol (2001) combines two disparate data sources, a travel survey and a computer use survey, taken from 1997. In addition, there is little evidence to support the constant travel time budget theory at the individual level (conceded by Mokhtarian and Chen, 2004). Similarly, there is little evidence to support the concept of an intrinsic utility of *travel*, as opposed to a utility for the *activities* that are undertaken whilst travelling. Indeed, the literature tends to confuse the two. Furthermore, there is a substantial body of literature, as cited in Section 4.4.3, challenging the enhancement theory.

Finally, the relevance of such arguments for those experience a mobility deficit can be questioned, for their mobility, already restricted, is unlikely to increase in response to Internet use. However, the possibility that this relationship exists has substantial implications for mobility-related exclusion, at a system level. Whilst the ability of virtual mobility to provide accessibility to opportunities, services, social networks and other goods in each of the dimensions of exclusion is not challenged by the above studies, the benefits of such accessibility are likely to be negated if virtual mobility generates travel. Should this be the case, the negative effects of mobility are likely to intensify, such that those with inadequate access to physical mobility may experience further exclusion as physical accessibility grows in importance, as discussed in Chapter 3.

4.5.2 Negative social effects

Just as debate regarding the mobility effects of virtual mobility has become increasingly polarised, so has that considering the social effects. Whilst many authors highlight positive social outcomes, as detailed above, there are concerns that Internet use will have negative social implications for both the individual user and for society as a whole.

In their highly influential study regarding the impacts of Internet use upon individual well being, Kraut et al (1998) found that Internet use is associated with an increase in social isolation and a decline in psychological well being:

(1994), Gorz (1979), Illich (1974), Sachs (1992) and Whitelegg (1997).

> '... greater use of the Internet was associated with declines in participants' communication with family members in the household, declines in the size of their social circle, and increases in their depression and loneliness.'
> Kraut et al, 1998.

Nie and Erbring (2000) and Nie et al (2002) found similarly:

> 'In short, no matter how time online is measured, and no matter which type of social activity is considered, time spent on the Internet reduces time spent in face-to-face relationships, and concomitantly increases time spent alone.'
> Nie et al, 2002.

Further concerns have been expressed regarding deception and misrepresentation arising from the masking of identity in the online world, discussed by Cornwell and Lundgren (2001) with regard to the development of romantic relationships and frequently by the popular press with regard to paedophiles posing as young children (for example BBC, 2004). There is also concern that the quality of online relationships is inferior to those offline. Thus, Helgeson et al (2000) find that online relationships are primarily characterised by weak ties. Furthermore, where online time detracts from offline social networks, strong ties can be substituted for weak, reducing social support. Adams (2000) expresses concern that online time will displace time spent in offline social networks, leading to the decline of spatial communities – which Castells terms 'disconnecting from the city' (cited Graham, 2002). Alstyne and Brynjolfsson (1997) discuss 'cyber balkanisation' – the fragmentation of society, as the social heterogeneity inherent in geographic communities gives way to online homogeneity, as people choose with whom they interact and the opportunity for serendipitous encounters with those outside of the chosen circle declines. The authors express concern that this will lead to prejudice and polarisation. Burrows et al (2005) express concern with regard to *offline* balkanisation: that online neighbourhood information systems may lead to polarisation of geographical neighbourhoods, functioning as 'social sorting software'. Graham (2002) expresses associated fears that the Internet enhances the power of the powerful, furthering their cultural dominance and suppressing cultural and social diversity.

It is important to note that the conclusions drawn from each of the above studies have been contradicted in the literature, challenged on a similar basis to those discussed in Section 4.5.1. Indeed, the findings reported in Kraut et al (1998) have been discredited by the authors themselves. In their 2002 paper, the same authors contradict their

earlier findings, after repeating their study with both their original sample and a fresh sample, such that their second study finds positive effects for social involvement and well being. Reflecting upon the changing nature of the Internet population and Internet use, Kraut et al (2002) suggest that those first attracted to the net are not representative of Internet users in demographics, personality, usage and thus reactions. In addition, the authors find that Internet use changes, such that more extreme usage is moderated over time. The authors are also critical of their initial methodological approach. Haythornthwaite and Wellman (2002) similarly find that studies based on early adopters are more reflective of the characteristics of the sample than of the impacts of Internet use. Gershuny (2002) suggests that the findings reported in Nie et al are based upon flawed methodology and are thus invalid[24]. Hardey (2004) finds limited evidence of deception and misrepresentation in online dating; Cummings et al (2002) find that online ties can be as strong as those offline – indeed, that they can strengthen offline relationships. Wellman (1999b) suggests that community is not a 'zero sum game', where membership of one community necessitates withdrawal from another. Davies (2003) suggests the same with respect to online and offline relationships. This is supported by quantitative research by Boase et al (2006), which finds that Internet users have substantially larger social networks than non-users. Harris (2002) challenges the notion of cyber balkanisation, finding evidence for the existence of a global cyber village; and Burrows et al (2005) admit to finding little supporting evidence for their claim of geographical balkanisation.

Whilst empirical evidence suggests that concern regarding the negative social impacts of virtual mobility is unproven, the possibility that virtual mobility may have negative social impacts remains. Should virtual mobility be found to have negative social effects, such that social exclusion is seen to increase, its use as a tool to alleviate mobility-related exclusion may not be appropriate. In the least, strategies should be in place to monitor and mitigate such negative effects. Similarly, if the quality of activity participation via virtual mobility is lower than that achieved through physical mobility, there is a danger that virtual mobility will become 'the poor man's mobility', thus that those reliant upon virtual mobility will be disadvantaged.

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[24] In this paper, Gershuny also discusses the notion of functional equivalence of online communications for face to face communications, dismissing Nie et al's assertion that online communications are inferior in their social function to face to face communications.

4.5.3 The 'digital divide'

There is evidence to suggest that there is a 'digital divide' in the UK: a gap in access to and thus use of virtual mobility, which is determined by an individual's characteristics. This suggests that people who are traditionally considered to be vulnerable to social exclusion are also likely to be excluded from access to the Internet.

The digital divide stems from factors including: the differential *availability* of the Internet; differential physical and cognitive *accessibility* of the Internet, in terms of the access point, communications infrastructure, hardware, software and content, each in terms of confidence, disability, language and skills; issues of *affordability*, of connection, hardware and software; low *awareness* of the benefits of Internet use, which drives demand and is linked to exposure and to the nature of the marketing of Internet services[25]; and the *appropriateness* of Internet content and services for the majority of the population, considering culture, language and needs (Ballabio, cited Phipps, 2000; see also Graham, 2002; Lenhart et al, 2003; PMSU, 2005).

The following statistics illustrate the digital divide:

- 35 percent of adults have never used the Internet (ONS, 2005a). Of those not online, 63 percent are not online because they do not know how to use the Internet; 56 percent perceive it to be too difficult to use; 50 percent find it too expensive; and 44 percent believe there to be nothing of interest to them online (OII, 2005).
- A growing proportion of the population – 8 percent – are 'Internet drop outs'. Of this number, 35 percent found nothing of interest online; 29 percent found it to be too expensive; and 13 percent found it too difficult to use the Internet (OII, 2005).
- Internet use varies by *age*. It is highest in the 16 to 24 age group (94 percent) and lowest in the 65 and older age group (22 percent) (ONS, 2005d). 69 percent of those over 55 have never used the Internet (ONS, 2004). Whilst Internet access and use is increasing across all age groups, the lowest increase is amongst those aged 65 and over (ONS, 2005e).
- PAT 15 (2000) and CLES Consulting et al (2003) suggest that *black and minority ethnic* (BME) groups are less likely to have access to and to use the Internet than their white counterparts.

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[25] Thus, the government's recent digital strategy recognises interest, motivation and perceived need as 'by far the biggest' barriers to accessing ICT (PMSU, 2005), followed by confidence and knowledge. The 'old digital divide', cost of access, is listed after these factors.

- Pilling et al (2004) find that *disabled* people are considerably less likely to have access to or use the Internet than non-disabled people. Russell and Drew (2001) report that just 28 percent of people with disabilities have used the Internet.
- Internet access and use is correlated with *education*. Those with a degree or higher are three times as likely as those with no formal qualifications to use the Internet (83:27 percent) (OII, 2005).
- Internet access is also *gendered*. Whilst statistics suggest that the gender gap is closing, more men than women have ever used the Internet (68:62 percent) (ONS, 2005d).
- Internet access varies by *geographical region*. The proportion of adults that have used the Internet is highest in London and the South East (both 64 percent) and lowest in the North East (43 percent) (ONS, 2004). Russell and Drew (2001) report that those living in the most deprived areas[26] are unlikely to have ever used the Internet.
- Internet access varies according to *income*. Almost six times as many households in the highest income decile have Internet access than those in the lowest decile (89:15 percent) (ONS, 2005f). Access to broadband is similarly correlated with income (OII, 2005).
- Data by class suggests that *occupation* is an important determinant of access, with those in social class AB (professional/managerial occupations) almost three times as likely to be Internet users as those in class DE (manual/unskilled) (Citizens Online, nd).
- Finally, a new divide is emerging within Internet users, based upon type of access. Studies suggest that people who have broadband have a different quality of Internet experience. In addition, they behave differently online to those accessing via dial up, accessing more and more varied services online (Cybermoor, 2004). Whilst, by July 2005, broadband was available to 99 percent of households (PMSU, 2005), levelling the spatial inequalities in infrastructure provision described by Graham and Marvin (2001), fewer than half (49 percent) subscriptions were broadband. 29 percent of subscriptions were metered (billed per minute of use) (ONS, 2005g).

It may be suggested that much of the above will naturally decrease in importance over time. However, whilst progress in overcoming the digital divide is being made, the above statistics continue to suggest that the promise of new, virtual accessibility to

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[26] The authors use the ACORN (A Classification of Residential Neighbourhoods) categories 'council estates, greatest hardship' and 'council estates, high unemployment'.

overcome mobility-related exclusion is unlikely to be realised without strategies to overcome the digital divide. A number of authors outline initiatives that aim to tackle the digital divide, by extending access, awareness, training and use. Government funded initiatives to extend access into homes, community online centres, libraries and schools are discussed by Hudson (2003), PMSU (2005) and Selwyn (2003). Community centred approaches, which provide access alongside initiatives to raise awareness, to develop skills, provide a socially and technically supportive environment and raise the relevance of the Internet through the development of content are assessed by authors including Cybermoor (2004), Day and Harris (1998), Hellawell (2001), Liff et al (2002) and Loader and Keeble (2004). However, physical mobility is necessary to access many such facilities and confidence is needed to learn with and in front of others, factors which may reduce the accessibility of such initiatives.

Whilst statistics suggest that the digital divide is closing, it remains the case that virtual mobility itself may not be universally accessible. Furthermore, virtual mobility may not be accessible to those who need it most. Initiatives to ensure the accessibility of virtual mobility are essential if its potential role in reducing mobility-related exclusion is to be realised.

4.6 Summary

This chapter has sought to present an understanding of the concept of virtual mobility and its potential effects for mobility-related exclusion, further defining the theoretical basis for this research. The chapter began by presenting the definition of virtual mobility developed for and used within this research. Next, the implications of virtual mobility for the geo-spatial concept of accessibility were outlined. The remainder of the chapter presented a review of the competing perspectives regarding the (potential) impacts of virtual mobility. First, the potential positive impacts for mobility-related exclusion were examined, highlighting the role of virtual mobility in increasing activity participation with reference to each of the nine dimensions of social exclusion. The chapter then turned to consider three potential negative impacts of virtual mobility, which may negate its benefits for the reduction of mobility-related exclusion.

The above discussion emphasises the fact that the effects of Internet use are, at this stage in its development, largely unknown. However, it also highlights that accurate understanding of the impacts of virtual mobility is essential, for both social and

transport policy. If the effects follow a virtuous cycle, whereby Internet use enables greater accessibility, which in turn enables greater participation and reduced mobility, it may be desirable to encourage Internet use as a tool of social and transport policy. However, if the effects are negative, in that Internet use has a negative social impact, or results in greater mobility, it is likely to be desirable that social and transport policy are constructed to mitigate such effects.

This thesis aims to build on the literature reviewed in this chapter, to provide empirical evidence for the effects (or otherwise) of Internet use upon personal travel and social exclusion. The following chapter summarises the three literature review chapters and presents the hypotheses that inform the empirical studies in this thesis.

Chapter 5. Linking social exclusion, personal travel and Internet use.

5.1 Introduction

The preceding chapters have sought to provide the context and background for the empirical research developed for this thesis, through the analysis and synthesis of a multidisciplinary literature base. This chapter summarises the literature review and presents the two hypotheses, developed from the literature study, which inform the empirical research detailed in Parts 2 and 3.

5.2 Summary of the literature review

In Chapter 2, a new conceptualisation of social exclusion was presented, which aimed to contribute towards theoretical advance in the understanding of the concept of social exclusion and to provide a framework within which this research could comfortably progress. The literature review revealed no single existing definition or conceptualisation of social exclusion that fully represented the author's understanding of the concept, which had developed through consideration of the literature analysed in Part 1. The novel conceptualisation of social exclusion presented in this study is one that is framed in terms of activity participation. It embraces the centrality of accessibility in the ability to participate fully in the cultural, economic, political and social life of the community in which we live.

In Chapter 3, a full discussion of the nature of and evidence for a link between transport and social exclusion was presented. Much of the literature reviewed is largely focussed upon transport *systems* and their influence upon social exclusion. However, Chapter 3 reveals that it is not necessarily *transport*, but *accessibility* and *access to activity participation*, which links to social exclusion. A novel, two-tiered definition of mobility-related exclusion was given.

Possible policy solutions to mobility-related exclusion were outlined. The discussion revealed the role of mobility in increasing individual accessibility, in the short term.

However, in light of the two-tiered definition, it emerged that this would be inappropriate, for mobility can decrease accessibility, in the long term, at the societal/system level and can have negative effects for the community, environment and health.

Chapter 4 presented a review of a third literature base. The centrality of accessibility, rather than transport, in the understanding of mobility-related exclusion raised the possibility that alternative forms of access may be effective in alleviating social exclusion. To this end, Chapter 4 examined the ways in which access can be improved, without the negative externalities associated with an increase in accessibility via physical mobility, through Internet-enabled 'virtual mobility'. Synthesising the social exclusion, mobility-related exclusion and information society literatures, the chapter highlighted the possible positive and negative effects of an increase in virtual mobility.

5.3 Identification of the direction of future research

The review of the literature identified a possible 'triangle of influence', between social exclusion, personal travel and Internet use. This concept forms the basis of the principal hypothesis informing this thesis.

> Hypothesis 1
> Virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion.

The literature review suggests that virtual mobility *can* provide access to opportunities, services, social networks and other goods, without recourse to physical mobility by the individual undertaking the activity. However, in his critique of research into the positive potential of virtual mobility, Adams (2000) suggests that 'it presumes much for which there is as yet little evidence'. Indeed, Chapter 4 highlighted the limited empirical evidence base for much of this research. The empirical research presented in subsequent chapters of this thesis therefore seeks to *further investigate the role of the Internet in providing access to activity participation*, exploring the nature of the triangle of influence: the interactions between social exclusion and personal travel; personal travel and Internet use; and Internet use and social exclusion.

The discussion in Chapter 4 also highlighted the possibility that virtual mobility-related externalities may arise, related to negative equity, mobility and social effects. In this

sense, results from the literature review suggest that virtual mobility may *in*crease, rather than *de*crease, social exclusion. However, it emerged that Adams' criticism of research into the beneficial effects of virtual mobility could equally be levelled at research into the negative effects of virtual mobility.

Critical appraisal of the literature revealed limited empirical evidence and methodological flaws in much of the research cited. This suggests that the balance of evidence found that these externalities are unlikely to be problematic or, at least, are unlikely to be problematic to the extent hypothesised in the literature. However, the *possibility* that these externalities exist has substantial implications for the use of virtual mobility to alleviate mobility-related exclusion. This observation informs the basis of the second hypothesis informing this thesis.

> Hypothesis 2
>
> For virtual mobility to reduce mobility-related exclusion, it must provide the same function as physical mobility or, at the least, fill the gap that a lack of physical mobility leaves. It must also not have any negative mobility or social effects, which may worsen mobility-related exclusion.

Thus, in addition to an examination of the role of virtual mobility in enhancing activity participation and thus mitigating social exclusion, the empirical research aims to *examine the nature of secondary effects of virtual mobility*, to determine their influence upon the primary hypothesis.

The following chapters detail this empirical research, each building upon the conceptual framework and emerging findings from the literature review chapters, testing and refining the theories developed above.

Part 2. The focus groups study

Chapter 6. The focus groups study.

6.1 Introduction

This chapter presents findings from the first study in this thesis: a series of six focus groups examining the nature of mobility-related exclusion and virtual mobility. The chapter begins with a discussion of the aims and objectives of the research. Subsequent sections consider the choice of methodology, presenting an overview of focus group research, followed by more detailed discussion of this study, including the sample, format and method of analysis.

The following sections consider the research findings. After each section, the findings are summarised and linked to the study aims and objectives. First, the links between transport and social exclusion are explored, with reference to the experience of mobility-related exclusion and its causes. Next, the nature and effects of Internet use are considered, with reference to current Internet use. The use of virtual mobility for communications activities, daily chores (shopping and information search) and education are discussed in full. The benefits of virtual mobility are considered. The following sections consider the barriers to the use of virtual mobility to overcome mobility-related exclusion, highlighting concerns regarding availability, usability, negative social effects and the quality of online activities. This discussion closes with a consideration of the acceptability, accessibility, affordability and availability of virtual mobility. The concluding section considers the implications of the study for the hypotheses and its implications for further research.

6.2 Aims and objectives

At the outset of this research in 2001, there was little literature on the subject of mobility-related exclusion. As Chapters 2 and 3 have shown, studies of social exclusion had not tended to consider the mobility perspective; and the subject was, at this time, under-researched in the transport studies literature. Whilst a number of authors had discussed and developed theories about reduced accessibility as a result of inadequate access to physical mobility, few studies had been undertaken into the experience of mobility-related exclusion *with those experiencing this exclusion*. There

are two potential problems with such an evidence base. Firstly, there is a danger that there has been an imposition of a problem from the perspective of concerned onlookers and that such a problem does not actually exist. Secondly, if the problem does exist, there is a danger that it will be misunderstood. This study therefore sought to:

(1) *Confirm* the existence of a mobility-related dimension to social exclusion; and
(2) *Clarify* the nature of mobility-related exclusion, giving a voice to those hypothesised to be affected by this exclusion and generating new insights by allowing participants to discuss the experience, in their own words.

Similarly, at the outset of this research, there was little literature regarding the accessibility and mobility impacts of *Internet* use. As has been seen in Chapter 4, the majority of studies have been theoretical in nature and limited in scope, primarily considering the professional classes and specific applications of ICTs. Thus, this study aimed to:

(3) Explore the *nature* and *effects* of Internet use by groups traditionally considered to be vulnerable to social exclusion;
(4) Examine *awareness* of the full functions and possibilities of Internet use; and
(5) Assess the *acceptability*, *accessibility*, *affordability* and *availability* of virtual mobility.

Finally, this study aimed to inform the next stage of research, to:

(6) Highlight and refine further research questions;
(7) Provide insights into appropriate methodologies.

6.3 Why focus groups?

'Focus groups' are collections of between six and 12 individuals, brought together to discuss a particular topic[1]. Unlike many other survey methods, focus groups enable

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[1] Smithson (2000) recognises three definitions of focus groups, each declining in facilitator control: group interviews; planned and defined discussions; and informal discussion with selected individuals on selected topics. This thesis uses the latter definition. Morgan (1998) defines what focus groups are *not*, emphasising the differences between focus groups and

the data gathered to be largely independent of the researcher. Indeed, Smithson (2000), citing Du Bois, states this as a key benefit of focus groups: 'A particular strength of the methodology is the possibility for research participants to develop ideas collectively, bringing forward their own priorities and perspectives, 'to create theory grounded in the actual experience and language of [the participants]'.' Whilst the researcher selects participants and mediates the discussion around the topic of interest, participants are largely free to explore the subject and are encouraged to interact and discuss. Whereas interviews and questionnaires focus upon defined research questions, focus groups enable participants to raise issues that are important to them. In this sense, the research is (largely) freed from the preconceptions of the researcher and greater control is handed to the participants. Thus, Wilkinson (1999), writing from a feminist perspective, highlights the non-hierarchical nature of focus groups and the ability of this methodology to shift the balance of power in favour of participants, as they are (more) able to define the research question. Focus groups can therefore generate new insights into the subject, as participants are given a free(er) reign to shape the discussion, independent of the researcher's own agenda. In addition, there is much to be learnt from participant interaction. Thus, Morgan (1998) suggests that bringing a group of people together allows them to share and compare their ideas. More than this, discussion enables the formation of opinions on subjects that the participant may not previously have considered and which would not, as a consequence, be forthcoming in other methodologies[2]. Bernard (2000) proposes that greater understanding can come through debate and through a measure of the degree of consensus and disagreement between participants. Whilst conflict groups are inadvisable, Bernard suggests that through group discussion, views can be challenged by other participants to an extent not possible in a discussion between the researcher and participant. Finally, focus groups can be a cost effective way, in terms of money and time, of gathering the views of a number of people.

Of course, much of the above theory is dependent upon the performance of the facilitator. The extent of facilitator control over the discussion will determine its direction and the confidence that participants have to speak freely. Whilst a topic guide can indicate areas to explore, the facilitator must avoid being too directive, while

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groups that do not involve research; groups that are not focused; and groups that do not engage in discussions, the latter including nominal groups, Delphi groups and serial interviews.

[2] Krueger (1994) states: 'A deficiency of mail and telephone surveys and even face-to-face interviews is that those methods assume that individuals really do know how they feel. A further assumption is that individuals form opinions in isolation... People may need to listen to opinions of others before they form their own personal viewpoints... people do influence each other with their comments, and in the course of a discussion the opinions of an individual might shift.'

simultaneously keeping the discussion on topic; they must develop a non-judgemental atmosphere, to encourage self disclosure (particularly important for the groups in this study, discussing the sensitive topics of poverty and exclusion); and ensure equal contribution of all participants, preventing dominance of one opinion over another and drawing in quieter, or dissenting, voices, to prevent a drift to a normative discourse. Kitzinger and Barbour (1999) highlight the importance of the facilitator's persona in the effective conduct of the group. Whilst the author could not alter her accent, age, class, education or ethnicity, which were often markedly different from those of the participants, she was careful to avoid construction of the 'other' (Smithson, 2000) and paid attention to details including attitude and dress. Appendix 1 considers this further[3].

By allowing in-depth exploration of the topic in all its complexity, this methodology fits well the aims and objectives of this stage of the research.

6.4 Methodology

A series of six focus groups was undertaken. Table 6.1 gives details of each group, indicating timing, location and composition.

Through purposive sampling, following careful consideration of the composition of the focus groups, it was possible to gain input into the research from representatives from a wide population, to allow the examination of a large number of factors hypothesised (in Chapter 3) to be important to the debate. Participants were those who may be expected to experience mobility difficulties and/or social exclusion, reflecting both the clustered and scattered aspects of exclusion (including people living in both rural and urban areas; and lone parents, low income, minority ethnic groups, older people and young people, respectively). Selection of personal attributes to inform group composition was informed by the literature review, consultation with professionals working within the community informatics sector and by visits to a number of online community centres. Details of meetings and visits are given in Appendix 1. All groups contained a mix of car and public transport users; a mix of gender; and a mix of Internet experience. Full discussion of the sample is given in Appendix 2.

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[3] Limitations of the focus groups methodology, including the nature of the data collected and therefore conclusions that can be drawn, are considered in later sections of this chapter.

Date	*Location*	*Number of participants*	*Composition*
12/09/01	Semi-rural, Hampshire	7	55+, mixed gender, retired, ABC1. Mix of car and public transport users. All have seen a demonstration of the Internet and at least half are regular users. Undertaken in the fieldworker's home.
12/09/01	Semi-rural, Hampshire	7	16-18, mixed gender, mix of school leavers (employed and unemployed) and sixth formers, ABC1. Mix of car and public transport users. All have seen a demonstration of the Internet and at least half are regular users. Undertaken in the fieldworker's home.
19/09/01	Urban, Hartlepool	7	Users of online community centre. Mixed age, mixed gender, mix of employed and unemployed, C2DE. Some have children. Mix of car and public transport users. All are regular Internet users. Undertaken in a private room within the community centre.
20/09/01	Urban, Stockton	7	Users of online community centre. Mixed age, mixed gender, all currently unemployed, C2DE. Some have children. Mixed ethnicity – half the group are refugees or first generation immigrants. Mixed of car and public transport users. All are regular Internet users. Undertaken in a private room within the community centre.
21/09/01	Semi-rural, Hampshire	7	25-50, mixed gender, mix of employed and unemployed, ABC1. Lone parents with children under 12. Mix of car and public transport users. All have seen a demonstration of the Internet and at least half are regular Internet users. Undertaken in the fieldworker's home.
25/10/01	Urban, Hampshire	9	18-40, mixed gender, mix of employed and unemployed, C2DE. Mix of car and public transport users. At least half have never seen a demonstration of the Internet. Undertaken in a private room within the local community centre.

Table 6.1. Focus groups: composition and timing.

Groups 1, 2 and 5 were recruited by an external fieldwork agency, to a specification provided. Groups 3, 4 and 6 were recruited through three community organisations,

following visits by the author to the same[4]. With the exception of groups 1 and 6, the groups were singly moderated by the author[5]. The externally-recruited groups met in the home of the fieldwork agent; those recruited by the author took place in a private room in each of the community centres. Locations were chosen to be free of interruptions and to be informal and neutral (Green and Hart, 1999). Participants were not asked to state their names during the discussion, thus contributions were anonymous. Discussions were recorded onto mini-disk with participants' permission and were transcribed by an external agency[6]. Discussions lasted 1.5 hours on average and included a short break for refreshments. Recording continued during the tea break and until all participants had left the room at the end, to ensure that any informal comments were recorded. Participants were paid in cash to thank them for their time.

A topic guide was used to structure the debate. Following a brief introduction to the research, participants were asked to introduce themselves to the group before being prompted to discuss travel and transport. The discussions aimed to uncover the role of transport in the lives of group members, alongside the extent to which lack of access to adequate transport affects quality of life. They aimed to uncover the possible influence of an increase in physical mobility (via an 'unlimited mobility ticket'), allowing an understanding of the dimensions of exclusion that could be affected by changes in accessibility. Through consideration of current use of ICTs, including the Internet, the discussions aimed to uncover the extent to which participants are 'virtual mobility ready' – *able to use* and *willing to accept* the use of virtual mobility in place of or in addition to physical mobility. In this way, the acceptability, accessibility, affordability and availability of virtual mobility, vis-à-vis the physical alternative and the extent to which this form of mobility could, when practiced, enhance or possibly reduce participants' quality of life, could be assessed. A copy of the topic guide is given in Appendix 3.

Whilst it was intended that facilitator intervention would be minimal, it emerged that discussing the role of transport in daily life is challenging for many participants. Not only is it difficult to remember what one does on a day to day basis, it is also hard to appreciate the role of transport in enabling or restricting activities, largely because this is not something that people ordinarily consider. For example, participants were likely

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[4] Visits to the community centres were invaluable in this process and are discussed in Appendix 1.
[5] Group 1 was moderated with Glenn Lyons; group 6 with Jackie Rafferty.
[6] Recording failed for the first part of group 6, thus analysis of this was based solely on the facilitators' notes.

to cite lack of money, rather than the cost of transport, as a barrier to activity participation[7], or to subsume transport costs within the activity cost, then cite activity cost as a barrier[8]. In an attempt to overcome this, participants were taken through progressive stages of thought, to familiarise them with thinking about transport, to help focus and develop their thoughts, before introducing the subject of mobility-related exclusion. Flip charts were used to note key points and visual aids illustrated key issues. Similar difficulties emerged in the discussion of Internet-based activities and thus a similar process was followed when discussing online activities. Whilst this process increased facilitator intervention on one level, it conversely reduced facilitator influence over the discussion. The facilitator's role was restricted to that of motivation, rather than to explaining the topic to be discussed, thus enabling the participants to lead each other towards the intended discussion topic. The content of the visual discussion aids is given in Appendix 4.

6.5 Method of Analysis

Analysis followed the grounded theory approach, discussed as a series of steps through the data by Strauss and Corbin (1990), from open coding, to the development of a framework of categories and sub-categories, to the discovery of relationships between the same (see also Glaser and Strauss, 1967). Whilst some theory had been developed from the literature review regarding the use of virtual mobility to overcome aspects of mobility-related exclusion, this stage of the research aimed to follow an inductive approach. The aim, during both conduct of the groups and analysis of the transcripts, was to allow themes to emerge, rather than to be testing hypotheses[9]. Rather than using a qualitative data analysis package (such as Atlas ti or Nvivo), the author followed a method that has served her well over a number of years of analysing focus group transcripts, to qualitatively analyse the conversation (a similar process is outlined in Krueger, 1998). Following transcription, the transcripts are read and re-read, themes highlighted, codes written on the transcripts and key sections cut out to create physical piles of data, spread across the floor. Colour coding allows retention of context, both within the discussion and between groups. Cross-referencing with the full transcripts and notes taken during the groups allows exploration of developing themes.

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[7] 'I don't think it's much the transport as the money. You can go anywhere you want if you've got the money, you can get a taxi where you want.' *Group 3 participant.*

[8] Thus, in group 2, a night out is costed at £30. Whilst £20 of this is travel, participants consider the whole cost of the activity. Thus the cost of travel is 'lost' within the cost of the activity.

This method allows the researcher to absorb themselves in the data in a way that is not possible (in the author's opinion) on-screen. This leads to the identification of themes, the identification of relationships between themes and the development of theories. Finally, the quotations used are 'cleaned', edited to remove pauses, false starts and fillers, to increase their usability for the reader. They otherwise remain in the participants' natural language.

This chapter now turns to consider the research findings.

6.6 Research findings

Discussion of the research findings is divided into a number of sections and subsections. The first section considers the links between transport and social exclusion, exploring the experience of mobility-related exclusion and its causes. Next, the nature and effects of Internet use are considered, with a discussion of current Internet use and its benefits. Finally, the potential negative effects of virtual mobility and barriers to its use are explored.

6.6.1 Exploring the links between transport and social exclusion

6.6.1.1 The experience of mobility-related exclusion

The focus group discussions confirmed that transport and social exclusion are inextricably linked, clarifying the nature of the experience of mobility-related exclusion and highlighting causal influences. Social exclusion and low mobility are mutually reinforcing: low mobility can lead to exclusion, by reducing access to activity participation; and exclusion can result in low levels of mobility, by reducing access to mobility.

To probe the role of mobility in (reduced) activity participation, following a discussion of daily activities to examine the role of mobility therein, participants were asked if there were any recent activities in which they could not participate, because of a lack of transport. After this discussion of the activities in which participants can and cannot participate, they were prompted to discuss what they would like to be able to do if

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[9] The author had less control in this respect over the groups that were jointly moderated. See also comments in Section 6.4 regarding moderator intervention.

mobility were no object, considering what they would do with an 'unlimited mobility' ticket.

That transport is key in facilitating participation in daily activities (outside of the home) emerged strongly. In the main, the types of activities that people participate in does not vary greatly according to characteristics, with the exception of access to mobility[10]. The availability of mobility greatly influences the *type*, *number* and *location* of activities in which participants can participate. It emerged strongly that participants who are able to travel, especially those with access to a car, are able to participate in a greater *variety* of activities; a greater *number* of activities in a given time period; and at a greater *range* of locations.

The activities that participants have been unable to undertake because of mobility difficulties are not superficial activities, but are those which influence quality of life and life chances. For example, participants in all groups discussed the need to travel out of their home town or village to access employment opportunities. Without mobility, they are limited to jobs available in the locality. Where there are no such jobs, they remain unemployed:

> - My daughter... She is starting to look for jobs and you can't get [buses] to [town or city] for 7 or 8 in the morning so she is restricted to [small town] jobs.
> *Group 1 participant.*

> - ... in this region, there's no work. When you imagine getting up in the morning, a new day, but 'what do I do?'
> - It is exactly [like that]. It's not to make money, but to be important.
> *Group 4 participants.*

The above quotation highlights the sense of hopelessness and reduced self esteem that results from lack of employment as a result of mobility-related exclusion. The following participant considers the role of transport in restricting educational opportunities:

> - [When] we were choosing [a college] I didn't have a scooter and we live in the middle of nowhere so that was a big problem for us because my parents were going to have to take

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[10] Of course, unlike their counterparts, those with children make child-related journeys; those in work, the daily commute; and activities including shopping tend to be gendered. However, the principle remains that there were no notable differences between the types of activities that are undertaken on a day to day basis either between or within the groups.

me to and from college every day and they didn't want to do that. Even [local town] is a nightmare, but they wouldn't have looked any further.
Group 2 participant

Participants also discussed how a lack of adequate transport has:

- prevented attendance at FE college and night school;
- impacted upon social networks, preventing participants from visiting, or attending nights out with, family and friends, also limiting visits to family/friends in hospital;
- has stopped them from being able to take children (or other dependants) on day trips or evenings out;
- prevented attendance at a funeral (one participant);
- prevented attendance at a family member's wedding (2 participants);
- acted as a barrier to the organisation of an 'African night' for locally-placed refugees, to showcase African music and culture to the residents of the area to build contacts and understanding between the communities;
- prevented access to quality groceries and other goods at reasonable prices;
- impacted upon health, because of difficulties in accessing medical care; and
- restricted the choice of type, location and timing of activity participation, because of dependence upon others for mobility.

Lack of access to adequate transport also prevents multitasking and the completion of a single activity, for example, shopping, in a single journey. In consequence, the number of activities that can be undertaken on any one day is reduced. Participants discussed the time poverty and deprivation by expenditure that results, each reducing their ability to participate in other activities. The following participant discussed how she makes several journeys a day to the supermarket, on foot, because, without a car or an accessible public transport service, she cannot physically carry all of the shopping that she needs:

- [Not having a car] didn't bother me when I was pregnant, but now I've got him, 'specially when you are shopping, pram, him, bags of shopping, we get his nappies in a big box and carrying them with the pram, it's easier to have a car you can put things on, you can get more stuff in one day than going down in 2 days.
- It would save you a lot of time for other things.
Group 3 participants.

Without transport, participants discussed the feeling of being imprisoned, both in the home, in the local area and in a life of missed opportunities:

> - You're just stuck in one place. When we had a car we used to be out all the time. Now we've got the four walls.
> *Group 3 participant.*

Perhaps surprisingly, in light of the evidence of the reduced opportunities as a result of reduced access to adequate transport, outlined above, when presented with the idea of a 'magic transport ticket', offering unlimited mobility (in the UK), participants primarily discussed increasing their leisure travel – visiting friends and family, going on day trips and holidays, treating others to trips, broadening travel horizons and experiences, staying out later – rather than being able to access better shops, employment opportunities, or colleges. The following quotations highlight latent demand for activities and a desire for new experiences, which are suppressed by inadequate physical mobility:

> - Go all the places you've always wanted to go like Flamingo Land, shopping in another town. If you've never been able to get there you can say right we'll just go.
> *Group 3 participant.*

> - [I] wouldn't go out more I'd go to places I haven't been before, more interesting than the places I go all the time... somewhere different, not just be in the same place all the time.
> *Group 2 participant.*

The decision to use additional travel for leisure purposes is perhaps to be expected, because leisure travel will be sacrificed more easily than essential, non-leisure travel. Thus, the majority of participants were more aware of an occasion in which a leisure journey was abandoned because of transport difficulties than they were of abandoning other travel, which will usually be undertaken, whatever the (time and financial) costs.

Of course, the unlimited travel ticket is a crude instrument. It does not deal with limited travel horizons or aspirations and the cost of the activity itself is prohibitive for many participants. Thus, the offer of unlimited travel is not one that would necessarily increase trips, without raised awareness of opportunities, or action to address the cost of activities. This is reflected in the cautious nature of participants' responses. However, it proved effective in exposing latent travel demand for access to leisure and

social activities, which we can expect to increase if the ticket were combined with action on these points.

6.6.1.2 Causes of mobility-related exclusion

Participants' exclusion from activities is experienced as a direct consequence of their modal exclusion – exclusion from different modes of transport. A number of observations emerged as key in determining modal availability: *economic status* (affordability); *location* (the presence of the mode at the intended origin and destination of the journey); *public transport infrastructure*; and *household structure*. Indeed, these factors were seen to remove the element of choice from transport decisions. It also emerged that the apparent availability of transport can disguise mobility restrictions. In particular, the use of dependant mobility was uncovered as a restrictive form of mobility.

Almost all participants feel excluded from certain modes, because of cost and affordability, which in turn acts to exclude them from certain activities. This is experienced to differing extents. Whilst for some participants, exclusion from one mode can be overcome by travel to an activity by another, less favourable (yet affordable) mode, for others, exclusion is absolute and low affordability of the mode leads directly to reduced participation. If they cannot afford to travel by motorised transport, the journey will be made on foot, or will not be made at all. Where finances for travel are limited, journeys are prioritised and participants are forced to self-select essential activities, thus journeys; and sacrifices are made in other areas of life, in order that essential journeys can be made. This deprivation by expenditure acts to reinforce poverty and exclusion in other areas of life, not initially recognised as being related to travel.

Thus, travel by public transport is beyond the means of many participants, to differing extents. Participants in groups 1, 2 and 5, who were not classed as being on a low income, discussed the high cost of long distance travel by train and of group travel, particularly travel with a family. For participants living in rural areas, the cost of public transport is enhanced by the need to use taxis to travel to the public transport interchange, with the result that few journeys are made by public transport. However, for participants in groups 3, 4 and 6, living on low incomes on deprived estates, the cost even of local travel by public transport is prohibitive. For these participants, with no motorised transport alternative to public transport, the choice of whether or not to travel is directly determined by finances. If they cannot afford to travel, the journey will

either be made on foot, or not made at all. The following quotations illustrate the nature of affordability, in stark terms:

> - Refugees only [get] £10 cash a week so if you get £10 a week, to take £2.70 [for the bus], even the bus is very big money, from £10.
> *Group 4 participant.*

> - I don't think I'd have enough money to use the bus...
> - Transporting what you've got as well. A taxi costs the earth, £5 to the town.
> - I used the bus about a year and a half ago for one day. Never again. Down to the town 3 miles, it was 67p. Daylight rob. I'd never use the bus again, I'd walk.
> *Group 3 participants.*

In addition to the cost of transport, participants discussed the inadequacies of public transport in meeting their needs. These were primarily related to the participants' location and the location of the activity. It emerged that both urban and rural dwellers face exclusion from activities because of inadequate routing and timings. Whilst poor public transport links in rural areas are easily observed, it also emerged that urban estates are also often bypassed by public transport:

> - Travel on a night from my area, the buses stop after 6, so it's difficult getting home alone from [town] and the children, taxis are very dear on your own.
> **- Does that stop you from**
> - It stops me going out into [town] ... so unless I can get a lift or there's a few of us to share a taxi, I don't go.
> *Group 4 participants (urban area, facilitator comment in bold).*

> - There is a bus goes past but I live in the middle of nowhere so I need a car. I think the buses are once an hour in the morning, they cut off in the afternoon 'til about 3.
> *Group 5 participant (rural area).*

Participants cited additional inadequacies with public transport, which restrict their use, including the following: unreliability; lengthy routes, with inconvenient location of interchanges; failing to serve areas at appropriate times (neither sufficiently early, nor late) and at low frequency; being dirty, cold and crowded; the threatening atmosphere at the interchange and onboard, a particular issue when travelling with children; and being uncomfortable, particularly when travelling with dependants or baggage. Trips by public transport are also seen to take a long time, particularly where the traveller is trip chaining, having to achieve more than one task or to visit more than one place

within the trip, often with the result that only one activity can be undertaken, or one location attended, each day. Other participants exposed the racism that they had experienced, restricting use of both public and college buses as drivers fail to stop to allow passengers from minority ethnic groups to board.

It is important to note that the availability of transport does not equate with its adequacy. Participants suggested that, even when transport, particularly public transport, is available, if it is judged to be inadequate, it will not be used. Each of the inadequacies listed above had reduced participants' use of public transport, thus reducing activity participation. This salient point is often overlooked in studies of transport accessibility, yet this research suggests that inadequate transport options restrict travel and therefore activity participation just as unavailable transport does.

Perhaps for this reason, car ownership was cited as highly desirable by many participants, because of the perception that having a car would make life easier, chores would be more convenient, leisure time would increase and opportunities would open up, including access to employment, education and better services and facilities. However, it also emerged that car ownership did not necessarily equate with unlimited accessibility. A number of participants emphasised that the car is only used for essential journeys, because of the high costs of fuel and parking; others discussed the sacrifices that they had to make in order to own a car, highlighting the deprivation that results. It became clear that the cost of car-based mobility to facilitate one activity *actively prevents* participation in other activities, an often unseen aspect of mobility-related exclusion. Many discussed parking difficulties, particularly when travelling with dependants. The following participant highlights the often overlooked problem of driver confidence in restricting mobility:

> - I had a funeral to go to in Hull and none of my family could come and I don't drive long distance by myself. I'm not that confident. So I didn't go because I couldn't afford the train fare there and back and it would have been 2 days off work. The only place I can't get to is long distance and that is because I refuse to pay the train fares so I normally cart someone with me and drive slowly. Price would be the only thing that would stop me. *Group 5 participant.*

It is notable that the participant identifies inadequate public transport in terms of price and time, rather than confidence in driving, as the primary restriction, highlighting the complexity involved in understanding the nature of mobility-related exclusion.

Age was seen to restrict modal choice: for young people because of legal restrictions on driving age and in terms of being able to finance travel; for older people, because of age-related health problems – being unable to drive any more, being unable to walk far, feeling unsteady or unsafe on public transport. For some elderly people, the car is seen to be a lifeline – for those without access to a car, physical mobility is not possible:

> I can't walk very far. If it wasn't for the cars I'd be locked in.
> *Group 1 participant.*

Household structure, that is, the presence of children, is seen to restrict modal choice, largely because of convenience and cost. It is notable that car driving parents perceive having a car to be necessary; and non-car-owning parents perceive having a car to be highly desirable. Not only is the cost of travel by public transport with children prohibitive, for all income groups, but the practicalities of controlling children, getting children and goods on to the vehicle and coping with trip chaining make travel uncomfortable and sometimes impossible. There is evidence that these factors prevent some participants from travelling:

> - The thing that put me off using the bus when they were younger I had a double buggy and one on reigns and everyone looked at me as if to say, 'for goodness' sake, hurry up' and the driver just sat and watched me and nobody helps... I do suffer from embarrassment badly and it put me off...
> - ... There should be transport specially for mothers and children.
> *Group 5 participants.*

The extent to which children are an independent variable or an additional restriction, with the extent of influence dependent upon the presence of other characteristics, including location, family circumstances, income and car ownership, is not clear from this study. What is apparent is that children generate trips, both in themselves and in extra trips to services and facilities. Where transport is not available, or is problematic, children and parents can be directly excluded from activities, or indirectly excluded because of the amount of time taken to fulfil child-related tasks.

Finally, for many groups, access to mobility is dependent upon friends and family members. Whilst not traditionally recognised as being vulnerable to mobility-related exclusion, by participants themselves and by studies of mobility-related exclusion, this study revealed that those dependent upon others for their mobility experience reduced

freedom, a reduced number of trips and a reduction in accessible destinations. Participants discussed having to go shopping when a friend or family member was also going shopping, rather than at a time convenient to the participant, or when the shopping was needed; being unable to socialise, particularly during the evenings; and travelling to places that the friend or family member is travelling to, rather than travelling to a first choice destination. It also emerged that participants would not ask for a lift each time they wanted to travel, because they felt uncomfortable asking – thus, there is evidence of self-selection, or prioritising, of trips, prior to asking for help. It emerged that without access to this form of mobility, many participants would be unable to travel, or would have to make sacrifices in other areas of life to be able to afford to travel by alternative means. The following quotations illustrate this dependent mobility.

> - If it wasn't for [partner], I wouldn't get anywhere.
> *Group 1 participant.*

> - My mum and dad are good, I usually get to do what I want to do. They both have a car... If there was anywhere I really wanted to get to my dad would come and get me. So there isn't anywhere I couldn't get.
> *Group 5 participant.*

There is evidence in the latter quotation that the participant is restricted in her mobility by this dependence ('usually', 'really'), yet she concludes that she is not, again highlighting low awareness of mobility-related exclusion and the difficulties in uncovering its nature.

A number of characteristics were linked with dependent mobility, including age, economic status, household structure, location and the public transport infrastructure, each linked to modal availability, as discussed above. Additionally, cultural restrictions can enforce dependent mobility. Two female participants of Pakistani origin stated that they are not allowed to travel independently and are consequently reliant upon their husbands for all mobility. This 'cultural exclusion' is one that is rarely recognised, yet it both reinforces and is reinforced by restricted mobility.

The providers of dependent mobility services tended to be close family members, but car owners living in deprived communities were suggested to provide a mobility function for a much wider social network. Of course, such mobility options are only available to those with car owners who are able and willing to provide transport within

their social networks. Those without such social networks can be seen to face an additional dimension of mobility-related exclusion, rarely identified within the wider literature, as a result of inadequate access to private transport, public transport and dependent mobility.

6.6.1.3 Summary: confirming and clarifying the nature of mobility-related exclusion

Focus group discussions confirmed the existence of a link between transport and social exclusion. They also clarified the nature of this link, in terms of the causes and consequences of inadequate mobility. Notably, this research uncovered a number of aspects of mobility-related exclusion that are not discussed in the literature, including the experience of mobility-related exclusion amidst mobility availability: for example, the role of car ownership in causing mobility-related exclusion and the problem of dependent mobility. The discussion exposed the consequences of inadequate mobility not only in terms of the many activities that are inaccessible as a result, but also the *feelings* associated with mobility-related exclusion. Participants highlighted feelings of helplessness, hopelessness and low self-esteem, of being imprisoned, both geographically and within a lifestyle. One participant suggested that these feelings had made her feel suicidal. Participants discussed missed opportunities and the eradication of choice in many aspects of their lives which, it emerged, are strongly linked to inadequate mobility. The findings confirm that the consequences of mobility-related exclusion contribute to exclusion within each of the dimensions identified in Chapter 2. This emerged within all groups, across demographic characteristics.

The discussions also exposed the difficulties of research in this area. It is all too easy to assume that participants are as aware of and troubled by matters that concern the researcher as she is. However, as has been witnessed in other areas of social policy, such concerns may just be accepted as part of everyday life. A limited awareness of alternatives can restrict consideration of one's current position. In turn, if the status quo is not considered, neither is change. Thus it emerged in this study. Participants are not necessarily aware of the role of mobility, or a lack thereof, in their lives. It emerged that mobility difficulties are often unquestioned, or subsumed within the activity. Thus, where mobility is unaffordable, the *activity* is deemed too expensive; where mobility is unavailable, the *activity* is inaccessible. This finding was to have important implications for the design of the second study in this thesis, as discussed in Section 6.7 below.

6.6.2 Exploring the nature and effects of Internet use

During the second half of the discussions, attention turned to the use of and feelings towards ICTs. Specifically, the discussions aimed to explore the nature and effects of Internet use. Finally, the discussions aimed to uncover the potential of virtual mobility to alleviate aspects of mobility-related exclusion, examining the degree to which it is acceptable, accessible, affordable and available and thus exploring the hypotheses outlined in Chapter 4.

6.6.2.1 Current Internet use

The purposes for which participants use the Internet emerged naturally during discussion. In addition, participants were prompted to list their Internet-based activities on a flip chart. This was later compared to the list of offline activities, recorded earlier in the discussion, to examine the potential for virtual mobility.

In discussing current Internet use, it emerged that, whilst participants' Internet use varies in terms of *specifics* – the individuals with whom they communicated, the newspaper that they read – the *types* of Internet activity exhibit little variation. Results do not suggest that people with certain characteristics access different activities online. Indeed, the types of activities discussed here correlate with the activities detailed by participants in response to an online survey, undertaken as part of the project to which this thesis is aligned. Details of this survey are given in Appendix 5. Whilst the characteristics of these respondents were not noted, the areas in which the survey was publicised suggests that they will exhibit different characteristics to those in the focus groups study. The finding that the nature of online activity participation is similar between these two groups further suggests that characteristics do not directly influence the types of activities undertaken online. This finding is consistent with the earlier finding that the types of activities that are accessible using physical mobility are not seen to differ greatly by characteristics. However, as with physical mobility, the number of and length of time spent in activities can vary where access is limited.

This said, one characteristic was found to influence the number and range of activities undertaken online: Internet experience, in terms of time spent online and Internet exposure. An identifiable 'timeline' of Internet activity emerged, along which participants progress. With increased experience and exposure, the Internet becomes more familiar. Participants feel more comfortable, confident and aware of the Internet's

possibilities. It is hypothesised that progress along this line increases 'virtual mobility readiness'. This is depicted in Figure 6.1.

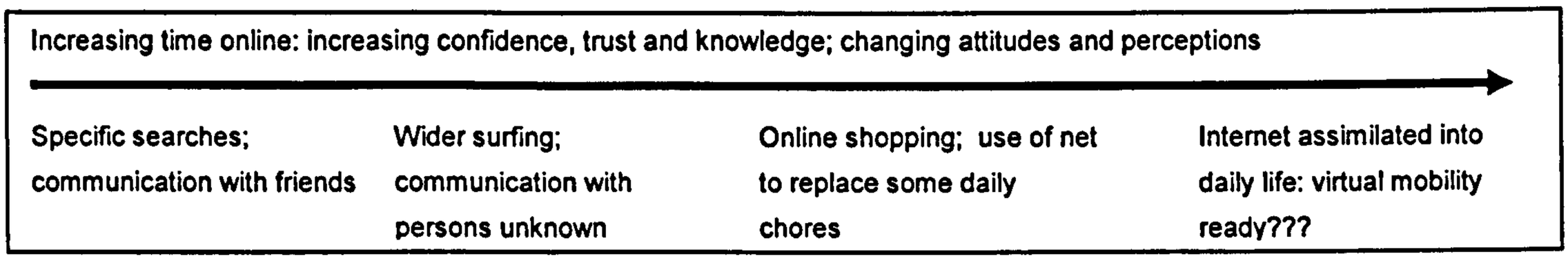


Figure 6.1. Timeline of Internet activity.

This notion of virtual mobility readiness, uncovered in the focus groups, is supported by research conducted more recently. Thus, research into online shopping finds that there is usually a delay of two to six years between first using the Internet and engaging in online shopping (The Future Foundation, reported in BBC, 2005c). Anderson (2005), citing Dutton and Shepherd, highlights a key reason for this. He suggests that the Internet is an 'experience technology', whose value is not easily imagined, only coming to light with increasing exposure and use. Table 6.2 lists the activities that participants undertake online.

Paid and unpaid work, education	*Entertainment / social / leisure*	*Daily life*
Job search, application.	Communicate with friends and family – email, web cam, personal web pages, voice chat.	Banking.
Communicate with colleagues, business contacts.	Communicate with persons unknown.	Benefits advice.
Childcare: research for children's homework, pictures to colour, posters, stories.	Entertainment listings – cinema listings, clubs, TV listings.	Directions, street maps and other travel info.
Finding a range of information for others (the 'escort search').	Purchase cinema/theatre tickets.	Medical information, diagnoses.
Research for college work.	Information about hobbies – music, gardening, recipes.	News, UK and overseas.
Online courses.	Football results.	Recipes.
College/university information/applications.	Information about day trips/holidays.	Religious information and worship.
	Reading, poetry.	Shopping, for: groceries; clothes; shoes; holidays; flights; cars; CDs; books; gardening equipment; magazines; insurance; jewellery; flowers; gifts.
	Browse auction sites.	
	Downloads – ring tones, music, games.	
	Gambling.	
	General surfing.	

Table 6.2. Internet activities

It emerged that online activities were undertaken both as a *substitute for* and as a *supplement to* offline activities. This section illustrates this finding with reference to three of these Internet-based activities: communications; daily chores; and education.

6.6.2.2 Communications activities

Perhaps the most popular use of the Internet is as a *communications* tool, allowing communication with friends and family and, as participants become more comfortable and confident, with persons unknown. Participants primarily use the Internet to communicate with distant friends and relatives – backpacking grandchildren, friends on holiday, relatives living overseas – rather than with those who live nearby. Online communications were particularly valued in group 4, with participants from across the globe, who were able to communicate online using text, voice and web cams. Participants suggested that the latter helps to 'close' physical distance. In addition, people can socialise as a group, online, particularly valuable for the following participant. She identifies poor transport as a barrier to socialising with friends, but she can do this online. It would also appear that online communicating is not a second-class option[11]:

> - I talk to my friends late on a night when I can't go out so it's good. I can't go and visit because it's dangerous walking around but I can sit in my own room talking to lots of people. I enjoy it.
> **- Would you rather have that than a better bus service?**
> - In the winter, yes.
> *Group 4 participant, facilitator comment in bold.*

In this sense, the Internet provides communications where previously communication may not have been possible, because of the cost of physical visits or telephone calls, or the time delay in communicating by letter. Thus, the online activity is supplementing offline contacts, overcoming a deficiency in the accessibility of the latter – however, for the majority, in-person visits would be preferable, if they were possible. Participants suggested that communicating via the Internet provides fast, reliable contact, at a time convenient to the user. Participants also suggested that it is easier to regain contact in this way, as the awkwardness of voice or in-person communication is overcome. The

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[11] Although, of course, the option of a car is not offered. Later in this group, participants were asked if they would rather have the Internet or a car and, after discussion, opinion was divided between the two options.

following quotations illustrate its use for family communications, allowing a closeness that would otherwise be lost as a result of inadequate communications:

> - My brother is in Hong Kong and emailing him is good, it's cheaper than the phone.
> **- ... So in that situation, if you hadn't got email, would that have meant you wouldn't have kept in touch with your brother?**
> - ... Probably. I speak to him very rarely on the phone.
> *Group 2 participant, facilitator comment in bold.*

> - I have a sister in Pakistan and at the moment with all the tension on the border, I am concerned for her. We keep in contact through email... When she used to write it would take anywhere from the quickest we have had mail was 5 or 6 days and the longest 2 weeks now when you think say 2 weeks, 10 days on average and now on the Internet instantaneously... At least you feel assured everything is ok.
> *Group 4 participant.*

There was a degree of stigma attached to communicating with persons unknown, which is discussed below. However, the following quotations illustrate the value of the Internet in providing access to new social networks online, supplementing existing social networks:

> - You can actually speak to people, you can do a variety of things, look up information, talk to your friends, meet new people...
> **- ... would you call them friends?**
> - Yes.
> *Group 4 participant, facilitator comment in bold.*

> - I go on the Internet quite a lot because I am a single parent and I find it quite helpful to communicate with the outside world... that's my way of escaping and talking to other adults.
> *Group 4 participant.*

6.6.2.3 Daily chores: shopping

It emerged strongly that the Internet is being used to substitute for physical access to a number of *daily chores*, including shopping (for a wide variety of goods), banking, paying bills and gathering financial and medical information. Shopping online is particularly popular, because it: frees up time; can be cheaper; is less hassle, particularly for those with children or other dependants; can be quicker; and gives access to goods that would not previously have been available, for example, goods

from other countries, particularly the home country in the case of immigrants, or from companies without local or accessible outlets. The following quotation illustrates the use of the Internet to both supplement and substitute offline activities:

> **- Why do you shop online?**
> - [For] the kind of clothes I like, I can't buy in shops *[note: supplementing]*. It's easier online *[note: substituting]*.
> - [So I] don't have to go traipsing round the streets *[note: substituting]*.
> *Group 5 participants, facilitator comment in bold.*

For those without Internet access, the substitution of trips was a clear aspiration:

> **- Does anyone use Tesco's online shopping?**
> - No but I would though so I wouldn't have to go on the bus anymore.
> *Group 6 participant, facilitator comment in bold* .

Later in the discussion, participants discuss the comfort and convenience of online shopping, without children, or having to use public transport. They continue to highlight the time saving benefits, suggesting that online shopping would free up time for other activities:

> - Yeah because you could do that in five minutes couldn't you and then go out.
> *Group 6 participant.*

The following participant identifies substitution of physical mobility as the key advantage of online banking:

> - It's convenience as well instead of getting on a bus into town you could sit in the comfort of your own home.
> *Group 6 participant.*

6.6.2.4 Daily chores: information search

Participants use the Internet extensively for advice, particularly medical advice, supplementing existing sources with those that were not previously accessible. Almost all Internet using participants have sought medical advice online, either through medical information websites or (more productively, in the view of the majority of participants) through informal support groups, where participants are able to talk with both medical professionals, fellow sufferers and people close to sufferers.

Interestingly, this form of contact with persons unknown was acceptable to all participants, as compared with the stigma associated with chat rooms, which is discussed below.

The advantages of seeking medical advice online were clearly expressed. Many participants have a fear of, or feel intimidated or confused by, the medical profession. Through the Internet, participants can ask questions that they would not feel comfortable asking their doctor; they can access information that is written in a language that is easy to understand; they can gain alternative opinions, or find out about alternative treatment options, often from people who have been through similar illnesses; and, importantly, they can feel emotionally supported by the people that they meet online. Each of these factors can contribute to better health outcomes. The following quotations highlight the use of Internet-based information – to which participants would not otherwise have had access – in each of these ways, also highlighting its role in equalising the power disparities between patient and professional:

> - I access a lot of information for my daughter, who had ulcerative colitis and she was due to have an operation, we found out a lot of information and support groups and things like that... specialists are busy and use their own jargon and you don't know what they are talking about... [she] had the choice of major operation or not and didn't know what it involved and she was able to get on and find the appropriate society and was in touch with someone who has had the operation and he gave her a lot of information. It did reassure her.
> *Group 1 participant.*

> - My brother, his little daughter, she has Blackfan Diamond syndrome... they looked it up and went to specialists and talked to specialists over the email and because nobody has any information on it, there's only 3 in this country that's got it, they asked the [online] specialist different opinions... They used to panic... [online] they got loads of advice back and they deal with it now they know what it is. They know what to expect.
> *Group 3 participant.*

Online information is not only used for extreme illnesses, but also for information about how to treat colds, or cuts and bruises. Participants discussed how online medical information allows self-diagnosis of some illnesses, particularly those involving children, reducing anxiety; and the Internet has also been used by some participants

for an online diagnosis by a medical professional, via NHS Direct[12], after a child fell ill during the night, to avoid travelling to see a medical professional.

6.6.2.5 Education

Finally, participants suggested that, as an information resource, the Internet is particularly valuable in *education*, at all levels: school, college and university, supporting offline education. There is evidence to suggest that online learning is both substituting and supplementing offline learning. Research online is seen to be easier and faster than using books or travelling to and using a library (although the problems with search engines were discussed in some groups) – and both easier and cheaper than taking children to libraries or buying reference books for the home.

> - It's far easier to search for something on there than to search through a book, you just tap in what you want and press the search button and ten seconds, up it pops.
> *Group 6 participant.*

Lack of reading material in the home has been posited as a reason for lower educational performance of children with parents with lower educational achievement, or of manual occupations, because of reduced exposure to information and reduced access to knowledge. The discussions undertaken in the focus groups suggest that this may be overcome by Internet use, as the Internet brings information into the home, increasing access and exposure.

A number of participants highlighted the new educational opportunities that had opened up to them by using the Internet to undertake online learning. Online courses allow participants to study in their own time, at a venue of their choice and at their own pace, opening up learning opportunities where previously access has been denied, because of difficulties travelling to the education centre, or in attending courses at scheduled times. Online learning can also be less intimidating than physical attendance in a classroom, particularly where it is in an online centre, where learning is actively encouraged. Participants valued the peer and professional support for learning given in online centres. Whilst in-person support is not available to other online learners, lone learners were able to find support in online discussion groups, set up by their learning centre, which place learners in touch with each other and with tutors. In addition to use of the Internet as an information resource for education, participants

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[12] http://www.nhsdirect.nhs.uk

discuss homework online; apply for courses online; and research educational establishments, particularly universities and sixth form colleges.

The following participant discusses the benefits of education in the home:

> - I wanted to do it because I could do it without leaving home to do it and it just worked out easier that way you didn't have to find a babysitter you didn't have to go anywhere.
> *Group 6 participant.*

Thus, being able to learn at home opens up learning opportunities, negating the need for mobility and enabling *multitasking* – the simultaneous conduct of two activities, education and childcare. This is elaborated, below:

> - And [online] you can talk to your friends and access your web at the same time and write, you can do more things at once, so which if you are on the phone it's harder to do or you are visiting to somebody it's harder to do whereas at home you could be writing your email and talking to somebody at the same time.
> *Group 4 participant.*

6.6.2.6 The benefits of virtual mobility

Across all of the online activities discussed, the advantages of participating online emerged strongly:

- Activities can be done at a convenient time;
- It can be faster;
- There is access to a greater variety of activities, opportunities, goods, services and social networks online, than would otherwise be available; and
- The activity can be undertaken in the home, negating the need for travel and allowing the simultaneous conduct of multiple activities.

6.6.2.7 Summary: the nature and effects of Internet use

The effect of Internet use upon offline activities was observed to be two-fold. Online activities can *substitute* for existing offline activities, as is witnessed in the conduct of daily chores online, where the online activity replaces the offline activity. Thus, participants naturally stated that the online activity is cheaper, easier or quicker than its offline counterpart, suggesting purposeful substitution. Secondly, online activities can

supplement existing offline activities, which can be seen in the use of the Internet as a communications medium, or in education. Participants naturally suggested that they would not have had access to a particular activity if they had not had access to the Internet, for example asking aloud what they would have done without access to the online activity and therefore suggesting a prior deficiency in accessibility. In this latter case, opportunities to participate are *created* where previously participation has been denied, because of lack of physical access to the activity. This is highlighted by the following participant:

> - The Internet is there to do things you can't generally do in your everyday life.
> *Group 5 participant.*

In both situations, participants described the impact as positive. Thus, it could be suggested that online activities are contributing to a reduction in the experience of mobility-related exclusion, resulting in (1), cost and time savings through substitution, which can be reinvested elsewhere; and (2), greater participation, where online access overcomes inadequate physical access.

Of course, not all online activity will have such an impact. Many Internet activities are entertainment functions, which have little impact upon welfare outside of this role[13]. However, it would be difficult to argue that the Internet is solely another medium for entertainment.

In consequence, this study suggests that, through the conduct of some activities online:

- More communications are being entered into;
- More information and advice is being sought and found;
- More opportunities, in many areas of life, are being opened;
- More services are being accessed; and
- Time is being saved, to be reinvested elsewhere.

In this sense, the findings suggest that the hypothesised positive social effects of virtual mobility, detailed in Chapter 4, are being realised, to varying extents, in many of the dimensions of exclusion.

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[13] However, its use for entertainment can have a positive welfare function in itself.

This research was limited in its ability to uncover transport effects of virtual mobility. There is some evidence of – and there is certainly a desire for – substitution of online for offline activities, but the net transport effects of this are unclear. This said, there is evidence to suggest that a focus upon the transport impacts as traditionally defined – in terms of substitution – may be inappropriate. The principal effect observed in this study indicates that, by supplementing current offline activities, *virtual mobility is substituting for the increase in travel that would traditionally be needed to allow participation in these activities*. Thus, this study adds a fifth possible effect for virtual mobility, in addition to the four hypothesised effects outlined in Chapter 4.

6.6.3 Barriers to the use of virtual mobility to overcome mobility-related exclusion: Internet concerns

The above discussion suggests that virtual mobility, via the Internet, could (and, for some participants, *does*) play a role in reducing mobility-related exclusion. However, the discussions exposed concerns regarding Internet use, which may act as barriers to the effective use of the Internet as a tool in the reduction of mobility-related exclusion. This section examines participants' concerns, considering: availability; usability; negative social effects; and the quality of online activities.

6.6.3.1 Availability

Concerns regarding the availability of virtual mobility emerged. The majority of groups were composed of both users and non-users, thus discussion of barriers to Internet use emerged naturally.

Whilst access to other ICTs was near universal, access to and use of PCs and the Internet was more varied. Income, age, employment status, having online friends/family, plus the presence of children in the household, were observed to have an impact upon (home) access to and prior use of PCs and the Internet. This reflects the influence of each of these characteristics upon disposable income, exposure to the Internet, perceived need and skills, factors that this study suggests are key in determining Internet use. Thus, this study confirmed that there are barriers to Internet access and use. However, results also suggest a more complex digital divide than commonly discussed in the literature. The digital divide appears to be two-tiered. The first divide (and the primary focus of the literature) concerns *use and non-use* of the Internet. The second concerns its *full* use. It emerged that many participants are not

able to use the Internet to its full potential. *Cost*, *exposure* and *skills* are key in determining full use. Thus, delivery charges for online shopping may be prohibitive, as may the requirement that users have a credit card, or a bank account – a quarter of participants in group 6 had neither of these. *Lack of confidence* emerged as an issue in all groups, though tending to decline with experience, as suggested in Figure 6.1. But it was *lack of awareness* of the possibilities of virtual mobility that emerged most strongly as a barrier to its full and effective use. This was revealed most clearly through the surprise at the number and variety of activities that could be undertaken at least in part online, which was exhibited when participants were asked to consider which of their offline activities could be undertaken online.

Interestingly, participants in group 3 were notably more aware of the possibilities of virtual mobility, which is likely to be attributable to the on-site Internet assistance that is almost always available to them. Arriving at the community centre with a problem, they are led to the Internet to find a solution. For these participants, from the start, the Internet is grounded in its practical applications, perhaps to a greater extent than in other learning approaches, which can be more abstract. In addition, they experience greater exposure to its applications through this tuition and through the sharing of experience in a group environment than do those using the Internet in isolation. Referring to the timeline depicted in Figure 6.1, we can suggest that these participants progress through the stages more quickly as a result of this increased exposure and experience[14].

Whatever the cause, it is clear that cost, exposure, skills and awareness are likely to limit not only the use but also the *full* use of virtual mobility and therefore its use as a tool to overcome mobility-related exclusion.

6.6.3.2 Usability

Participants with little or no online experience expressed considerable anxiety regarding the usability of the Internet: being able to turn the PC on; using the software; finding the appropriate information; losing information; 'breaking' it in some way; getting viruses; being subject to fraud; stumbling across pornographic web sites; being overwhelmed by the volume of information presented... The origins of these fears was unclear. However, an interesting phenomenon was observed. Unlike other ICTs, there

is a perception that a high level of skill is need to use computers and the Internet. One can speculate that it is linked to cost of the equipment, the promotion at the time of courses to teach people Internet skills (which may suggest that tuition is necessary, reinforcing anxieties regarding Internet use), or exposure, itself linked to cost. Whilst participants had used other ICTs without thought for training, there is a clear barrier to taking this approach with PCs and the Internet, which may restrict or slow its adoption.

Whatever their origin and whilst such anxieties appear to dissipate with Internet experience, discussions suggest that the above fears and perceptions could form a barrier to the take up and use of virtual mobility.

6.6.3.3 Negative social effects

Concerns regarding the social effects of Internet use were raised in all groups. Concern ranged from that closely paralleling the scenario presented by Forster (2004) in 'The Machine Stops', to the loss of written, spelling and communications skills, to anxiety regarding deception and misrepresentation in the online world. With regard to the latter, participants across all groups expressed concern regarding trust online: trusting the quality of the information online; trusting financial interactions; and trusting those they meet online[15].

Trust in others online was a common topic of conversation. The following quotation illustrates the majority view:

> **- Has anyone made friends on the web, do you think that it's possible to make friends on the web?**
> - No, I think that's dodgy.
> - If you watch Coronation Street, you know that it's dodgy[16].
> - It could be anyone, you could say you're anybody and they're not going to know, are they, you can't see through a computer.
> *Group 6 participants, facilitator comment in bold.*

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[14] This finding reflects that in much of the digital divide literature. In particular, Servon (2002) (published after this study was conducted) describes the difference between Internet access and Internet use, the latter dependent upon training, which supports this finding.
[15] It should be noted that participants expressed no such concerns with regard to communicating with *existing* social networks online.
[16] Coronation Street, a popular UK soap opera, had recently run a storyline in which teenager Sarah Louise Platt was abducted by an older man masquerading online as a teenage boy.

In the following exchange, participants discuss participating in chat rooms under a false identity, which is used as proof that chat room users are not to be trusted:

> - We go in and have a laugh and pretend we are, like, over 60s slob room, something like that. It was a laugh.
> - **So you wouldn't go in and be you?**
> - No, definitely not.
> - You don't know who you are talking to.
> - Everybody else is lying.
> *Group 2 participants, facilitator comment in bold.*

It was difficult to discuss online relationships, the use of chat rooms, etc., because of the stigma associated with such relations. Participants confessing to building friendships online, or using chat rooms, were often challenged by other group members, who questioned the validity of such relationships, the identity of the users and suggested that such interactions were not healthy, or 'real'. An interesting paradox emerged. Many participants had used chat rooms, or knew those who had, yet no one had first or second hand experience of negative effects. Media reports, or television fiction (including the Coronation Street Internet abduction storyline, mentioned above), were cited as 'evidence', yet participants were only able to report positive experiences online. The following extract illustrates this paradox. The participant simultaneously criticises and justifies online relations, with reference to use by others and himself, respectively:

> - If that [chatting online] is their life, then that's very sad, but I can imagine if they, like me, live in the middle of nowhere, it's a rainy day and you've got nothing to do, fair enough.
> *Group 2 participant*

The above anxieties appear to stem from a common substitution perception. That is, that participants tended not to view online relations as supplements to, but as substitutes for, offline social networks. Again, this fails to reflect participants' own experiences. No participants reported a decline in their offline social networks as a result of online participation and the root of the perception that the two may not co-exist was unclear.

The existence of such anxieties and the stigma associated with online relationships may restrict the use of virtual mobility to build new social networks. Conversely, however, the use of chat rooms, despite these expressed views, may suggest that

these anxieties decline over time, or that there is a degree of cognitive dissonance between stated and revealed preferences, which may exist within the individual, or which may be prompted in a group situation. This study is unable to conclude either way. However, the methodological finding that it is difficult to discuss this subject has highlighted the difficulties of research in this area, which must be accounted for in the design of further research.

6.6.3.4 The quality of online activities

Concerns regarding the *quality* of online activities vis-à-vis their offline counterparts emerged, which could exist as a barrier to the use of virtual mobility to alleviate mobility-related exclusion. Towards the end of the discussion, participants were asked to consider which of their offline activities, listed earlier, they could undertaken online. The majority of participants suggested that, in many cases, whilst the activity itself could not be undertaken online, the purpose of the activity could be achieved. This emerged in relation to activities such as visiting family and friends, going to the cinema or attending mosque, where the purpose is communication, watching movies and worship, respectively. However, many activities fulfil more than one purpose. For example, as the following quotation illustrates, attending mosque five times a day is not only about worship:

> **- Do you think you would be allowed to virtually go to the mosque? So you could have a web cam and pray with other people there?**
> - No no no no. Social life there you meet different people. Social club.
> - It could be possible for some people that were unable to get to the mosque who were ill sometimes if a web cam was there you can listen to the sermon because it's being broadcast live and from that point of view to hear the sermon that could be done.
> - Very interesting, you can listen to a service in Saudi Arabia.
>
> *Group 4 participants, facilitator comment in bold.*

The above discussion is interesting, exposing both disadvantages and benefits of virtual mobility. Whilst there is concern regarding the quality of the online activity as a substitute, participants naturally consider the additional accessibility provided by virtual mobility, naturally considering its role in overcoming accessibility difficulties and supplementing participation.

This also emerged in relation to shopping. Whilst grocery shopping is a chore for many, for some it fulfils an important social function. This is reflected in the reduced

enthusiasm amongst participants for clothes shopping online, which is viewed by some as a social activity, rather than a purely retail activity. However, the benefits of online shopping, in terms of increased access to a wider variety of goods and cost and time savings, as outlined above, were also stressed. The discussions again exposed a degree of dissonance between stated and revealed preferences. Whilst concern regarding the quality of online social interactions emerged naturally, discussion of the quality of other activities was largely restricted to consideration of additional online activities, rather than to those already being undertaken. The focus group discussions highlight an important finding: that satisfaction with current online activity behaviour is easily lost when studies focus not upon discussion but upon attitudinal statements, or upon attitudes towards prospective behaviour. This may be the case in the majority of studies reviewed in Chapter 4.

This said, it is clear that many activities should be viewed in terms of their multiple purposes. This has clear implications for the ability of virtual mobility to alleviate mobility-related exclusion. As both substitute and supplement, where the online activity does not fulfil each of the purposes identified by the user, it could be considered as a second choice option. As a result, the online activity may be rejected; additional activities may be undertaken to fulfil the additional purposes; or the user may continue to experience exclusion. Where the offline activity has been substituted, there may be greater exclusion than previously. These concerns are expressed by the following participant:

> [Facilitator suggests giving Internet access to alleviate isolation]
> [Ironic laughter]
> **- So you don't agree?**
> - Absolutely not.
> - People need to get out.
> - Especially lone parents with children they spend enough time cooped up in the house. They haven't got the finance to go out so don't discourage them from going out on their odd little shopping jaunt or trip to the park. That's outrageous.
> *Group 5 participants, facilitator comment in bold.*

6.6.3.5 Summary: considering the acceptability, accessibility, affordability and availability of virtual mobility

The focus groups identified a number of positive implications of virtual mobility for mobility-related exclusion: the substitution of existing offline activities for online; and

new accessibility, supplementing existing activity participation. However, they have also identified a number of concerns regarding the accessibility, affordability, availability and, importantly, the acceptability of virtual mobility, the latter in terms of both the nature of the online activity vis-à-vis its offline alternative and in terms of attitudes towards virtual mobility. In this sense, the findings parallel those in the literature (reviewed in Chapter 4), confirming the existence of barriers to the use of virtual mobility to alleviate mobility-related exclusion. Mobility effects are unproven in this study. However, the study confirmed a *dual* digital divide, highlighting concerns regarding the ability to use and the ability to *fully* use virtual mobility. Whilst there was no evidence of negative social effects in this sample, many participants expressed concern in this regard. The almost schizophrenic nature of participants' attitudes to the Internet and the resultant difficulties associated with research into the acceptability of virtual mobility is an important finding of this study, influencing the direction of further research. Finally, concern emerged with regard to the quality of online activities, such that the additional accessibility granted by virtual mobility may be inadequate for the user's needs. In these respects, the use of virtual mobility may indeed result in a 'virtual mobility-related dimension' to social exclusion, as considered Chapter 4.

6.7 Conclusions: could virtual mobility alleviate mobility-related exclusion?

To conclude, this section considers two questions:

- What do the focus group discussions reveal with regard to the hypotheses?
- What are the implications of the findings for the second study?

The principal hypothesis informing this study suggests that virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion. This study supports this hypothesis. By exploring the nature of mobility-related exclusion, this study has clarified the nature of the accessibility deficit. Through examination of current Internet use, it has emerged that virtual mobility is currently being used to overcome accessibility difficulties, in many of the dimensions of social exclusion. Substitution of offline activities for their online counterparts was observed to result in cost and time savings, which can be reinvested elsewhere, to increase activity participation, overcoming an accessibility and participation deficit. Supplementing offline with online activity participation enables greater participation in a wide range of

previously inaccessible activities. Thus, virtual mobility does indeed appear to be providing an alternative to physical mobility as a tool to increase activity participation and to decrease mobility-related exclusion.

To an extent, the discussions also support the concerns highlighted in the literature regarding the adequacies and effects of virtual mobility, which form the second part of the hypothesis given in Chapter 5. There is a danger that a virtual mobility-related dimension to social exclusion may emerge, a result of differential access to use and full use of the Internet and as a result of reduced quality of some online activities vis-à-vis their offline counterparts. In this sense, the optimism regarding the accessibility benefits of virtual mobility may be tempered by the possible limitations of the medium. There was no evidence in this study of any negative social effects from online activities. Despite this, concerns regarding social effects may moderate the use of virtual mobility; however, its continued and enthusiastic use displays cognitive dissonance on the part of users, which is likely to mitigate, if not negate, such effects.

The focus groups study has produced valuable research findings. With regard to the aims discussed in Section 6.2, the study has been effective in: confirming and clarifying the nature of mobility-related exclusion; and exposing the nature and effects of Internet use, allowing the exploration of the adequacy of this form of accessibility. The third key aim of the study was to inform the next stage of the research, in terms of both the design of the methodology and the research questions to be addressed. This study has provided valuable insights in this respect.

A number of methodological difficulties emerged during the study. It emerged that:

- Participants tended to be unaware of the role of transport in their lives. During the focus group discussions, low awareness of behaviour restricted discussion of both the role of physical mobility in activity participation and the role of inadequate mobility in preventing participation. It is easy to assume that participants are aware of and troubled by the subject in which the researcher is interested. However, for many participants, the subject may be of little active interest. It is merely a fact of life and, as such, is rarely actively considered, or questioned. Thus, authors considering the role of habit in informing travel behaviour suggest that it is erroneous to suggest an active choice with regard to travel: rather, it is an unquestioned part of everyday life (Aarts et al, 1997; Lanzendorf, 2003). This issue has been highlighted in previous research, leading to the development of activity

diaries, which record mobility within the context of everyday life and thus enable more effective recall (Jones et al, 1983). Thus, this study suggests that research that aims to explore the role of mobility in a direct way, for example, in questionnaires, or structured interviews, is unlikely to be successful. Future research must circumvent the problem of low awareness if a true picture of travel behaviour and change therein is to emerge.

- Participants also tended to be unable to recall their behaviour and behavioural change, in respect to travel and Internet use. Research published since this study (Anderson and Tracey, 2002) also highlights this as a problem with retrospective qualitative research that aims to uncover change. Whilst this is closely related to the above observation, a separate point emerges, which suggests that methodologies based upon retrospective recall may compound the problem of low awareness and therefore be inappropriate in studying behaviour. Methodologies that record behaviour in real time may be more able to accurately record behaviour.
- Considering behavioural change, participants tended to be unaware of changes in their behaviour. Further compounding issues of awareness and recall, it is the researcher's mistake to believe that participants are purposeful in implementing change. When gradual, change can be unnoticed, thus also can the timeline of and impetus for this change. Future research should therefore consider a study across time, sampling behaviour at a number of discrete intervals to allow comparison of behaviour that is independent of the participants' awareness and recall.
- A degree of cognitive dissonance was observed: a difference between behaviour and reported attitudes. It was particularly noticeable that participants' stated concerns regarding the social effects of Internet use were not reflected in their reported behaviour. Whilst there is a possibility that this may have been influenced by the group setting, such that participants felt unable to voice (perceived) deviant opinions, analysis suggests that there is genuine conflict between behaviour and stated concerns. This suggests that attitude-based research, including stated preference or prospective questioning, should be avoided. This dissonance also suggests that attitudes may influence reported behaviour, such that it may differ from actual behaviour. This again suggests that real-time, comprehensive reporting, such as in activity diaries, may be more appropriate than recall surveys, or those targeted to examine only specific aspects of behaviour.
- This study has not been able to attribute particular responses to individual characteristics, reflecting the number of participants and that the groups contained (and the individuals represented) a mix of characteristics, with anonymised responses. Focus groups do not aim to gather data and draw conclusions that are

statistically representative or generalisable. Rather, the methodology is intended to provide indicative conclusions and theoretical advance. However, the attribution of responses to particular groups is likely to be important to policy makers, in both the design and monitoring of policy interventions. As such, further study should aim to consider the influence of individual characteristics upon the results.

- Finally, this study has been effective in exposing the qualitative benefits of virtual mobility. However, it has been unable to *quantify* these benefits, in terms of (current and future) trips substituted, or levels of activity participation, the latter either in terms of the number of activities undertaken, or the number of minutes spent in each activity. Of course, focus groups studies do not aim to provide quantitative evidence. However, this is likely to be important if the effects of virtual mobility are to be fully understood. In addition, whilst it is increasingly recognised within the transport community that qualitative research is of value – and that quantitative research has its limitations (Clifton and Handy, 2003; Goulias, 2003) – there remains a bias within the academic, practitioner and policy communities towards quantitative evidence, reflecting transport studies' positivist, physical scientific foundation. There continues also to be a political need for quantitative evidence to underlie policy decisions, reflecting the present government's emphasis upon evidence-based policy making. In light of the above and in order that this research be received by a wide community, further research should aim to quantify the benefits observed in this study.

With regard to the research questions, the following issues emerged as important for further research:

- The collection of data regarding both the substitution and supplementing effects of virtual mobility.
- The quantification of effects.
- The secondary effects of activity participation using virtual mobility: that is, the effects on participation in other activities, including travel.
- The differential benefits of virtual mobility, for different groups, based upon characteristics influencing the use and *full* use of virtual mobility to overcome mobility-related exclusion, including: income; Internet experience; location; mode of transport.
- The role of virtual mobility in enabling multitasking as a route to increased activity participation.

The research findings, building upon those discussed in the literature review, provide valuable insights into the nature and effects of mobility-related exclusion and the potential for virtual mobility in reducing mobility-related exclusion, by providing (increased) access to activity participation. In so doing, this study served to validate the research topic and to highlight and refine further research questions. In addition to framing future research questions, the focus groups study provided important methodological findings. Together, these findings determined the design of the second study, to which this thesis now turns.

Part 3. The diary study

Chapter 7. The diary study: introduction and overview.

7.1 Introduction

Following the conceptual, theoretical research established by the literature review in Part 1 and the qualitative empirical research in Part 2, the thesis moves to present quantitative empirical work. This short chapter provides an introduction to the second study, detailing the aims and objectives, before providing an overview of subsequent chapters in Part 3.

The first empirical study in this thesis, detailed in Chapter 6, produced valuable research findings, supporting the hypotheses detailed in Chapter 5. The study found that virtual mobility is providing additional accessibility which, on occasion, enables the substitution of the offline activity for an online equivalent. More often, however, online activities are supplementing offline activities, providing additional accessibility where previously access was denied. Discussions focused upon the benefits of virtual mobility for a number of key activities, including communicating, searching for information and shopping. Results also highlighted the role of virtual mobility in enabling multitasking to increase activity participation. However, the study was unable to provide evidence on the *precise* nature of the effects of virtual mobility, specifically, if the observed positive effects are mitigated by the suggested (but not observed) negative effects. This was largely due to methodological issues, including problems of awareness, recall and cognitive dissonance.

The study proved valuable in informing the second empirical study, in two ways. Firstly, as Section 6.7 highlights, the research findings were instrumental in refining the aims and objectives for the second study. These are as follows.

(1) To gather quantitative data regarding physical mobility, virtual mobility and activity participation, plus behavioural change therein.
(2) To use these data to more fully understand:
    (a) the influence of physical and virtual mobility upon the nature and extent of participation in key activities;

(b) the influence of virtual mobility upon the nature and extent of physical mobility – and vice versa; and

(c) the influence of personal characteristics upon the use of physical mobility, virtual mobility and thus upon activity participation.

(3) To draw conclusions from the above with regard to the hypotheses: namely, the extent to which virtual mobility is influencing patterns of physical mobility and social exclusion, the latter understood in this context as activity participation; and, additionally, the extent to which these impacts may differ according to key characteristics.

Secondly, the first empirical study highlighted a number of methodological barriers to research in this area. A review of the literature, during the course of research into appropriate methodologies for the second empirical study (detailed in Chapter 8), suggests that a number of authors support this finding. Authors including Doherty and Miller (2000), Golob (2001) and McCray et al (2003) highlight a 'methodological gap', which prevents the collection of appropriate data to further understanding of the impacts of virtual mobility upon physical mobility. Indeed, the gap between our understanding of the data that we need in order to more fully understand the complexities of travel behaviour and our methodological ability to collect these data is such that Axhausen (1998) questions whether or not we will ever attain the breadth and depth of data that we wish to have. Gershuny (2002a, 2003), in his critique of Nie and Erbring (2000), discusses the limitations of current methodological approaches in uncovering the impacts of virtual mobility upon sociability and concludes similarly[1].

A review of methodologies, presented in Chapter 8, found no single approach that could confidently be used in this research. Thus, a key aim of the research became not only to collect quantitative empirical data to contribute towards *theoretical* advance in this area, but also to contribute towards *methodological* advance, through the development and testing of an original methodological design. In consequence, a fourth aim is added to those listed above:

(4) To contribute towards methodological advance.

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[1] The reader will remember from Chapter 4 that Kraut et al (2002) found similarly in their critique of their own research.

In sum, therefore, the research presented in subsequent chapters aims to test the theories developed during the literature review and focus groups stages and to pilot and test a new methodological approach to the field of study.

7.2 Overview

Part Three of this thesis progresses thus. Chapter 8 presents a discussion of the methodology, a longitudinal, panel-based diary study. To justify this choice, the suitability of a number of quantitative methodologies is considered, followed by a review of existing diary studies. This discussion validates the claim that no single existing methodological approach was suitable for use in this research. Next, the survey instrument developed for use in this research, the 'accessibility diary', is presented and discussed in full, with reference to the aims and objectives detailed above and in line with aim (4). Chapter 9 considers the sampling strategy and sample composition. It was not the aim in this research to gain a representative sample, such that the results could be generalised to a national population, rather to increase theoretical understanding and to explore a new research methodology. Thus, theoretical sampling was judged to be appropriate. The sample method is outlined and the sample profile is presented.

Chapter 10 presents results from the primary data analysis. The chapter progresses through a number of sections. The first details the process of data preparation. The second considers the longitudinal data, seeking to explore the impact of Internet use upon travel and activity participation through the examination of changes in behaviour over time. In light of the absence of clear longitudinal trends, the analysis turns to consider the impact of Internet use using a composite database. The chapter concludes with an evaluation of the implications of the findings for the hypotheses and further research. Chapter 11 introduces the concept of multitasking. Following a literature review and conceptual discussion, empirical evidence is presented, which emphasises the importance of multitasking for the field of study. The analysis undertaken in Chapter 10 is repeated, using a database which incorporates secondary activities data. As above, the chapter concludes with an evaluation of the implications of the findings for the hypotheses and further research.

Chapter 8. Methodology.

8.1 Introduction

This chapter considers the methodology for the second empirical study in this thesis. The focus groups research exposed a number of methodological issues concerning research into the implications of virtual mobility for personal travel and social exclusion. In addition, critical appraisal of previous studies revealed problems with the use of certain methodological approaches for study in this area, as detailed in Chapter 4 of this thesis. Alongside the aims and objectives, detailed in Chapter 7, these methodological findings were instrumental in the choice of methodology for this stage of the research.

Chapter 7 highlighted a 'methodological gap', which a number of authors suggest has frustrated research into the implications of Internet use. The results from the focus groups studies and the following literature review complement such suggestions. Thus, this study aims not only to collect empirical data to contribute towards theoretical advance in this area, but also to contribute towards methodological advance through the development and testing of an original methodological design. As such, this chapter presents a novel methodology in detail, which has been developed through the adaptation of an existing technique as an attempt to overcome these methodological problems.

The chapter develops through six subsequent sections. The first considers the (un)suitability of a number of quantitative methods for this research. This leads naturally to a discussion of the perceived benefits of a longitudinal, panel-based diary study. A review of existing diary studies follows. This review reveals the lack of a single existing method that could record activities, communications, travel and the complexities of time use, including polychronic time use (multitasking), to the level of detail required for the study of the impacts of Internet use upon the same. Thus, the following section details the 'accessibility diary', developed by the author for use in this research. Each aspect of the diary is considered, with explicit reference to the aims and objectives. The chapter then turns to discuss the principal disadvantage of diary-based, longitudinal panel studies, attrition, alongside the strategies employed to address this issue. A summary section follows.

8.2 Choice of methodology

In light of the aims and objectives, it was necessary for the methodology to meet the following requirements:

- Provide quantitative data on activity, Internet and travel behaviour, as both primary and secondary activities;
- Gather evidence of change in the above, to allow assessment of the effects of virtual mobility (specifically, its substituting and/or supplementing effects within key activities); and
- Allow appraisal of the influence of key characteristics upon behaviour and behavioural change.

A number of methodologies were considered and the relative benefits and disbenefits of each, for this study, were evaluated[1]. Given that it was an aim to gather quantitative evidence, methods which gather qualitative data, including further focus group studies, qualitative interviewing and ethnographic research, were rejected[2]. The findings from the multidisciplinary review of quantitative methods suggested that a longitudinal, panel-based diary study, with data collected contemporaneously, would be the most appropriate methodology for gathering data on behaviour and change therein, for this study. Diary studies have become increasingly popular in the field of transport research since their first recorded use just over sixty years ago (Axhausen, 1995). Before presenting a review of the principal benefits of a diary study for this research, this section outlines the principal reasons for the rejection of alternative methodologies.

Questionnaires have been used by many authors in transport research. Whilst this would provide quantitative data for a large sample, at relatively little cost[3], the methodological difficulties that emerged during the focus groups study were judged to prohibit this approach for this research. As highlighted in Chapter 6, focus group participants exhibited a low awareness of the role of travel in their activity participation and a low awareness of their current travel behaviour. It emerged that, for many, travel

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[1] The review of methods that follows is intended to provide justification for the choice of methodology for this study only. The review is therefore specific to the needs of this research. It is not the intention of the author to provide a generic review of methods, rather to present a review in relation to the chosen methodology. In light of this, the comments below should not, unless otherwise stated, be interpreted as a judgement of these methods in the context in which they are applied.

[2] On the use of ethnography in transport research, see CTS (Nd) and Laurier (2004).

[3] Monetary and time costs.

is just a part of life, which is rarely considered. There was also evidence to suggest that participants with Internet experience were beginning to feel similarly about their Internet use. A number of authors have highlighted this problem in relation to the recall of activity participation behaviour. Thus, Robinson and Godbey (1997) find that '[t]he simple question [of activity behaviour], when broken into the constituent information expected of respondents, is beyond the ability of most respondents to answer accurately.' Gershuny (2003) and Kitterod and Lyngstad (2005) find similarly, in their discussions and comparisons of appropriate methodologies for time use research[4]. Because participants are generally unaware of their behaviour, it can be suggested that attempts to explore behaviour in a direct way, using a questionnaire-based methodology that presupposes this knowledge, would be unlikely to be successful in providing a true picture of this behaviour. In addition, given the complexity of data required for this study, it would be necessary to probe many areas of behaviour. The task of remembering behaviour across all of these areas would be likely to result in cognitive overload and, in consequence, low response rates.

A further drawback of questionnaire surveys is the dissonance between stated and revealed behaviour. This was revealed in the research presented in Chapter 6 and is discussed in Robinson (1999). Kitterod and Lyngstad (2005) similarly suggest that perceptions of the 'social desirability' of certain activities can lead to their over- and under-reporting in questionnaire surveys, a phenomenon that is particularly notable with regard to paid work (Bonke, 2005). This (often subconscious) cognitive dissonance raises further questions regarding the accuracy of the patterns of behaviour reported in many surveys.

Research in this study aims to uncover not only patterns of *current* behaviour, but also behavioural *change* and reasons for this change. However, questionnaires asking directly about change may not provide accurate data, for a number of reasons. Firstly, given the low awareness of current patterns of behaviour, there may also be low awareness of behavioural change. Change that is substantial, or associated with a life event, will be more easily remembered. Participants are less likely to be aware of or to remember gradual change, which evolves over time. Secondly, participants in the focus groups study were unable to recollect past behaviour, or to remember behavioural change. This suggests that methodologies requiring retrospective recall

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[4] Gershuny (2003) states: 'All in all, since people cannot be expected to have knowledge of the elapsed time they have recently devoted to various activities, it seems inappropriate to base our measurement of the use of time on a technique [i.e., a questionnaire survey] that pre-supposes this knowledge'.

are unlikely to collect accurate data on change. Similar issues with retrospective data are considered by Lanzendorf (2003).

Longitudinal research, in which contemporaneous data are collected in multiple waves, can overcome problems with retrospective recall (Smith, 2003; Terzis, 1990). However, longitudinal questionnaire-based research, where the questionnaire fails to accurately measure contemporaneous behaviour (as suggested above) will in consequence be unable to provide an accurate measure of change. In addition, longitudinal research is most useful when it is conducted as a panel survey, rather than as a series of cross-sectional surveys. Goodwin (1997) suggests that 'there is a class of phenomena that simply cannot be observed at all in cross-section surveys'. Anderson (2005) illustrates this in relation to studies of poverty and ICT poverty, highlighting the transient nature of (ICT) poverty that is hidden behind aggregate statistics (also Jarvis and Jenkins, 2000). Goodwin (ibid) suggests that studies that aim to uncover behavioural change using cross-sectional data are likely to produce misleading results, particularly with regard to the strength and form of relationships between variables. Thus, cross-sectional surveys are likely to be troublesome for this study, which aims to detect the effects of the independent variable Internet use upon the dependent variables travel and participation in key activities (see also Duncan, 2000; Gershuny, 2002a). Whilst questionnaire studies can be conducted with a panel, attrition can reduce response rates by 30 percent with each wave (van der Loop, 1990). Effective strategies to reduce attrition are costly (Thomson and Holland, 2003; Ward and Henderson, 2003). The financial, time and personnel resources necessary to implement these strategies for a large sample were not available for this study[5].

Tayyaran et al (2003) discuss the use of stated preference surveys to assess change. Mundorf et al (2001) use prospective forecasting techniques[6]. However, dissonance is likely to limit the utility of such methods. There may be little relation between stated preferences and actual behaviour, should the hypothesised scenario occur. This suggestion is supported by Prochaska's theory of change (cited ibid)[7]. Salomon (1986) highlights an additional problem with the use of stated preference and prospective forecasting for research into the impacts of new technologies: values and attitudes

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[5] Polak (1995) identifies three key problems with panel surveys: attrition; fatigue; and conditioning. These issues are considered in Section 8.6.
[6] I.e., 'If x were to occur, what would your reaction be?'
[7] Prochaska suggests that there are six stages through which people must pass before making an effective change in their behaviour: pre-contemplation; contemplation; preparation; action; sustained change; maintenance. Thus, the path to change is not as simple as stated preference models may suggest.

change over time, as technologies become normalised. Thus, such surveys have limited value in the study of change, for the independent variables against which they measure change are neither constant nor reliable.

Finally, Clifton and Handy (2003) and Goulias (2003) suggest that questionnaire-based research design may not be appropriate for exploratory research, such as that discussed in this thesis. These authors suggest that questionnaires can impose a version of reality, which is inappropriate when investigating new research questions[8].

For these reasons, a questionnaire-based approach was judged to be unsuitable for this study. As such, a number of other quantitative research methods were considered. Structured interviews pose similar problems to those outlined above. Whilst interviews are advantageous in that explanation to reduce the complexity of the questionnaire is possible, such moderator intervention may influence the results, introducing bias. In addition, the resources[9] required to interview a sufficient sample in this way were prohibitive for this study. Data tracking methods, using GIS to monitor travel behaviour and Internet tracking software to monitor online behaviour, used by authors including Anderson and Tracey (2002), Murakami et al (2003) and Ohmori (2004), were similarly beyond available resources, including financial resources and technical expertise for design of the survey instruments and their implementation. Furthermore, it was judged that such a methodology would give a rather shallow database, recording only online and travel activities without further detail on the context for these activities, which would be unlikely to meet the aims of this study[10].

Salomon (1986) considers the value of experimental research, including the implementation of behavioural change and monitoring of its effects. However, this approach was inappropriate for this study, for a number of reasons. Firstly, because of inability to resource the provision of hardware and Internet connections. Second, there are ethical considerations associated with behavioural intervention, including the need to restrict the behaviour of a control group and the removal of the technology after the lifetime of the study. Third, there are concerns regarding a 'Hawthorn effect', with the result that behaviour is affected by participation in the study (Salomon, 1986). In

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[8] Whilst this is in line with criticism of positivist research methods, the authors' discussions centre around the suitability of methodologies, rather than of theoretical approaches to research.
[9] Financial, time and personnel resources.
[10] Crucially, Anderson and Tracey (2002) supplements data tracking methods in combination with other methods, including questionnaires, diaries and face to face/telephone interviews. The resources for such a multi-method study were outside the scope of this study.

addition, it can be suggested that the provision of free Internet access in the course of research (such as in Hampton, 2003) biases Internet use, encouraging greater use than would naturally be observed. This would prevent the ability to draw conclusions with reference to the general population, just as the behavioural change observed as a result of the provision of free transport should not be generalised to a population without such free access. Fourth, the timeline of Internet activity identified in Chapter 6 suggests that use of and responses to virtual mobility change with experience[11]. Thus, it is important to identify the cumulative effects of use, examining the behaviour of those who have been online for a number of years. This is not possible in an experimental study which monitors behavioural change from first use, within the time frame of this study.

Finally, direct observational studies, differentiated from ethnographic studies by their ability to provide quantitative data and most commonly used in the field of applied behavioural analysis (for example, Iwata et al, 2000), were investigated. However, such techniques must be used within a controlled environment, with small samples. For the participant, they can be highly intrusive and for the researcher, very time consuming. These concerns limited the suitability of this method for this study.

8.3 Diary studies: an overview

The above discussion has highlighted the perceived inadequacies of a number of quantitative methodologies for this study, centring upon concerns regarding the quality of the data collected, its applicability and its reliability. This section provides an overview of the use of diary studies for the collection of data on behaviour and behavioural change. The discussion highlights the ways in which the chosen methodology, a longitudinal panel-based diary study in which the data are collected contemporaneously, is perceived to overcome many of the above limitations.

Diaries allow the collection of a large volume of highly complex data, with relatively little cognitive effort for the participant[12]. The participant does not answer questions, they merely note their daily behaviour. Thus, diaries can allow collection of data not only on patterns of travel, but also on the context for travel, including the activity prompting

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[11] Indeed, Kraut et al (2002) attribute the great differences in the findings of their two studies, conducted two years apart, to changing behaviour due to greater Internet experience.
[12] Whilst the *cognitive* burden can decrease, the longer timescale for participation introduces additional burdens, discussed in later sections.

travel, the scheduling of trips and the sociability of journeys[13]. Such contextual information not only improves the understanding of travel behaviour, but can improve the quality of data collected, for when participants situate activities in context, their ability to recall each activity accurately can improve (Adler, 2003; Robinson, 1999). In addition, diaries encourage the recording of activities contemporaneously. Reducing the need to recall events can further reduce cognitive burden. The accuracy of data collected may be further improved by the use of contemporaneous reporting, overcoming data quality issues associated with retrospective and prospective surveys (Corti, 2001; Mokhtarian and Salomon, 2002)[14]. Robinson (1999) suggests that data collected using diaries is more accurate because there is less opportunity for the misrepresentation of activity patterns. He suggests that to do so purposefully would require substantially more effort than truthful representation (Gershuny (2003) finds similarly). And in light of the above discussion regarding low awareness of behaviour and the dissonance between stated and revealed behaviour, the author additionally suggests that full reporting of activity participation may reduce subconscious misrepresentation.

The above discussion notes that, in a diary study, participants do not answer questions: they merely note their daily behaviour. As such, the influence of the researcher upon the data collected is reduced to a minimum and the problem of the imposition of a theoretical framework through the survey instrument, highlighted by Clifton and Handy (2003) and Goulias (2003), may be reduced. In addition, the subject of the study can be concealed from the participant, reducing the possibility that participants will modify their behaviour or their responses, either purposefully or subconsciously, as a result of the study[15]. Finally, the study of change through a longitudinal, panel study is likely to be the most effective method, as detailed in Section 8.2.

The above discussion has highlighted the advantages of diary studies in the exploration of human behaviour[16]. In light of these advantages, diaries have become an important tool in the progression of activity-based theories of travel behaviour. Both informing and in response to this theory, in the field of transport studies, diaries have

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[13] Section 8.5 considers the extent to which any survey method can collect information on the *full* context for travel.
[14] Of course, participants may choose not to record contemporaneously, but at the end of each day. This is outside the control of the researcher and may influence the accuracy of reporting.
[15] This said, the benefits of disclosing the purposes of the study to increase accuracy of response and as part of a strategy to reduce attrition are considered in Section 8.6.

developed from their initial format as simple origin-destination travel diaries to the more comprehensive activity diary used in transport studies today. However, whilst such diaries have developed alongside new behavioural theories, few have incorporated recording of the use of new technologies. A multidisciplinary review of the use of diaries in research revealed the same[17]. Analysis of existing diaries highlighted the lack of a single diary that could confidently be used within this research. The following section presents a review of diary studies, to justify this claim. In light of this, a new diary method, the 'accessibility diary', was developed by the author, in which existing techniques from across a number of disciplines are adapted and applied to a new area of research. The accessibility diary is presented and discussed in Section 8.5.

8.4 Four diary traditions

This section presents a review of four diary traditions: travel diaries; activity diaries; time use diaries; and communications diaries[18].

Whilst traditionally more common in the social sciences, primarily in the form of time-use diaries, the use of diaries in travel behaviour research is not unusual. However, whilst diaries have been used to study travel behaviour for sixty years, their use as a survey tool only became common in the latter decades of the 20th Century (Stopher, 1997). Used initially to collect data about trips to feed models which aimed to predict and provide for traffic flows, *travel diaries* collect information solely about the trips that people make. The travel diary will typically capture information on the origin and destination of the trip (to varying levels of accuracy); departure and arrival times; mode(s) used; and whether or not the traveller was accompanied. More detailed travel diaries also record parking details (including cost and location relative to origin/destination). Limited information about trip purpose may also be collected (Arentze et al, 2001; Axhausen, 1995; Butcher and Eldridge, 2003).

As activity-based theories of travel behaviour gained popularity, such diaries were adapted to embrace the context of travel, recognising that trips are made in the context

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[16] The disadvantages of diary-based approaches, including attrition as a result of participant burden and data analysis issues, are considered in Section 8.6.
[17] Whilst a handful of time use studies have incorporated the collection of information on time spent in Internet-related activities (for example, Anderson and Tracey, 2002), the author is unaware of any activity-diary studies, used for the study of travel behaviour, which do so.

of individual and household characteristics and obligations. *Activity diaries* reflect this recognition that travel cannot be measured in isolation of these factors. Thus, unlike travel diaries, activity diaries aim to collect information on the contextual factors that have been identified as being important in determining the place of travel in everyday life, primarily, the situation of travel in relation to other activities and obligations.

Often, activity diaries are presented as modified travel diaries, with the addition of space to record activity participation. In such diaries, in contrast to travel diaries in which only the activity associated with each trip is recorded, the participant is asked to record every activity in which they participate, including start and end times and the presence of others during the activity. They are then asked to record whether or not this activity required travel and, if it did, to chronicle their travel, often in a separate travel diary. However, some activity diaries, influenced by time-use diary methodology, break fully from the travel diary tradition and conceptualise travel as an activity like any other. Such activity diaries tend to collect less information about the trip as a consequence, perhaps only the time, mode and activity location, the latter in less detail than that collected by travel diaries. Still other activity diaries move further from the traditional travel diary, collecting information about the activity patterns of the household, rather than the individual; and some also collect information about participation secondary activities (Arentze et al, 2001; Behrens, 2003; Doherty, 2003; Harvey, 2003; Jones, 1983; Scottish Executive, nd).

Time use diaries have contributed much to the design of activity diaries. However, they have tended, if not to ignore travel, to record only one aspect of travel – for example, travel purpose in a very generalised sense, as 'work related travel', or 'domestic related travel', alongside the duration of this activity (Gershuny, 2000, 2002b, gives an overview of time use diaries; ISER, nd, gives examples). Such level of detail is insufficient for those attempting to fully understand traveller behaviour, as mode(s) and stages are not recorded. In addition, time reporting intervals can reduce accuracy of reported travel times and can reduce the reporting of short trips.

Finally, *communications diaries*, of which the author can find few examples, aim to record all communications entered into over a specified period of time, to varying levels of detail. Whilst time use diaries record communications, they do so in low levels of detail. Communications diaries record not only the activity of communication but also

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[18] The specifics of each diary vary according to the needs of the study. Visual examples are not given – the reader is referred to Axhausen (1995), Harvey (2003) and ISER (nd) for such

the time and mode of communications, who else was involved and the direction of communication. Copher et al (2002) describe their diary as a 'communication diary'; Anderson et al (1999), Gershuny, (2000), Mokhtarian and Meenakshisundaram (1999) and Ohmori (2004) incorporate communications into their diaries.

A comprehensive, multidisciplinary review of diaries from each of these traditions revealed that none recorded activities, communications, travel and the complexities of time use, including polychronic time use (multitasking), to the level of detail required for this study of the impacts of Internet use upon the same. In consequence, the 'accessibility diary' was developed. So called to reflect the emphasis upon all forms of access, to all activities, the accessibility diary draws together aspects from each of the above methods to allow recording, at the individual level, of personal travel, activity participation, time use and communications use, in one survey instrument. By recording access in terms of both physical travel and communications use, the diary recognises that time and space no longer pose the principal barriers to participation. Recording activity participation alongside modes of access, the accessibility diary allows assessment of the influence of both physical and virtual mobility upon the individual's patterns of participation in activities.

The following section discusses the accessibility diary in detail.

8.5 The accessibility diary

The accessibility diary was designed for use in a longitudinal panel survey with c. 100 participants[19]. Participants completed the diary for seven days, repeated three times, at six month intervals[20]. The length (in days) of the survey period and the frequency of repeat waves imposed a significant burden upon participants and in so doing created a significant design challenge. Of all strategies to reduce respondent attrition and maintain the quality and reliability of response across the diary period, design of the diary is the most important[21]. Therefore, in designing the accessibility diary, the data needs of the study were considered in conjunction with the needs of participants for a

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information.

[19] The sample rationale and recruitment process are discussed in Chapter 9.

[20] This is in contrast with the majority of diaries that were reviewed by the author in the course of this research, most of which run for just one or two days (for example, Butcher and Eldridge, 2003; Madre, 2003) and few of which are repeated over time, by the same panel (for example, Battellino and Peachman, 2003). In the studies that were repeated, participants were revisited once a year or less (including Gordon and Lahelma, 2003; Lucey et al, 2003; Tomanovic, 2003).

simple, usable diary format, which is as easy and as quick to use as possible. The accessibility diary was therefore designed with the following user-centred objectives foremost in mind. To:

- take no more than 15-20 minutes in total per day to complete;
- be intuitive to complete, following natural thought processes and working in the user's natural language;
- be easily learnable, following one-to-one training at an inception meeting; and
- prompt the user to record all of the information needed, to eradicate participant anxiety and maintain data quality.

To this end, the amount of data that the user was asked to record was reduced to the bare minimum necessary to attempt to uncover the links between physical mobility, virtual mobility and activity participation (Arentze et al, 2001; Ortuzar and Lee-Gosselin, 2003).

There is a dilemma in transport research. As understanding of travel behaviour grows, so does the number of questions that we wish to answer and, consequently, the amount of data that we wish to collect. It is tempting to enhance existing methodologies, continuously adding recorded variables to measure as many aspects of life that may influence travel behaviour as possible (for example, Doherty, 2003). However, by doing so, the complexity of surveys increases and so, in parallel, can non-response, both to individual questions within a survey and to the survey as a whole (described by Stopher et al (nd) as 'a burning issue in all fields of research'). As a result, there is a danger that, in attempting to collect data on everything, we find in fact that we have data on very little, because our surveys impose too great a cognitive, time or effort burden upon participants. Considering this problem, in his 1998 paper, Axhausen concludes that a survey to collect information on the *full* context for travel (which, he suggests, would require a number of independent diary surveys, including intended action, action, reason for action and feelings about the action, each with up to 25 variables) would be unpopular with survey respondents. He writes: 'The level of literacy, introspection, conscientiousness, commitment, and free time seem unlikely to be available in many cases', leading to unrepresentative, small samples. These problems are likely to be amplified in longitudinal panel surveys.

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[21] Adler (2003) highlights the importance of survey usability in reducing non-response.

In response, the accessibility diary was designed to balance research needs for complex data and user needs for a survey instrument that is quick and easy to use. The detailed discussion below illustrates that the accessibility diary attempts to simplify data collection for a complex subject area. To this end, a number of compromises were made in the design of the diary, reducing the number of different *types* of data collected, with the aim of increasing the *volume* and *quality* of data, through increased usability.

A variety of diary designs were considered during the design process. At each stage, pre-test mock ups were given to a cross-section of the author's colleagues, with a mix of age, gender, socio-economic profile and educational achievement[22]. In the final pre-test, ten staff were asked to complete the diary for a 24-hour period. Participants were debriefed during a one-to-one discussion. All aspects of the design, including instructions, activity codes and inception meeting questionnaires were pre-tested. The final design of the accessibility diary is given in Figure 8.1. Users are asked for just six basic pieces of information: (1) what they did; (2) the start and (3) end times of the activity; (4) the participation or (5) presence of others; and (6) what else they were doing at the time. In light of the issues of low awareness, dissonance and poor recall, discussed in Section 8.2, the diary was designed to actively help users to remember their activities (stressed by Zmud, 2003). Full instructions and training were provided[23]; it is as flexible to and mindful of participant needs as possible[24]; and the separation of the collection of personal data from the diary itself was intended to reduce respondent burden still further[25].

The diary was issued as a professionally printed A4 booklet, with 28 pages. The option of an online diary was rejected, because of the bias that this would introduce in prompting Internet use. The front cover was designed to appear professional, yet informal, with immediate 'eye appeal' (Stopher et al, nd). The cover design is given as

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[22] Staff within the Faculty of the Built Environment at the University of the West of England, Bristol, in which the author was employed during the course of this research.
[23] Instructions on how to complete the diary, with reference to an example of a completed diary and an accompanying narrative, are provided on the first pages of the diary. These are reproduced as Appendix 6. The instructions discuss how each column should be completed and were piloted, to ensure the usability of the instructions and their utility, in increasing usability and in increasing accuracy. Participants received training during a one-to-one interview, lasting up to 1 hour and including a practice diary. They were given an information booklet. This is included as Appendix 7.
[24] Ampt (2003) highlights the importance of flexibility regarding when the survey should be completed in reducing non-response. To this end, instructions specified that the user should complete the diary at a time convenient to them. Lucas (2002) highlights the importance of designing the survey for the abilities of the target population.
[25] Personal data were collected during the inception interview.

Figure 8.2. Participants returned the diary in a Freepost envelope. The diary was distributed in the second full weeks of March 2004, October 2004 and March 2005. Dates were carefully chosen to avoid public and school holidays and seasonal weather variation (Huysmans, nd). However, the difficulty of selecting a 'typical' reference week, which is truly representative of behaviour, is recognised. This is discussed fully in Chapter 10.

The following sections consider each aspect of the diary[26].

Day(s) .....

What did you do? *Please write code for one main activity*	Start time	End time	Where did you do it? *E.g. at home; at office; between home and work...*	Did anyone else do this with you? *Yes / No*	Was anyone else around at the time? *Yes / No*	What else were you doing? *Please enter code and duration for up to three additional activities*					
						Code	Dur.	Code	Dur.	Code	Dur.
	:	:									
	:	:									
	:	:									
	:	:									
	:	:									

Figure 8.1. The Accessibility Diary

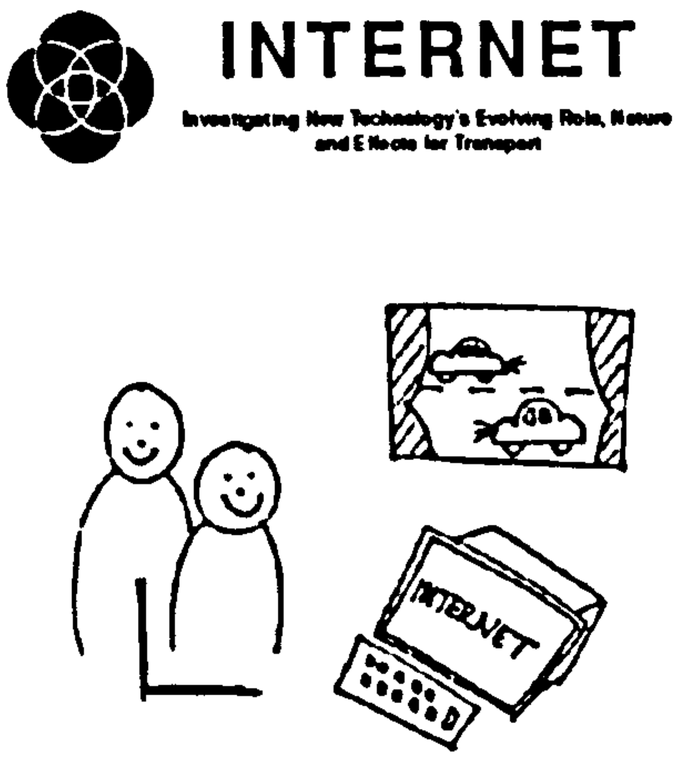


Figure 8.2. Diary cover design

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[26] A number of methods were used, following the implementation of the diary in the first wave, to assess the usability of the accessibility diary: telephone interviews during the diary week; two questions within a short post-diary questionnaire; and two focus groups with study participants. Its utility for the study of the impacts of Internet use upon activity participation and travel was assessed during the analysis. The results of these studies are considered in Appendix 19, in which conclusions from a technical appraisal of efficacy and fitness for purpose are drawn; and in Chapter 12, which discusses methodological challenges in this field of research.

8.5.1 Column 1: What did you do?

Many activities are easily forgotten, because they occur frequently, or because they are unimportant to the participant (Butcher and Eldridge, 2003). Thus, it is important that the survey tool helps the user to remember (Corti, 2001; Zmud, 2003). To this end, unlike in the majority of diaries reviewed in the course of this research, the activities column is placed first. Pre-testing suggested that this method is more intuitive – that it is more natural to recall initially what you did, before remembering the time that you started and finished the activity. A focus upon the activity, which is the aspect of life that is likely to be most important to the individual, above other factors including time, is more likely to help to fully recall the structure of their day. In keeping with this theory, participants are encouraged to complete their diary as each main activity changes.

Short instructions are included at the top of each column of the diary, in this case, 'Please write code for one main activity'. Whilst full instructions are available within the diary, such visible directions are intended to reduce the possibility for misinterpretation of the survey instrument, reducing inaccurate response (Zmud, 2003).

8.5.2 Activity codes

Participants are asked to use pre-coded activities to describe their day[27]. The activity codes are the key to the simplicity of the diary for users, whilst simultaneously providing rich and complex data. In addition, the use of activity codes allows the combination of a number of measured variables into one recorded variable, including the mode of access to the activity[28].

Activity codes are commonly used in time-use diaries and in some activity diaries (for example, Barrett et al, 2002; Gershuny, 2000; Jones, 1983; Keuleers et al, 2002). However, existing activity listings were not appropriate for this study, failing to record

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[27] The column to record activities has enough space to allow the user to write their activity in full, allowing them to complete the activity code at a later date, if they find this easier or quicker.
[28] Corti (2003) suggests that pre-coding also places less burden upon the researcher, whilst also reducing the possibility of miscoding of responses by the data inputter. However, there are issues with pre-coding, including the variable interpretations of the codes by participants. Gershuny (2000, Appendix 1) considers this problem. However, this was judged by the author to be the lesser of two evils, the other being misinterpretation by the data inputter. In addition, the aggregate codes used within the analysis (discussed in Chapter 10) should reduce the importance of subtle misinterpretations such as those discussed by Gershuny. Ultimately,

activities that are key to this research in sufficient detail. Thus, following consultation with the author's colleagues to create a list of all online and offline activities in which they had participated that week, a list specific to the aims and data needs of this study was developed. Many activities are grouped – for example, all forms of personal care are grouped as one code, similarly all sports. Activities undertaken in the course of paid work are recorded as a single activity, reducing respondent burden and reflecting the fact that it is not the aim of this research to understand the changing nature of work in response to workplace Internet use. All forms of communication, information search, shopping and travel are listed separately, because of the importance of these activities to the aims and objectives. Because travel may not be an entirely derived demand, 'travelling for pleasure' is included as a distinct code. The wording of the codes was pre-tested to ensure adequate fit between participants' natural language descriptions of the activity that they have undertaken. Activity codes are given in Figure 8.3.

The codes are grouped into eight categories, to facilitate quick and easy search for individual activities. The categorisation was pre-tested for intuitiveness and learnability. Codes begin with the letter corresponding to their categorisation. Each category contains an 'other' option, to encompass activities that are not essential to this study. Participants can also classify their activities as 'other', outside of the seven categories, to overcome difficulties in categorising their responses. The provision of a 'personal' option was included to reassure the participant that the survey does not wish to pry into their personal lives.

Gershuny recommends the approach taken in this study, although he recommends being mindful of its limitations.

Communicating:

C1	Face to face
C2	By telephone (landline)
C3	By mobile telephone
C4	By text, or video messaging
C5	By letter
C6	By fax
C7	By email
C8	In chat room
C0	Other communicating
C0I	Other communicating – Internet

Entertainment / recreation

E1	Resting, relaxing
E2	Reading
E3	Do hobbies
E4	Play sports
E5	Cinema, theatre, watch sport, etc.
E6	Social (pub, club, bingo...)
E7	Watching TV, video, DVD
E8	Listening to music, radio
E9	Travelling for pleasure
E10	Surfing (no specific purpose)
E11	Playing computer games
E0	Other entertainment / recreation
E0I	Other entertainment / recreation – Internet

Formal activities

F1	Paid work
F2	Education
F2I	Education – Internet
F3	Voluntary work
F3I	Voluntary work – Internet
F4	Religious activity
F4I	Religious activity – Internet
F5	Campaigns, civic
F5I	Campaigns, civic – Internet
F0	Other formal activities
F0I	Other formal activities – Internet

Household and personal

H1	Sleeping
H2	Personal care
H3	Eating, drinking, inc. preparation
H4	Housework, household maintenance
H5	Childcare
H6	Other caring activities
H7	Running errands (e.g. posting a letter)
H8	Escort (includes school run)
H9	Banking, financial
H9I	Banking, financial – Internet
H10	Medical (includes GP, hospital)
H0	Other household and personal

Information search

I1	Trivia
I1I	Trivia – Internet
I2	Window shopping
I2I	Window shopping – Internet
I3	Journey information
I3I	Journey information – Internet
I4	Employment information
I4I	Employment – Internet
I5	Hobbies
I5I	Hobbies – Internet
I6	Medical (Inc. NHS Direct)
I6I	Medical – Internet
I7	News (includes TV, newspaper)
I7I	News – Internet
I0	Other information search
I0I	Other information search – Internet

Shopping for:

S1	Groceries (main)
S1I	Groceries (main) – Internet
S2	Groceries (top up)
S2I	Groceries (top up) – Internet
S3	Clothing
S3I	Clothing – Internet
S4	Music
S4I	Music – Internet
S5	Journeys (not holidays)
S5I	Journeys (not holidays) – Internet
S0	Other shopping
S0I	Other shopping – Internet

Travel

T1	Driving the car
T2	Travelling in car as passenger
T3	Travelling on bus
T4	Travelling by coach
T5	Travelling on train
T6	Riding motorcycle or similar
T7	Travelling in taxi
T8	Riding bicycle
T9	Walking
T10	Travelling on an aeroplane
T0	Other travel

Other / Personal

O1	Other activities
O1I	Other activities – Internet
O2	Personal activities
O2I	Personal activities – Internet

Figure 8.3. Activity codes

To enable understanding of the interactions between physical mobility, virtual mobility and activity participation, the diary needed to gather data on the mode by which participants access key activities. Rather than gathering data on mode of access separately, which would complicate the layout and completion of the diary, mode of access is included within the activity codes. Furthermore, activities are not categorised separately according to whether or not they are online or offline. Where it is possible to do an activity online and offline the activity is listed twice, in succession, with the online activity distinguished by placing the letter 'I', for Internet, after the activity code.

The activity codes were reproduced on every other page of the diary, facing the participant as they complete the diary, allowing easy referral. Pre-testing suggested that flicking backwards and forwards through the diary to consult the codes, previously located only on the inside cover of the diary, increased respondent burden in both effort and time. In addition, it was hoped that this layout would increase use of the codes, increasing the reliability of the data collected; and increase learnability, allowing respondents to complete the diary more quickly and easily.

8.5.3 Start time, end time

Free response recording of time is used, rather than the pre-determined division of time into intervals (common in the majority of time use surveys) to reduce the focus upon time frame, as opposed to activity. That is, participants enter data as each activity changes, not when a specified period of time has passed. This also allows participants to record activities with shorter time spans and reduces the size of the diary. In consequence, the principal way in which change in activity participation is measured is through change in the duration of time spent in key activities, rather than the number of activities undertaken[29]. This reflects the following conceptualisation of the measurement of well being:

> ... the ultimate constraints in determining the level of individual well-being are the availability of human time and the set of factors that determine the effectiveness with which time is used. Change in well-being can be conceptualized as determined by changes in the factors that influence the effectiveness of time.
> Juster and Stafford (1985)

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[29] This decision reflects the time-use focus of the diary and was taken both to reduce the respondent burden and increase the specificity of recording. However, in consequence, it is not possible to accurately assess changes in the number of activities undertaken, over time.

Unusually in the diaries reviewed, the columns to record start and end times are placed next to each other, to the right of the column to record activities. Pre-testing indicated that the use of colons (:) within these columns would increase usability. Participants are asked to round times to the nearest five minutes. Activities lasting for less than five minutes (for example, making a cup of tea during a TV advertising break) may not be recorded. However, all travel and Internet-based activities are recorded, however short. Duration of travel time may also be used as a proxy for distance, providing an indication of changing location.

8.5.4 Where did you do it?

Adler (2003) highlights the problem of asking for detailed location information which, in the main, the participant does not know and which, in consequence, is often unusable or unrecorded. The request for unknown information may also reduce participant confidence, increasing survey non-response. As such, this study declined to collect detailed location information. In addition, the aims of this study did not necessitate the collection of precise data. However, a 'location' column was included to allow assessment of the influence of spatial accessibility upon activity participation and possible substitutability. To reduce burden, participants were instructed to only briefly indicate their location. Pre-coding of the activity location was rejected, in favour of a reduction in the complexity of the diary.

8.5.5 Did anyone do this with you / Was anyone around at the time?

This aspect of the diary was included to allow assessment of the influence of sociability upon substitutability and to allow the assessment of changes in social contact alongside change in physical and virtual mobility over time. Detailed or pre-coded information here was judged to increase respondent burden to an intolerable level. Thus, the relationship of those involved or otherwise in the activity is not specified.

8.5.6 What else were you doing?

People often do more than one thing at once. Indeed, studies have shown that up to 95 percent of the population report multitasking each day (Hungerford, 2001); and that

people are multitasking for approximately one third of the day (ibid; also Bittman and Wajcman, 2000; Floro and Miles, 2001; Ruuskanene, 2004. Using data from 1979, Michelson and Frederick (2004) found this figure to be 44 percent). The ability to multitask can be an influence upon the desirability of substitution of physical for virtual access, as revealed in the focus groups study – or vice versa. This hypothesis and the multitasking literature are discussed in detail Chapter 11.

These columns allow the participant to record up to three different activities. Pre-tests indicated that, with few exceptions, most notably during paid work, the capacity to record three secondary activities was sufficient. Participants are only asked to record the duration, rather than the scheduling, of secondary activities, for a number of reasons: to reduce burden; because of spatial constraints within the diary instrument; and to allow summing of time spent in secondary activities, such that participants can record the total amount of time spent (for example) sending personal emails during the working day, rather than recording each incident separately. Therefore, the accessibility diary does not record the *number* of secondary activities in which the participant is involved. In consequence, it is not possible, using this diary instrument, to assess change in the number or frequency of activity participation over time.

8.6 Minimising attrition

Section 8.2 highlights attrition as a key disadvantage of longitudinal panel surveys. Section 8.5 considers the importance of usability of the survey tool in reducing attrition. This section discusses additional strategies employed in this study for this end.

Stopher et al (nd) discuss the benefits of incentive payments in reducing attrition. In this study, participants received incentives to reward their participation: £25 for the first and second waves, £35 for the third. They also received a project mug, plus a project pen with each wave, each containing web/telephone contact details, so that their use would remind the participants of the study and prompt notification of changes in contact details. In addition, the sampling strategy employed to recruit the majority of participants – snowballing – ensures that if contact with one participant is lost, re-contact can easily be made through other participants (Harocopos and Dennis, 2003). This method can also give an increased sense of belonging, in comparison to more anonymous methods. The personal methods of contact employed in this study – face-

to-face, by telephone, or via a friend, never by post – have also been proven to reduce attrition (Goulias et al, 1992).

Ampt (2003) suggests that participants are more likely to stay with the study over time if they are given honest information about the nature of the study, including the level of commitment required. To this end, participants were given full information about the demands of the study at the point of recruitment, to enable informed judgement about participation. Participants also received an information booklet and were directed to a project web site (www.transport.uwe.ac.uk/internet), containing detailed information about the diary study, to illustrate what participation will involve. Ortuzar and Lee-Gosselin (2003) suggest that perception of policy relevance can increase participation rates, thus participants were provided with this information. Information plays a further role by inducing interest in the study, which Adler (2003) suggests may be an incentive to participate. Finally, many authors highlight the importance of the interviewer in maintaining response rates (including Duncan, 2000; Goulias et al, 1992; Polak, 1995). The author worked hard to build and maintain informal and friendly relationships with each participant during the early stages of the research. This was an additional aim of the one-to-one training interview. In addition, participants received a telephone call before and during each diary week, Christmas cards and regular project updates.

8.7 Summary

Chapter 7 highlighted a 'methodological gap', which a number of authors suggest has frustrated research into the implications of Internet use. This chapter has presented a novel methodology, the accessibility diary, which has been developed as an attempt to overcome this methodological problem.

The chapter firstly presented a review of quantitative methods. The suitability of each method for use in this study was considered, with reference to the findings from the focus groups study and alongside the aims and objectives. The discussion found a longitudinal, panel-based diary study to be the most appropriate method for research in this area. A multi-disciplinary review of existing diaries followed, which revealed none that could fully satisfy the needs of this study. Subsequent sections detailed the accessibility diary, presenting detailed examination of each aspect of its design, justifying each with reference to the literature and to the aims and objectives of this research.

The accessibility diary takes an existing technique, the diary study and adapts the method for application in a new area of research. As such, this study aims not only to collect empirical data which will contribute towards theoretical advance in this area, but also to contribute towards methodological advance through the development and testing of an original methodological design. Subsequent chapters present results from the application of the accessibility diary. Appraisal of these results will allow assessment of its efficacy and fit for purpose, allowing conclusions to be drawn regarding the extent to which this latter aim has been achieved.

Chapter 9. Sample strategy and composition.

9.1 Introduction

This chapter considers the sample strategy and composition, with reference to the aims and objectives of this research. The chapter develops through four principal sections. First, the sample strategy is considered. Drawing upon the evidence presented in previous chapters, four key variables are identified, which are hypothesised to influence the impact of virtual mobility. This section concludes with a consideration of the implications of the nature of the sample for the analysis. Next, the sample method is outlined. The subsequent section considers the sample profile in depth. Comparisons between the initial sample and the longitudinal sample are drawn, to assess the effect of attrition. Where appropriate, national data are also given. A summary section draws the chapter to a close.

9.2 Sample strategy

Glaser and Strauss (1967) discuss 'theoretical sampling': sampling from (researcher-constructed) groups, with the purpose of furthering theoretical and methodological development[1]. This approach has been adopted in transport research by authors including Behrens (2003) and Thomsen (2004), in their investigations of relatively novel research topics (the travel behaviour of black South Africans and children's perceptions of automobility, respectively)[2]. It is also recommended by Stopher (1997) as a key method to be adopted for the advancement of understanding of travel behaviour[3]. Glaser and Strauss (1967) draw clear distinctions between theoretical and statistical (random) sampling, including the analyses and thus conclusions that can be drawn from each. In short, theoretical sampling lends itself more to conceptual, rather than statistical, analyses and generalisations; and to descriptive, rather than statistically

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[1] Strauss and Corbin (1990) describe theoretical sampling as 'sampling on the basis of concepts that have proven theoretical relevance to the evolving theory.'
[2] Of his sample, Behrens notes: 'The data collected and analysed are thus indicative of diversity, rather than representative of reality... The data have not been used to calibrate a predictive model, nor make claims of statistical representivity. They have been used to investigate the diversity and size of gaps in understanding, and to explore a new research method in South Africa.' (Behrens, 2003).
[3] Stopher terms this 'stratified' and 'choice' sampling.

verifiable, conclusions. Random sampling, though amenable to greater statistical analyses, may disguise patterns of behaviour exhibited by key populations, where their number within the population (and therefore the sample) is small. This may, in turn, inhibit theoretical development. In light of the novelty of the research presented in this thesis and of the proposed methodology, this sampling strategy was chosen for the diary study[4].

The literature review and the focus groups study highlighted a number of variables, which were seen to influence needs from and uses of physical and virtual mobility, plus responses to and effects of the same upon activity participation. Of these, four were selected as being likely to be important to the developing theory regarding the influence of virtual mobility upon physical mobility and social exclusion, which is given as hypotheses in Chapter 5. They are income, Internet experience, mode of travel and residential location. It was hypothesised that we would expect to see differences in behaviour between these four key comparison groups, for the following reasons.

9.2.1 Income

Low income does not necessarily lead to poverty, nor poverty to social exclusion, as discussed in Chapter 2. In addition, income may not be truly indicative of material wealth (Barnes, 2002). However, income is widely used as a proxy for financial well being, because of its simplicity and broad applicability (Monahan, 2004). Here, it is hypothesised that income levels (as a proxy for wealth) can determine or at least influence behaviour. Specifically, for this research, income can be an influence upon three key behaviours: activity participation; Internet access and use; and travel mode availability and use[5]. Chapter 3 discussed the influence of income upon mode availability and use, including distance travelled and trips made; Chapter 4, the influence of income upon Internet access, experience, exposure and use. In addition, with regard to activity participation, the type, frequency, diversity and location of activity participation can be affected by available income. As well as directly influencing the affordability of participation, income can indirectly affect other factors that influence activity participation, including exposure to/information about the activity, social circles, personal tastes and desire to participate. In addition, the affordability and availability of

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[4] The implications of the sampling choice for the analysis presented in this thesis are elaborated in Section 9.2.7.

[5] Unless otherwise stated, reference to 'mode' is to travel mode, not ICT mode.

mobility will be influenced by income, in turn influencing activity participation in the ways described above.

The sample aimed to include participants from a range of incomes. Income levels were judged using the income deciles used in the 2001/02 Expenditure and Food Survey (ONS, 2003b).

9.2.2 Internet experience

Chapter 6 highlights the differences in use of the Internet by Internet experience, identifying a timeline of Internet activity. Haythornthwaite and Wellman (2002) concur:

> 'Across all studies, the largest and most significant differences in access and use are related to years of experience. Those who have been online longer spend more time online each day, and are more likely to be online on any particular day. These *netizens*... are the ones who engage in the most kinds of online activities'.

Thus, a key variable in this study, hypothesised to influence the nature (in terms of length of time online each day and the activities undertaken) and therefore effects of Internet use, is Internet experience. The study aimed to sample participants with varying levels of Internet confidence, experience and expertise. In order to examine the effects of Internet use, it is necessary to study those who currently use the Internet. Thus, all participants have Internet access, *at home*[6]. The decision to restrict sampling to those with access at home was taken to minimise variability in access, ensuring that participants can use the Internet for personal use and that they can access the Internet in a similar environment. Access in community centres, public terminals and the workplace is likely to be a different experience to access at home, in terms of (feelings of) freedom, privacy and security. It was also hypothesised that substitution of certain key activities are (solely or) more likely to be realised if the participant uses the Internet in the home[7].

The initial aim was to split the sample into two groups: those who had been online for less than six months; and those online for more than two years. However, it proved to

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[6] 49 percent of UK households had access at home in April 2004 (ONS, 2004c).
[7] The possibility of recruiting a control group with no Internet access was considered but rejected, because of the ethical issues associated with requiring that a household would not become Internet enabled during the study.

be difficult to recruit participants who had been online for less than six months. It is hypothesised that this is linked to the advanced state of Internet take up in the UK (detailed in Chapter 4 and Fig. 9.2). In addition, almost half of those not online have no intention of using the Internet (ONS, 2003a)[8]. Thus, the number of people in the general population who have recently gone online can be assumed to be relatively low. In response, the sample strategy was amended, with the aim of recruiting a *range* of experience, measured in years since first use and years since first use at home[9].

The diary data are used to create an additional Internet experience variable, namely, the average time spent online per day. Chapter 10 considers time spent in primary activities; Chapter 11, total time spent online[10]. Finally, there is a mix of dial up and broadband users.

9.2.3 Travel mode availability and use

Chapter 3 presents evidence of different mobility patterns by mode availability; and the differential access afforded by different modes. It is likely that the impetus to supplement accessibility through virtual mobility will be influenced by modal availability and accessibility (with necessity leading to virtual mobility use). Chapter 3 also highlighted the acceptability of different modes which, we can hypothesise, is likely to influence the desire to substitute physical mobility for virtual mobility.

Mode availability and use are assessed in a number of ways. Participants are asked the number of cars, bicycles and motorbikes available in their household; and whether or not these modes are always available for their use. They are asked how often they use different modes; and which mode(s) they use to access key activities. These questions also give an indication of the extent to which participants are multimodal in their travel behaviour. Recognising that car availability/use is not the sole determinant of the accessibility of key services, the study considers this variable in conjunction with

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[8] Statistics correct at the time of recruitment.
[9] Research reported after fieldwork and analysis reveals that Internet experience continues to influence Internet use (Fallows, 2006). The following experience bands are used: 3 years or less; 4-5 years; 6 years or more. The reasons for selecting these bands are not discussed, but we can hypothesise that the stability of the online population over recent years has been an influence upon the decision to use a wider lower band than the timeline of Internet use, discussed in Chapter 6, might suggest.
[10] Livingstone et al (2005) discuss six Internet experience variables: frequency of Internet use; average time spent online per day; years of Internet use; self-efficacy; number of websites visited last week; and number of online activities. The structure of the diary prohibits many of these measures. However, future research may find these variables useful.

residential location factors including the availability of services and facilities in the local area, including public transport.

9.2.4 Residential location

Residential location can determine the services and facilities that are physically available and accessible to the individual, household and community, both offline and online. In turn, the availability and accessibility of services and facilities influences demand for and use of physical and, it is hypothesised, virtual mobility. As such, residential location is a key variable in this study.

In general, the level of services and facilities available within a settlement varies according to the extent to which the settlement is rural or urban, with the number and variety of services/facilities tending to increase as an area increase in population size and density[11,12]. At the time that the sampling strategy was devised, there was no clear, agreed definition of rural or urban in use in academia or in policy. Whilst cities, suburbs and towns are generally seen to be urban and market towns, villages and hamlets more rural, it was similarly difficult to find agreed definitions of these settlements[13]. The author relied upon two sources to define the nature of the locations for use in this study. The first, issued by The Countryside Agency (TCA, nd), suggested that rurality is recognised in the levels of service outlets, the economy of the area, population density, certain community characteristics and the environment/landscape. The second, a set of policy documents issued by the DfT, highlights the lack of a set definition of rurality, with policies taking 'rural' as 'not urban', or as having a population of less than 3,000, 10,000 or 25,000 (respectively the Rural Bus Subsidy, Rural Bus Challenge and Urban Bus Challenge). Each definition was a ministerial decision[14]. Conversations with local authorities' transport departments (Oxfordshire, Warwickshire and South Gloucestershire) also suggested a degree of

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[11] This is not always the case – deprived urban areas tend to be service and facility poor because of a complex set of factors, including perceptions of risk and the market for services/facilities (SEU, 1998).
[12] This is evidenced not only in terms of, for example, healthcare, leisure, retail outlets and schools, but also in the provision of transport services (public transport) and facilities (the road network, service stations, etc.) and the type of Internet services (broadband/dial up) available in an area.
[13] A definition of market town was available at this time (DTLR, 2001).
[14] DfT, personal communication.

political expediency and 'feeling' in deciding which areas are rural/urban, rather than clear definitions or guidelines[15].

In light of the above, the author developed the following criteria. Six areas were selected, varying in terms of population size, density, local services and facilities, proximity to other settlements and location within the transport network. Table 9.1 shows these criteria. Settlements chosen are in the south west of England, within a two-hour drive of Bristol (the author's residence) and a one-hour drive of each other. The location of study areas within this corridor minimises variability in terms of climate, employment type and culture and facilitates easy travel between areas, an essential practical consideration in light of the need to interview each participant. The areas chosen vary in terms of population socio-demographics: areas classified in the highest and lowest deprivation bands (based on the IMD) were avoided. Areas which had received (government or voluntary sector) interventions, particularly in terms of transport services or Internet access, were also avoided.

Locations selected are as follows:

- Small village: Stogumber, Somerset.
- Large village: Sandford, Devon.
- Market town: Crediton, Devon.
- Large town: Taunton, Somerset.
- Outer city: Bradley Stoke and surrounding area, Bristol.
- Inner city: Bristol.

Figure 9.1 shows the geographical location of the study sites. Full details of each are given in Appendix 8.

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[15] In the intervening period, a policy document titled 'A review of urban and rural definitions' has been published (ONS, 2004b). This document confirms the lack of clear definitions, suggesting rather that definitions in use seem often to have been developed largely as a matter of convenience. Bringing together a number of definitions of urban and rural in use in the UK for policy and statistical reporting, alongside more theoretical discussion of the cultural, economic, political and social nature of settlements, the report does not develop a single definition. Rather, it suggests that the definitions are a matter of judgement, considering three broad factors: settlement form (population size: broadly, urban areas are 10,000+); sparsity/remoteness (population density); and function/land use – the extent to which the land is agricultural or industrial, countryside or 'built up' – which also relates to economic definitions of an area. These conclusions are broadly in line with the criteria used in this study.

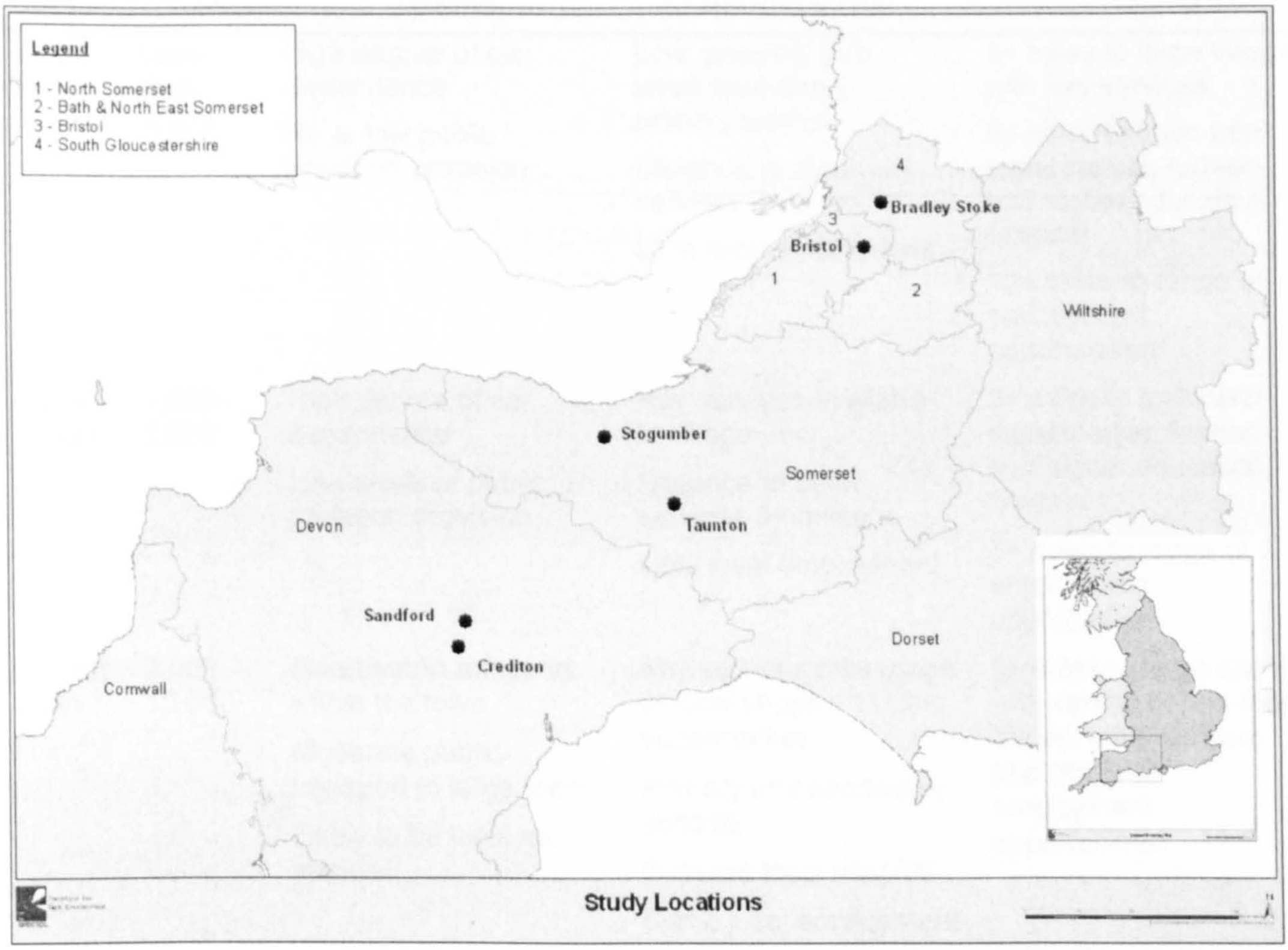


Figure 9.1. Study areas

Loc.	*Pop.*	*Transport*	*Service levels*	*Proximity*
Small village	Less than 1,000	High degree of car dependence No or low public transport provision	Low: possibly pub, small food shop, primary school Distance to other key services 3+ miles[16] Little local employment	3+ miles to large village with key services 5+ miles to town with supermarket, further and higher education, hospital 10+ miles to range of employment opportunities
Large village	1,000 - 3,000	High degree of car dependence Low levels of public transport provision	Key services available in village Distance to other services 3+ miles Little local employment	3+ miles to town with supermarket, further and higher education, hospital 5+ miles to range of employment opportunities
Market town	3,000 - 10,000	Good public transport within the town Moderate public transport to large town Likely to be local rail station	Key services plus range of local shops including supermarket Primary and secondary schools Possible local hospital Some local employment	5+ miles to large town with variety of non-food shops, main services and range of employment opportunities
Large town	10,000 - 75,000	High levels of public transport within the town Good transport to outlying areas Rail station(s) with good inter-city service	Wide range of services and facilities in locality including further education, hospitals, leisure and employment	30+ miles to nearest city
Outer city		High levels of public transport within the area High levels of public transport to city centre	Key services in suburb, likely to be local shops and supermarket Full range of services and facilities in city	5+ miles from city centre
Inner city	75,000+	High levels of public transport within the area Inter-city and local rail stations Possibly other forms of public transport Possibly an international airport	Wide range of services and facilities in locality including further education, hospitals, leisure and employment	Not applicable

Table 9.1. Criteria for the selection of study sites

[16] Here, 'key services' are post office, food shop, GP and primary school, as used in the IMD (ODPM, 2004).

9.2.5 Socio-demographic variables

A mix of age, educational attainment, employment profiles, gender and household structure was sought, in addition to the above key variables[17]. However, it was not the aim to gain a representative or equal mix of these variables. Reflecting the aim of this study to explore theoretical issues concerning the relationship between virtual mobility, activity participation and physical mobility, priority was given to sampling adequately within the four key variables[18].

9.2.6 Sample size

The sampling strategy aimed to select up to 100 participants. This was in part determined by available resources, given the practical constraints imposed by the resource-intensity of the chosen methodological approach. The attrition strategy, detailed in Chapter 8, necessitated personal contact with all participants throughout the study. In addition, all participants were to be interviewed face to face. Neither of these would have been possible with a larger sample. It was also anticipated that recruitment would be difficult (which indeed it was), because of the (labour and time) intensive nature of the study for participants. Thus, 100 was seen to be an achievable target and a manageable size for a lone researcher.

100 was also judged to be sufficient to allow representation of the key variables. A target of 96 participants was set, which was judged to be large enough to allow effective study of change and the influence of key variables upon change. A sample size of 96 allows for 6 participants representing each of 16 combinations of factors of the four key variables, also allowing maintenance of sufficient sample size in case of attrition. The sample size further justifies the choice of theoretical sampling. A random sample of 100 participants would be unlikely to allow adequate exploration of behavioural difference between key groups, thus inhibiting understanding of the differential effects of virtual mobility that are anticipated given the literature review and focus groups study findings.

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[17] This was additionally important to minimise the risk of gaining an homogenous sample, which is a concern with the snowballing recruitment technique discussed in Section 9.3.
[18] This study did not seek to examine the role of disability in social exclusion, physical mobility or virtual mobility. It was felt that to do so in sufficient depth, given the demands of the chosen methodology, would require a dedicated study.

9.2.7 Consequences of the sampling approach for the analysis

The nature of the sample reflects the aims of the research and has implications for the analysis. The empirical research presented here aims primarily to test an emerging theory, to pilot a novel methodology and to explore appropriate methods of analysis, rather than to provide definitive, statistically verifiable and generalisable findings. Therefore, a non-representative, theoretical sample was chosen, with a small sample size, the latter being appropriate for the methodology, given the available resources. However, these factors influence the extent to which the data are amenable to statistical analysis and to which findings can be expected to be statistically significant. Statistical tests *are* run on the data, but the possible limitations of this statistical approach, for this sample, are borne in mind throughout the analysis. In consequence, many results that are presented offer descriptive interpretations, rather than those that are necessarily statistically verifiable[19].

9.3 Sample method

Recruitment was a lengthy process, because of the precise nature of the sample required and the respondent burden involved in the study. It took c. six months[20]. A number of recruitment strategies were employed, the primary being snowballing. This method is commonly used to sample populations that are widely distributed, elusive or otherwise hard to reach[21]. It was selected for a number of reasons, including the sample requirements. Through snowballing, participants can identify potential participants with appropriate characteristics, saving researcher time. In addition, this more personal sampling method may influence response rates, reduce attrition and make it easier to regain contact with participants, through their social networks, should contact be lost (Harocopos and Dennis, 2003). To begin, contact was made with key figures in each community (including parish council clerks, voluntary group staff and

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[19] Copher et al (2002) report similar issues in their study, which contained a sample of 45 diary participants. They suggest that the lack of statistical significance, despite large differences in the raw numbers, may have been due to large variation which, they suggest, developed as a result of the sample size. Thus, the authors report and discuss large variations and suggest that the reader consider their validity, in light of the sample and the statistical tests.
[20] Recruitment was divided into two phases after being suspended for four months following the author's involvement in a car accident. The given figure excludes this delay. Some participants were lost as a result of the subsequent delay in starting the project. This figure refers to the initial recruitment. Recruitment prior to wave 2 took c. an additional month.
[21] Snowballing is discussed by authors including Atkinson and Flint, 2001; Lucas, 2001; Mumford, 2001.

the local media) during initial visits to each area. The nature of the project was explained, both over the telephone, in writing and in a face to face meeting. The particular benefits of the study for the community and for participants were stressed. Each individual was asked whether or not they would be willing to take part in the study themselves and whether or not they could recommend others in their community who may be willing to participate. When potential participants were named, they were contacted by the author by telephone. The nature of the contact was explained and, where contact was accepted, a short screening questionnaire was completed, to assess compatibility with the sample frame. Participants were turned away at this point if they did not have access to the Internet at home; if they were outside the study catchment areas; and if their participation would result in over-sampling from key characteristics[22]. The only key variable not discussed at this stage was income, because of the perceived sensitivity of this question early in the recruitment process. The screening questionnaire is given as Appendix 9.

Next, participants were interviewed in their home or, on occasion, their place of work, at a time convenient to them. The considerable health and safety implications of a lone researcher meeting unknown persons, in private spaces, often late in the evening, were considered in full. The risk assessment and health and safety strategy are included as Appendix 10. The interview, which lasted (in the main) 30-60 minutes, involved an interviewer-administered questionnaire, which gathered personal data. The questionnaire is given in Appendix 11. In addition, participants were introduced to the study and received in-depth training in how to use the diary instrument, which included the completion of a practice diary, using the interview day as an example. As mentioned in Chapter 8, the inception interview was a key opportunity to build a positive relationship with each participant, as part of the strategy to reduce attrition. Thus, the interview was informal and rarely remained 'on topic'.

The snowballing strategy had mixed success. It was successful in Stogumber, where all participants were recruited through snowballing. This is in part due to the successful relationships developed with key figures in the community. However, it is hypothesised that snowballing was an effective technique in Stogumber more because of the close community networks in the village. Not only were people aware of and in touch with other members of their community, they were able and willing to pass their details on. It was markedly less successful in other areas and it can be hypothesised that this is due to two factors. First, difficulties developing relationships with key figures in the

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[22] Approximately a quarter were turned away.

community, due both to personalities and to restrictive time pressures. Stogumber was the first recruitment site. The lengthy recruitment process, including the process of integration into the community, had not been anticipated and could not practically be repeated in every study area. Second, the nature of the sample areas, in terms of size and community relationships, influenced the success of snowballing. This may have impacted upon willingness to pass on details and upon ability to identify potential participants in the area, linked to participants' lack of knowledge about other community members. As a result, in other areas, alternative methods were employed, in conjunction with snowballing.

In Crediton, participants were largely recruited following coverage in the local print media and from snowballing from these contacts. In Sandford, participants were recruited via the local media, door knocking and approximately half through snowballing from these contacts. Recruitment in Bristol and the Bradley Stoke area was largely following coverage in the local print media and local radio[23]. In Taunton, participants were identified and contacted by Somerset County Council, which has a 'citizen's panel' to which consultations are distributed. However, none of the participants contacted had previously taken part in surveys for the Council[24].

The sample was refreshed prior to the second wave. The above strategies were re-employed.

9.4 Sample profile

92 participants were recruited for the first wave. Of these, 87 participants returned their diary. 85 were complete and usable. 69 participants completed and returned complete and usable diaries for all three waves, representing 79 percent of initial participants. As Table 9.2 illustrates, attrition between the waves was primarily due to illness, moving house, or feeling too busy to participate[25].

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[23] In addition to conversations and meeting with selected local media representatives, a press release was distributed by the University of the West of England press office.
[24] All participants were screened and interviewed in the way described above, regardless of recruitment method.
[25] It was a requirement that participants did not move from the study area during the time of the study. Those leaving the study area also left the study.

	Illness	*House move*	*Too busy*	*Unknown*
Wave 1-2	3	0	2	1
Wave 2-3	3	4	2	3

Table 9.2. Stated reasons for attrition between the waves

A further 9 participants were recruited prior to the second wave. A total of 96 participants completed and returned at least one diary. 7 completed only one and 20 completed two diaries.

Personal data on participants were gathered during an inception interview. The following sections consider the sample profile, with reference to the key variables[26]. Whilst it was not the aim to gain a representative sample, where appropriate, comparisons have been drawn with the national population and the national Internet user population, to further illustrate the nature of the sample[27]. In addition, comparisons are drawn between the longitudinal sample (n=69) and the initial sample (n=87), to illustrate the influence of attrition upon the sample profile. Finally, reflecting the direction of the analysis (discussed in Chapter 10), data are included for the composite sample – all those participating in at least one wave of the study (n=96).

The reality of recruitment compromised the aim of gaining 6 participants representing each of 16 combinations of factors of the four key variables. This was additionally weakened by attrition. However, the following sections illustrate that variation in characteristics was achieved. In light of the sample size and composition, subgroups are created for each variable. These are informed by the research question and the sample composition within each variable, alongside the practical time and space constraints imposed by this thesis. The subgroups and their justification are detailed below.

9.4.1 Income

Table 9.3 gives the income profile for the sample in wave 1, alongside national statistics for the number of households with Internet access, by income. Income bands are based upon government-defined income deciles (ONS, 2003b). A mistake in the

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[26] The reader will notice that the inception questionnaire requests more data than is used below. Only the data used in the analysis for this thesis is included here.

inception questionnaire led to the combination of the second and third income deciles. Table 9.3 highlights the similarity of the income profile for the initial, longitudinal and composite samples, illustrating that attrition did not greatly affect the income profile of the longitudinal sample.

Annual household income	*Initial sample (%)*	*Longitudinal sample (%)*	*Composite sample (%)*	*Internet access: national population (%)*
Less than £5,999	1.1	1.4	1.0	12
£6,000 – 12,999	5.7	7.2	5.2	14, 23
£13,000 – 16,999	1.1	1.4	1.0	31
£17,000 – 21,999	14.9	14.5	14.6	42
£22,000 – £26,999	17.2	18.8	15.6	48
£27,000 - £33,999	12.6	13.0	12.5	57
£34,000 - £41,999	13.8	14.5	14.6	69
£42,000 - £55,999	12.6	10.1	12.5	74
£56,000 or more	5.7	7.2	7.3	85
Rather not say	3.4	2.9	4.2	-
Don't know	11.5	8.7	11.5	-
Total	100	100	100	-

Table 9.3. Income profile

The sample contains a range of income types. However, it proved difficult to recruit participants with Internet access in lower income deciles. This reflects the national Internet access profile. Thus, the sample is biased towards those in higher income deciles. As a result, analysis groups deciles, as follows. Firstly, above and below national average annual household income, which was £27,300 (ONS, 2003c)[28]. Given the structure of the dataset, this is taken as up to £26,999 and £27,000 and over. This also divides the responding sample roughly in half. Second, analysis will be in quintiles, with the lowest two quintiles combined. This is given in Table 9.4.

[27] Statistics for national comparisons are correct for the start of the study. 'National' refers to both GB and UK populations, reflecting the variability in sampling within ONS statistics. National statistics are not always available and, as such, are not given in some sections.
[28] The figures are for 2002, which was the most recent available at the time of recruitment.

	Subgroup	*Initial sample (%)*	*Longitudinal sample (%)*	*Composite sample (%)*
1	Below average household income	40.0	43.3	37.4
	Above average household income	44.7	44.8	46.9
2	1st and 2nd quintile	7.9	10.0	7.2
	3rd quintile	32.1	33.3	30.2
	4th quintile	26.4	27.5	27.1
	5th quintile	18.3	17.3	19.8

Table 9.4. Income profile by analysis variables

9.4.2 Internet experience

Reflecting the timeline of virtual mobility readiness, uncovered in Chapter 6, Table 9.5 highlights participants' Internet experience, measured in terms of years since first use and years since first use at home. The sample is considerably mixed in terms of Internet experience, with a fairly even spread across the years for access (first use). The majority of participants have gained home access in the past five years. This appears to be in line with the national profile (Figure 9.2) (ONS, nda). The data suggest that attrition has not greatly affected the Internet experience profile of the sample.

No. years	*First ever use*			*First home use*		
	Initial sample (%)	*Long. sample (%)*	*Composite sample*	*Initial sample (%)*	*Long. sample (%)*	*Composite sample (%)*
1 year or less	6.9	5.7	6.3	16	13	15.6
2	8	10.1	7.3	20.5	23.1	20.8
3	5.7	4.3	6.2	13.8	14.5	13.5
4	11.5	14.5	14.6	6.9	5.8	8.3
5	9.2	7.2	9.4	13.8	14.5	13.5
6	12.6	13	12.5	9.2	7.2	9.4
7	11.5	13	11.5	3.4	4.3	3.1
8	11.5	11.6	10.4	8	7.2	7.3
9	11.5	7.2	10.4	4.6	5.8	4.2
10+	11.2	12.8	11.3	3.3	4.2	4.1
Total	100	100	100	100	100	100

Table 9.5. Internet experience (years since first ever use/first home use)

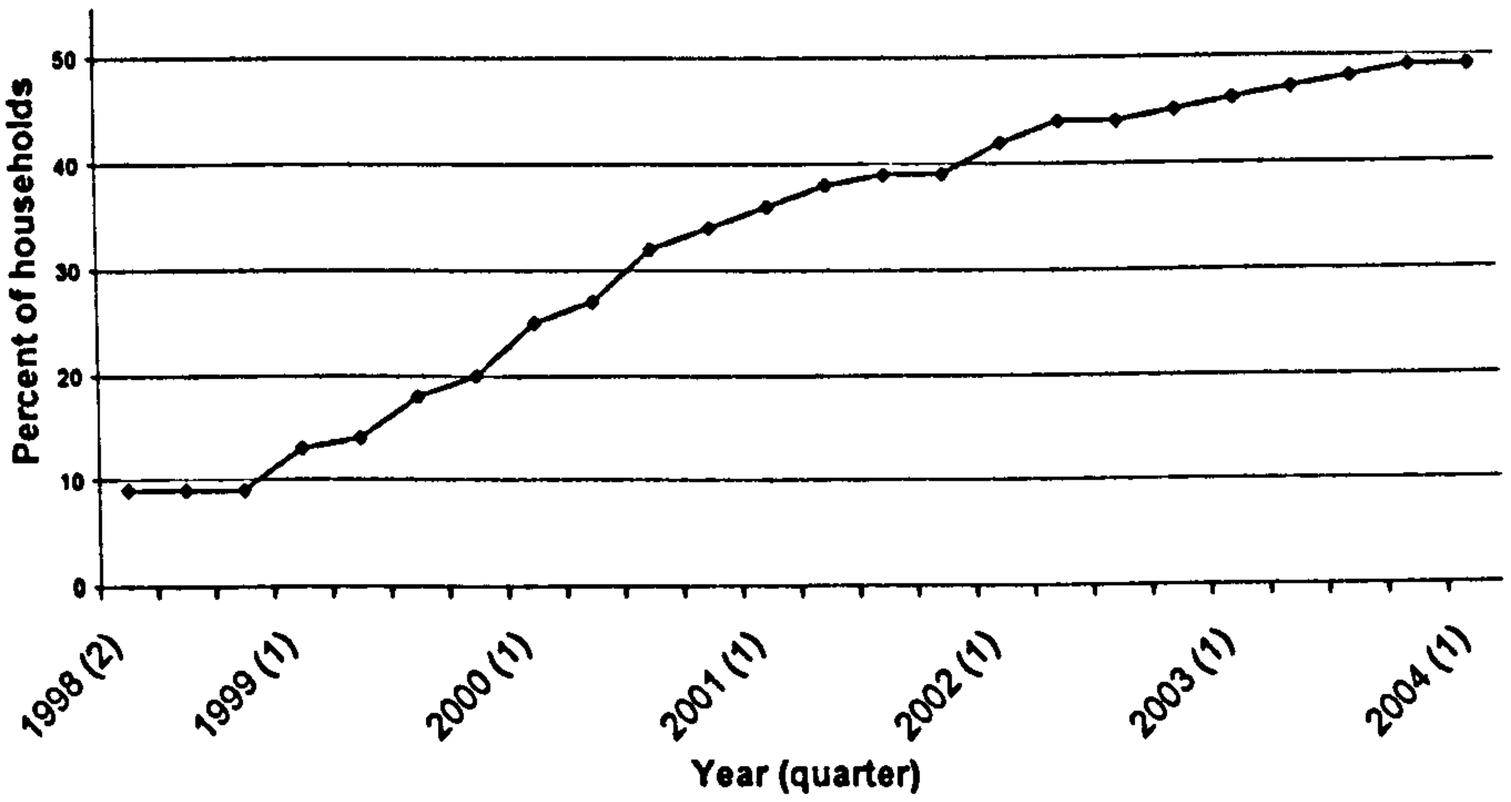


Figure 9.2. UK households with access to the Internet, 1998-2004[29]

Table 9.6 shows type of access to the Internet at home, which may influence use. The table includes a longitudinal element, showing changing access over time[30]. The data suggest that attrition has not greatly affected the Internet access profile of the sample[31].

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[29] The ONS began collecting data on household access to the Internet in April 1998.
[30] Participants were asked to update their inception questionnaire with each wave. A short form with selected variables was included with each diary. Few members of the sample (less than a third with each wave) returned an amended questionnaire. Where a questionnaire was not returned, it is assumed that no details have changed.
[31] The author was unable to locate national data that corresponds with the time periods of this study.

	Wave 1		*Wave 2*		*Wave 3*		
	Initial sample (%)	*Long. sample (%)*	*Initial sample (%)*	*Long. sample (%)*	*Initial sample (%)*	*Long. sample (%)*	*Comp. sample (%)*[32]
Fixed fee	58.6	56.5	62.1	60.9	66.7	66.7	58.2
Broadband	33.4	29	41.4	39.2	51.7	52.2	41.8

Table 9.6. Changing access to the Internet between sampling waves

Analysis will consider the following groups. First, in two groups, two years or less and three years plus. Whilst it would be perhaps more useful to consider those online less than six months, or less than a year, the sample size does not permit the breakdown of the data in this way. Thus, this breakdown is intended to allow some indication of Internet experience. Analysis will be for both 'first ever' and 'first home' use. Second, by access to the Internet: fixed fee or broadband[33]. Third, by duration of online time during each wave, dividing the sample in to equal quartiles[34]. The decision to use bands relative to the sample was taken in order to maintain groups of equal size and thus better statistical comparability[35].

9.4.3 Mode use

Tables 9.7 and 9.8 give household and individual vehicle availability. The sample has higher than the national average household access to all modes. This may be expected, given the income and residential location profiles of the sample. Individual availability, a more reliable measure of modal access, is substantially lower than household availability. Table 9.9 gives information on mode use, suggesting that many participants are, to an extent, multimodal. Because of space constraints, data is for the longitudinal and composite samples only. The data for the initial sample suggests that attrition has had little impact upon the sample profile.

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[32] The data for the composite sample includes only those who did not change their subscription during the study (n=79).
[33] The composition of the two groups may change over the waves.
[34] As above, the composition of the groups may change over the waves.
[35] The use of bands considering number of days using the Internet per week, used by authors including Robinson et al (2002), was rejected, as a less accurate measure of *extent* of use.

Vehicle	*No. vehicles in household: initial sample (%)*			*No. vehicles in household: longitudinal sample (%)*			*No. vehicles in household: composite sample (%)*			*No. vehicles in household: national profile (%)*[36]	
	0	*1*	*1+*	*0*	*1*	*1+*	*0*	*1*	*1+*	*0*	*1+*
Car	8	51.7	92	10.1	47.8	89.9	8.3	49	91.7	28	72
Bicycle	34.5	19.5	65.5	39.1	17.4	60.9	34.4	18.8	65.6	58	42
Motorbike	93	5.7	7	91.3	7.2	8.7	92.7	6.3	7.3	97.2	2.8

Table 9.7. Vehicle availability (1): number vehicles in the household

Vehicle	*Vehicle always available: initial sample (%)*		*Vehicle always available: longitudinal sample (%)*		*Vehicle always available: composite sample (%)*	
	Yes	*No*	*Yes*	*No*	*Yes*	*No*
Car	64.4	35.6	65.2	34.8	64.6	35.46
Bicycle	52.9	47.1	49.3	50.7	52.1	47.9
Motorbike	1.1	98.9	1.4	98.6	1.0	99.0

Table 9.8. Vehicle availability (2): vehicle always available

Mode	*Daily (%)*		*Weekly (%)*		*Monthly (%)*		*Less than monthly (%)*		*Never*[37] *(%)*	
	Long.	*Comp.*	*Long.*	*Comp.*	*Long.*	*Comp.*	*Long.*	*Comp.*	*Long.*	*Comp.*
Car	46.4	45.8	37.7	37.5	1.4	1.0	1.4	1.0	13	14.6
Bicycle	2.9	4.2	8.2	7.3	11.6	13.5	26.1	22.9	52.2	52.1
Bus	5.8	5.3	8.7	10.6	10.1	11.7	37.7	35.1	37.7	37.2
Train	0	1.0	5.7	4.1	15.9	18.8	53.6	52.1	24.6	24.0

Table 9.9. Mode use: longitudinal sample

The analysis is only for cars, because of the low availability and use of the majority of modes. Thus, the data will be analysed in the following subgroups: first, by the number of cars in the household; second, individual availability of the car; and third, by mode use, considering daily, weekly and less than weekly car use.

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[36] Car availability: DfT, 2003a. Bicycle availability: DfT, 2003b. Motorbike availability: DfT, 2003c. For most modes, national data are only available for no vehicle in the household and for 1 or more vehicles (here indicated as 1+).

[37] Data for motorbike and coach use has been omitted, given low usage (one person and nobody using more than occasionally, respectively).

9.4.4 Residential location

The reality of recruitment difficulties and of attrition impacted upon the target of 16 participants in each study area. However, as Table 9.10 illustrates, the sample did achieve a mix of study areas, with numbers in each large enough to allow comparison. As with the other key variables, the data suggest random attrition. Analysis will be by these six locations.

	Initial sample		*Longitudinal sample*		*Composite sample*	
	(n)	*(%)*	*(n)*	*(%)*	*(n)*	*(%)*
Small village (Stogumber)	12	13.8	9	13.0	12	12.5
Large village (Sandford)	16	18.4	14	20.3	16	16.7
Market town (Crediton)	12	13.8	11	15.9	13	13.5
Large town (Taunton)	17	19.5	14	20.3	18	18.8
Outer city suburbs (Bristol)	12	13.8	8	11.6	17	17.7
Inner city suburbs (Bristol)	18	20.7	13	18.8	20	20.8
Total	87	100	69	100	96	100

Table 9.10. Residential location

9.4.5 Socio-demographic variables

9.4.5.1 Age

As Chapters 3 and 4 illustrate, age can influence access to both physical and virtual mobility. There is a mix of age in the sample, with over-representation of people under 45 and under-representation of people 65 and over. However, Internet use tends to be more common amongst younger age groups, as illustrated by the national statistics, given in Table 9.11. Comparison between the initial and longitudinal samples suggests that attrition has not been selective by age group.

Age (08/03/04)	*Initial sample (%)*	*Longitudinal sample (%)*	*Composite sample (%)*	*National population[38] (%)*	*Ever used Internet (%)[39]*
16-24	10.3	13.0	9.4	14.4	92
25-34	24.1	20.3	25.0	17.5	
35-44	26.4	26.1	26.0	18.8	81
45-54	17.2	18.8	18.8	16.3	67
55-64	16.1	20.3	15.6	13.8	48
65+	5.7	5.8	5.2	20.0	17
Total	100	100	100	100	-

Table 9.11. Age profile

9.4.5.2 Education

Table 9.12 gives the educational profile of the sample, alongside the national profile, divided into three categories as per the 2001 Census (ONS, nd b). Participants are substantially more educated than the national population. Whilst it is likely that Internet use is positively correlated with education, the oversampling of those with higher level qualifications should be acknowledged in the analysis[40]. Comparison of the initial and longitudinal samples does not suggest selective attrition on the basis of education[41].

Qualification	*Initial sample (%)*	*Longitudinal sample (%)*	*Composite sample (%)*	*National population (%)*
No formal qualifications	3.4	4.3	3.1	36
Lower level qualifications[42]	51.6	52.1	53.2	44
Higher level qualifications[43]	44.8	43.5	43.7	20

Table 9.12. Educational profile

9.4.5.3 Ethnicity

All participants are white. It is likely that this reflects the population of the sample areas. The sampling strategy may also have induced an ethnicity bias: snowballing can result in a greater degree of homogeneity than random sampling, with respect to

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[38] ONS (2004d). Figures for males and females are combined in this table for a whole population average. Percentages exclude people under 16, to allow sample comparison.
[39] ONS (2004e).
[40] Statistics for Internet access by education are not available (ONS, personal communication).
[41] Few participants gained qualifications during the study (just one moved between the bands, from lower to higher level). Thus, analysis is for educational profile at wave 1 only.
[42] Up to diploma or equivalent.
[43] First degree and higher.

many variables, reflecting the social networks of initial participants. The media in which the study was advertised may also have a readership bias. It is perhaps unrealistic to expect that a small sample should have an ethnic balance. In a sample of 69, 5 would be expected to be non-white (7 in a sample of 96), given the current UK profile. However, studies reviewed in Chapters 3 and 4 suggest that both mode and Internet access and use are influenced by ethnicity. It is therefore important that the ethnic profile of the study samples be acknowledged.

9.4.5.4 Gender

Chapter 3 suggested a gender imbalance in physical mobility and in the nature of activity participation. There is a slight over representation of women in the sample (58:42 ratio in both the longitudinal and composite samples). The initial sample showed a similar profile (56:44).

9.4.5.5 Household composition

Chapter 3 suggests that the presence of children in the household can influence the nature of, need for and number of necessary activities and thus of trips made. Therefore, the presence of children may influence the desirability of virtual mobility. Table 9.13 gives the profile for the longitudinal and composite samples[44]. The initial sample showed a similar profile. Whilst participants were encouraged to inform the author if their household composition had changed, few gave the ages of their children, except in wave 1. Thus, we do not know (and cannot assume) the age profile of children in the household in subsequent waves.

Number of children in household	*Total (%)*		*Under 5 (%)*		*Under 12 (%)*	
	Long.	*Comp.*	*Long.*	*Comp.*	*Long.*	*Comp.*
0	65.2	66.7	88.4	90.6	72.5	77.1
1	14.5	14.6	10.1	7.3	14.5	13.5
2	14.5	14.6	1.4	2.1	8.7	6.3
3	5.8	4.2	0	0	4.3	3.1
Total	100	100	100	100	100	100

Table 9.13. Household composition: children in the household

[44] The number of children in the household did not change substantially between the waves. Two households changed the number of children in the household, from one to two children, during the study period.

9.5 Summary

This chapter has presented the sample strategy, method and composition. The aim was to gain a mix of participants, representing a number of different characteristics in respect of income, Internet experience, mode use and residential location, to allow further examination of the influence of these characteristics upon the impacts of virtual mobility. Whilst it was not the aim to gain a representative sample, national data has been presented, to further illustrate the nature of the sample. From this it has emerged that the sample is not necessarily nationally representative, but is, for many variables, broadly representative of the national Internet user population. In addition, comparisons with the initial sample have been given, to allow assessment of the extent to which attrition has been selective. From this, it has been suggested that attrition has been random.

The sample was intended to be 'fit for purpose' (May, 2001): to allow analysis of the data by the characteristics that are hypothesised to be important to the theory outlined in previous chapters. To this end, it is suggested that the sample is appropriate for this study. However, the nature of the sample has implications for the types of analysis that can be undertaken. The key groups may not be able to be truly compared by eliminating the bias that may arise from intervening variables (if, indeed, this can ever be achieved). Through theoretical sampling, this study aims not to describe the world scientifically, or to establish facts that can be statistically verified, but to further explore the theories that had emerged during the earlier stages of research, using quantitative empirical data. The ways in which these data may be used in the pursuit of this aim is discussed further in the following chapter. There are also implications for the extent to which conclusions from this study can be generalised to the population, which is discussed more fully in the discussion and conclusion chapters.

Chapter 10. Results and discussion: primary activities.

10.1 Introduction

This chapter presents results from the analysis of primary activities. The chapter progresses through a number of sections. After each section, the findings are summarised and linked to the study aims and objectives. The first section outlines the method of data preparation. The next considers the longitudinal data, seeking to explore the impact of Internet use upon travel and activity participation through the examination of behaviour (and change therein) over time. Analysis is for the key activities discussed in Section 10.2 and considers trends for the whole sample, for the key variables subgroups identified in Chapter 9 and for individuals.

These analyses reveal no clear longitudinal trends. In consequence, following an in-depth discussion of the possible reasons for the lack of a longitudinal trend, the chapter turns to consider an alternative analytical approach, using a composite database. This analysis seeks to assess the impact of Internet use in two principal ways. In the first, analysis of activity participation is by extent of Internet use, in terms of total weekly time spent online. Each activity is considered in turn, before the potential influence of the four posited key variables is assessed. In the second approach, differences in participation between those participating in activities online and those participating offline only are considered. Each activity is considered in turn. The influence of key variables upon the whole sample findings is assessed, before an email survey, which aimed to probe the diary findings, is discussed. The chapter then concludes with an evaluation of the implications of the findings for the hypotheses and their implications for further research.

10.2 Data preparation

The task of data preparation is often overlooked when designing research, yet for this study, this task was time consuming and complex. Indeed, Gershuny notes that this process can be more complex than the analysis itself:

> The analysis of time budgets is in fact anything but straightforward. These practical difficulties may explain why literature in the field often gives the impression that researchers have been exhausted by the rigours of data collection and preparation, and have only very meagre residuals of intellectual energy to devote to analysis.
> Gershuny, 2003.

Gershuny's observation is valuable in highlighting not only the complexity of data preparation, but also the extent to which the researcher actively shapes the dataset. It is therefore essential that the process of data preparation is transparent, such that the results can be understood in context. This section highlights the technical and conceptual processes that shaped the data for this analysis.

Upon receipt, the diary data were inputted by temporary staff into a basic SPSS database. Each participant was assigned a unique identity number, consistent across the waves, to enable panel analysis. Much of the data were inputted as seen. Only the location and sociability variables required recoding. Inputting took around 30 person days, for each wave. Every 20th case of the database was checked for random and non-random errors. Few random errors were detected[1]. Non-random errors were amended using universal recode commands. This checking process gives high confidence in the quality of the database.

The analysis focuses upon a small number of activities that are pertinent to the hypotheses. In common with many time use studies, a number of composite activities are created from the many activities listed[2]. Whilst some level of detail is lost through

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[1] Data inputting for the first wave had a great deal of errors. As a result, staff inputting the second and third wave diaries were instructed to check each others' databases at the end of each day. Perhaps because staff knew that their work would be checked, there were few errors in the inputting for waves 2 and 3.

[2] For example, Gershuny (2003) records 40 different activities, but for analytical purposes creates just four composite activity categories: paid work, unpaid work, leisure and sleep. Robinson (1999) recodes the many activity-types into four categories: contracted time; committed time; personal time; and free time. In a later study, Gershuny (2005) creates 8 composite activities from in excess of 200 recorded activities: paid work, unpaid work, shopping,

categorisation, it is necessary, to reduce the complexity of the data and for the purposes of meaningful (statistical) analysis. For this study, with 89 activities plus an additional three secondary activities, there are more than 58 million unique and more than 2 million non-unique activity combinations.

The activities chosen reflect the findings from the literature review and the focus groups study. They are 'key activities' not in terms of prevalence in relation to other activities, but in relation to the subject under investigation in this thesis[3]. The literature review suggests that they are activities that are likely to influence the experience of social exclusion and are likely to be susceptible to substitution. The focus groups study further suggests that virtual mobility is providing important supplementary access to these activities (and therefore substituting for what might otherwise be an increase in physical mobility). Whilst this approach may not uncover change in other activity areas, on the basis of the literature review and focus groups research, such activities are judged unlikely to have substantial implications for physical mobility or social exclusion. Therefore it is suggested that their exclusion within this study is justified.

The composite activity categories are: education; employment information search; information searching; paid work; shopping; and social networks. Each activity is considered as total activity time (minutes per week) and in both its offline and online forms. In addition, the analysis considers: total Internet use; and total physical mobility use[4]. The composition of these activity categories is given in Table 10.1.

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leisure out of home, sleeping and personal care, eating at home, media related leisure and other home leisure. Each categorisation reflects the focus of his research.

[3] This said, the majority of key activities selected are highly prevalent in the lives of participants. This is shown in the prevalence tables, given in Appendix 12.

[4] Because of the structure of the diary (specifically, the inclusion of secondary activities) and the nature of responses, it is not possible to associate travel directly with activities. This prohibits analysis of combined travel and activity participation.

Composite activity	*Associated activities*
Education	F2 – education; F2I – education online.
Employment info. search	I4 – employment information; I4I – employment information online.
Information search	I1 – trivia; I1I – trivia online; I2 – window shopping; I2I – window shopping online; I3 – journey information; I3I – journey information online; I4 – employment information; I4I – employment information online; I5 – hobbies information; I5I – hobbies information online; I6 – medical information; I6I – medical information online; I7 – news; I7I – news online; I0 – other; I0I – other online.
Paid work	F1 – paid work.
Shopping	I2 – window shopping; I2I – window shopping online; S1 – groceries (main); S1I – grocers (main) online; S2 – groceries (top up); S2I – grocers (top up) online; S3 – clothing; S3I – clothing online; S4 – music; S4I – music online; S5 – journeys; S5I – journeys online; S0 – other; S0I other online.
Social networks	C1 – face to face communications; C2 – telephone; C3 – mobile phone; C4 – text; C5 – letter; C6 – fax; C7 – email; C8 – chat room; C0 – other; C0I – other online; E3 – hobbies if with others; E4 – sports if with others; E5 – Cinema, etc., if with others; E6 – social; F4 – religious; F4I – religious online; F5 – civic; F5I – civic online.
All online activities	C7 – email; C8 – chat room; C0I – other communications online; E10 – surfing; E0I – other entertainment online; F2I – education online; F3I – voluntary work online; F4I – religious online; F5I – civic online; F0I – other formal online; H9I – banking online; I1I – trivia online; I2I – window shopping online; I3I – journey information online; I4I – employment information online; I5I – hobbies information online; I6I – medical information online; I7I – news online; I0I – other information online; S1I – groceries (main) online; S2I – groceries (top up) online; S3I – clothing online; S4I – music online; S5I – journeys online; S0I – other shopping online; O1I – other activities online; O2I – personal activities online.
All travel activities	E9 – travelling for pleasure; H8 – escort; T1 – driving the car; T2 – car as passenger; T3 – bus; T4 – coach; T5 – train; T6 – motorcycle; T7 – taxi; T8 – bicycle; T9 – walking; T10 – aeroplane; T0 – other travel.

Table 10.1. Composite activities and associated activities

Transforming the databases required extensive recoding, taking many weeks.

Recoding of personal characteristics into key variables was a similarly lengthy process.

All main activities and secondary activities were recoded into new variables in this way.

Only then could summary databases be developed, showing time spent in each composite activity, per person, per week and per wave, to allow intra-wave analysis.

Analysis is weekly, removing daily variation[5, 6].

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[5] This is also more appropriate for the majority of statistical tests, which require independence of observations.

[6] Initial analysis was repeated using daily activity participation data, to confirm that this decision did not substantially alter the patterns of activity participation, nor the strength of the relationships between waves or activities.

The accessibility diary collected a substantial volume of data, of which only part will be used in this thesis, for a number of reasons. Firstly, research into the use of activity diaries vis-à-vis travel diaries has shown that collecting data on total daily activity participation helps to improve the accuracy of the data in which you have a primary interest (discussed in Chapter 8). Secondly, the wider dataset allows the activities and change therein to be placed in a wider context, where appropriate. Third, whilst key hypotheses had been developed and were to be tested in this study, the aim of theoretical development remained. The three disciplines that are integrated within this research are relatively novel, as is their incorporation into a single study. Progress within each was expected to be rapid during the course of the methodological design, data collection and data preparation period (c. 2 years). Indeed, the literature review chapters highlight that this was the case. The precise details of the analysis were not established at the outset of the study, to allow the incorporation of developments in the fields of study. Given the rapid progress in the field, it could not have been clear at the outset of the research that the activities focussed upon in this analysis would be the most important. For all of these reasons, it was important not to restrict the data collection. In this sense, collection of a wide ranging database enabled an element of inductivism, discussed in Chapter 6. Finally, the unused data will not be wasted. The survey allowed the collection of a wealth of information that can be used for further research in this area, beyond the confines of this thesis.

10.3 Examining change: over time

Initial analysis sought to uncover change in participation (total minutes per week) in key activities over time. Through examination of the change in minutes per week spent in each activity, as both offline, online and total time, the intention was to observe emerging patterns that might indicate the impacts of online activity upon offline and total activity participation. Thus, building upon the aims and objectives detailed in Chapter 7, the following key questions informed this stage of the analysis:

1. Is there evidence of a significant change in activity participation, between reference weeks?
2. Is there evidence to suggest an effect of Internet use upon participation in key activities, over time?

There are a number of possible trends that we might expect to observe from longitudinal analysis. Reflecting the literature reviewed in Chapter 4, at their simplest and in aggregate, these are as follows. Should *substitution* be evident, the total time spent in key activities may be expected to remain stable, with offline time decreasing and online time increasing. Should online participation be *supplementary*, however, as hypothesised in Chapter 6, it may be expected that offline time would remain stable, whilst total and online time increase. It is possible that online activity may *increase participation both on and offline* (as hypothesised in the generation scenario). It is equally possible, however, that there is *no interaction* between online and offline time (neutrality) (Mokhtarian and Salomon, 2002). To explore these hypotheses, the analysis focused upon close examination of descriptive statistics, using line charts to plot trends over time for the whole sample and for selected subgroups. Paired samples t-tests were employed to assess the significance of differences in activity participation between the waves for the whole sample and for selected subgroups.

10.3.1 Whole sample analysis

Descriptive statistics were generated for the whole sample, for each key activity category and, within this, for total, offline and online participation. Table 10.2 gives descriptive statistics for each key activity, across the three waves. Sample means were plotted as line charts, to assist in the identification of trends (Figs. 10.1-10.7). Descriptive statistics, tables and figures were generated for all activities, for all subgroups considered in this analysis. For reasons of space and clarity, tables and figures are only included where their inclusion is judged to add substantial value to the text. Paired samples t-tests were carried out to support the descriptive analysis, to indicate the statistical significance of observed difference between the waves. Given that the sample size is less than 100, tests consider a 90 percent confidence level as significant (Copher et al, 2002).

Differences between the waves were not statistically significant, for any activity. This suggests that, for this sample, there is no identifiable longitudinal trend for the unit of measurement considered and for the timeframe of this study. Thus, it is not possible, with this dataset, to infer relationships between Internet use and activity participation, for the activities considered. This section turns to consider the longitudinal results, before then turning to consider the possible reasons for the absence of clearly observed longitudinal trends in the data.

Activity	*Type*	*Wave*	*Mean*	*Median*	*Mode*	*Std. Dev.*	*Skew*	*Kurtosis*
Education	Total	w.1	150.80	0	0	453.83	3.57	12.13
		w.2	162.91	0	0	533.21	3.90	15.63
		w.3	187.97	0	0	581.07	3.30	9.86
	Offline	w.1	141.81	0	0	434.69	3.68	13.03
		w.2	157.83	0	0	524.25	3.99	16.58
		w.3	178.62	0	0	561.60	3.29	9.7
	Online	w.1	8.99	0	0	43.73	6.01	39.59
		w.2	5.09	0	0	22.22	5.26	29.85
		w.3	9.35	0	0	30.26	4.09	19.49
Employment information	Total	w.1	4.20	0	0	21.67	5.79	34.85
		w.2	9.26	0	0	52.26	6.53	44.70
		w.3	3.12	0	0	10.15	3.34	10.25
	Offline	w.1	2.75	0	0	13.89	5.52	32.12
		w.2	2.30	0	0	16.47	7.96	64.68
		w.3	0	0	0	-	0	-
	Online	w.1	1.45	0	0	11.44	8.27	68.60
		w.2	6.96	0	0	38.47	5.83	33.82
		w.3	3.12	0	0	10.15	3.34	10.25
Information search	Total	w.1	121.72	60	0	157.37	.79	3.23
		w.2	127.51	35	0	213.16	2.77	9.40
		w.3	110.17	45	0	191.07	3.53	16.96
	Offline	w.1	56.33	0	0	99.83	2.36	5.36
		w.2	53.30	0	0	149.46	4.97	29.57
		w.3	40.51	0	0	87.15	2.97	9.97
	Online	w.1	65.39	20	0	112.60	3.06	11.75
		w.2	74.20	0	0	123.47	2.24	5.11
		w.3	69.97	0	0	133.43	3.08	11.25
Paid work	Total	w.1	1564.84	1650	0	1090.63	.20	-.56
	Total	w.2	1365.48	1635	0	1109.58	.28	-.58
	Total	w.3	1342.25	1275	0	1043.58	.09	-1.14
Shopping	Total	w.1	156.46	145.00	-	116.14	.89	.37
		w.2	163.46	165.00	0	106.13	.41	.14
		w.3	149.88	135	0	124.83	1.06	1.17
	Offline	w.1	132.94	115	0	102.95	1.08	1.25
		w.2	146.87	160	0	89.96	.03	-.55
		w.3	135.10	130	0	118.09	1.19	1.80
	Online	w.1	23.52	0	0	48.69	3.13	12.81
		w.2	16.59	0	0	42.96	3.60	15.81
		w.3	14.78	0	0	34.52	2.94	9.12
Social networks	Total	w.1	518.19	492	0	375.43	.92	.78
		w.2	623.94	560	-	414.57	1.01	1.66
		w.3	559.93	480	-	397.35	1.27	1.93
	Offline	w.1	446.74	405	-	372.47	1.09	1.08
		w.2	532.86	435	180	391.67	1.31	3.05
		w.3	478.33	400	0	387.98	1.69	3.41
	Online	w.1	71.45	25	0	122.59	3.05	10.77
		w.2	91.09	20	0	142.96	1.76	2.02
		w.3	81.59	15	0	159.52	3.14	10.72
All online activities	Total	w.1	211.51	170	0	200.95	1.08	.33
	Total	w.2	242.59	135	0	293.66	2.28	6.93
	Total	w.3	234.23	180	0	242.71	1.56	2.66
All travel activities	Total	w.1	641.54	625	215	349.69	.48	-.26
	Total	w.2	695.35	640	-	351.12	.64	.66
	Total	w.3	650.49	695	705	329.01	.15	.61

Table 10.2. Minutes spent participating in key activities per week, in each wave: descriptive statistics for the whole sample (n=69)

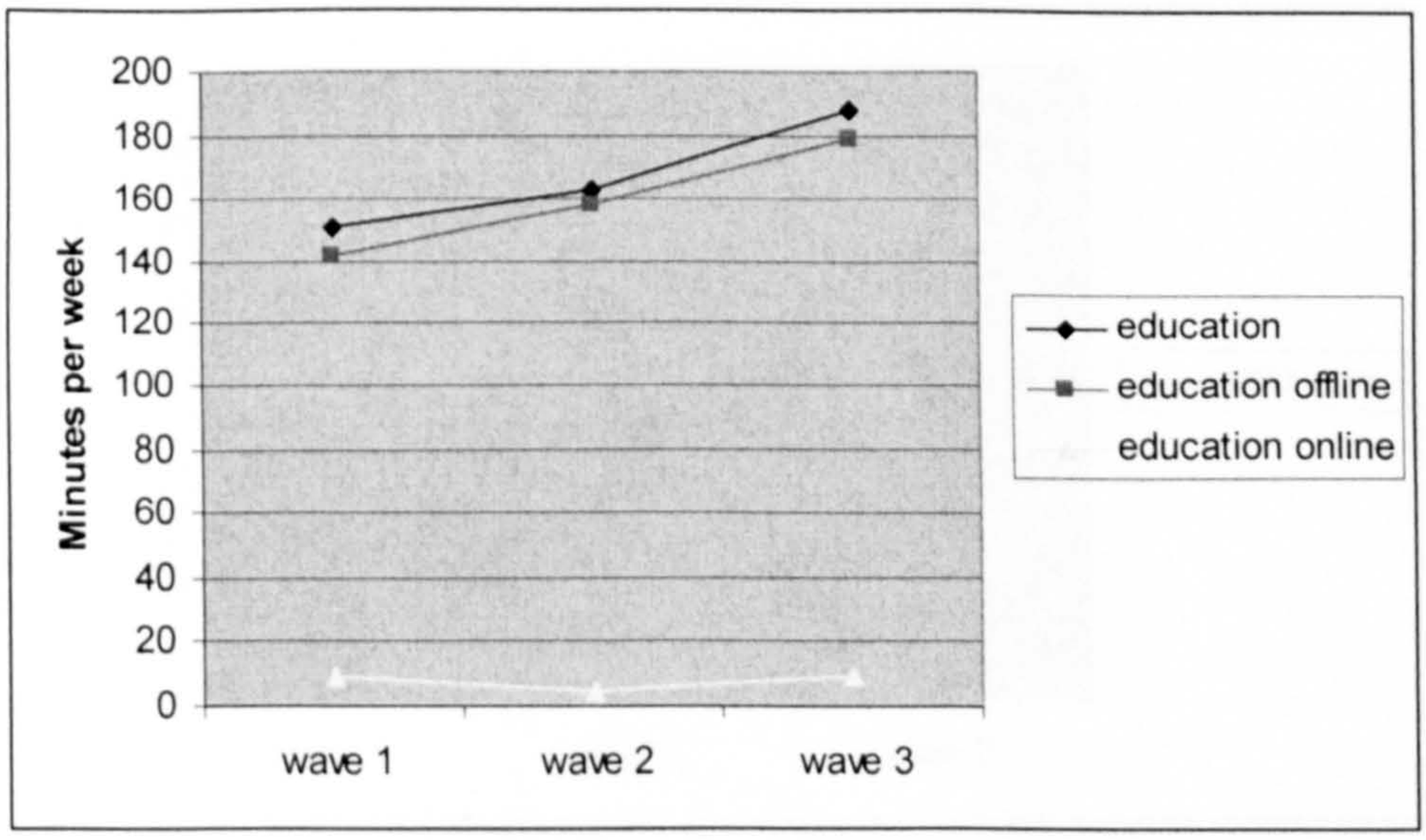


Figure 10.1. Minutes spent in education activities: whole sample

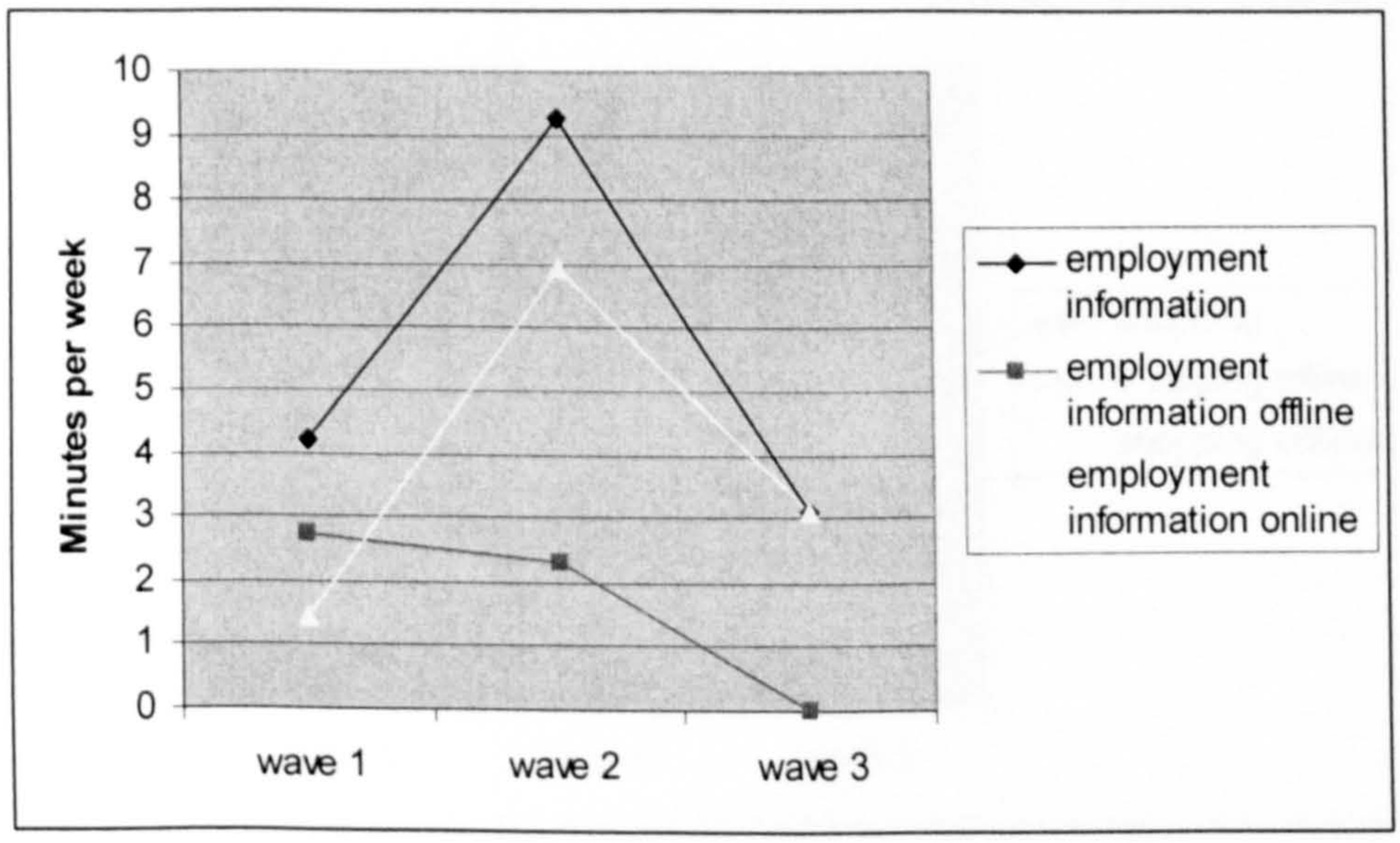


Figure 10.2. Minutes spent in employment search activities: whole sample

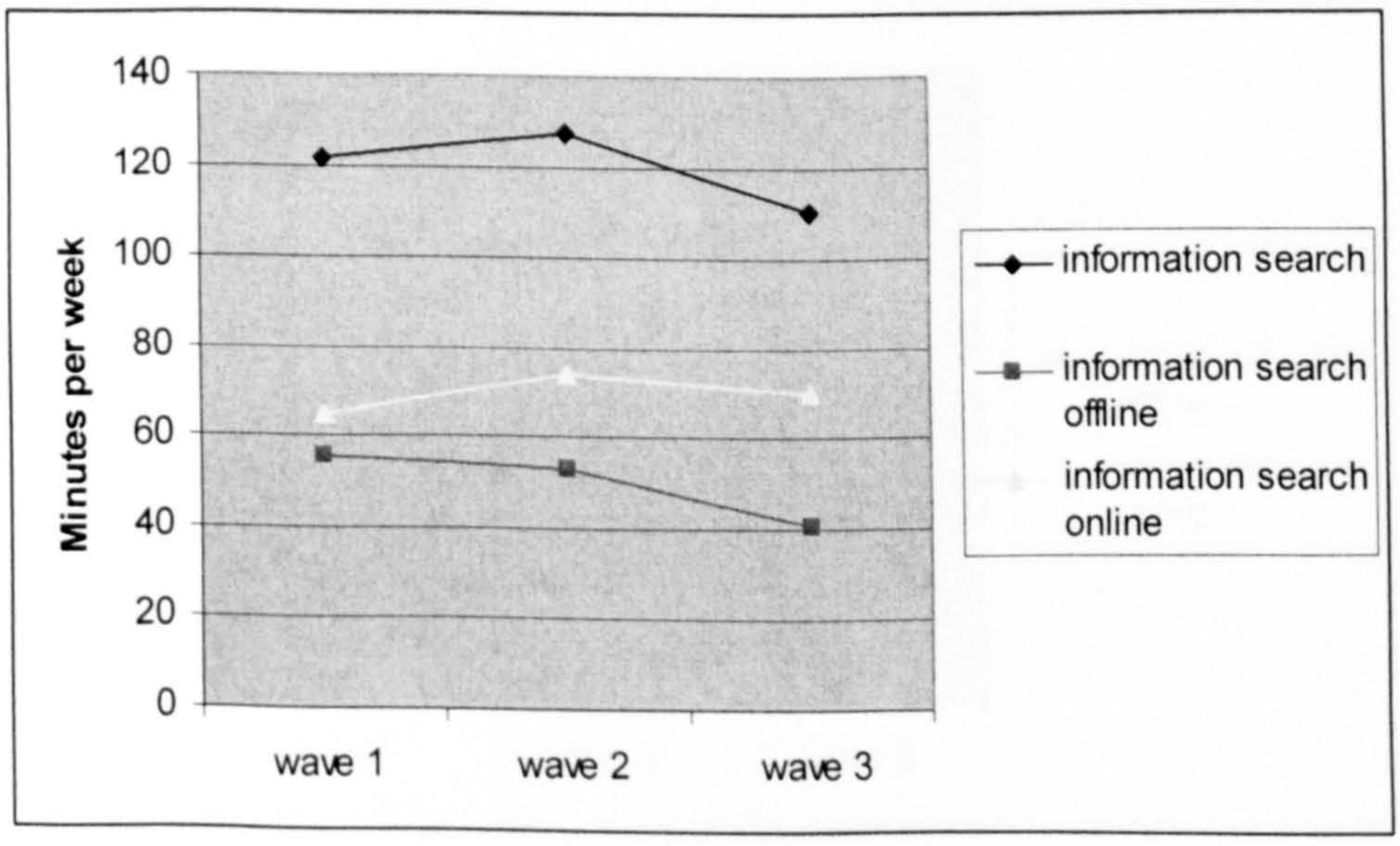


Figure 10.3. Minutes spent in information search activities: whole sample

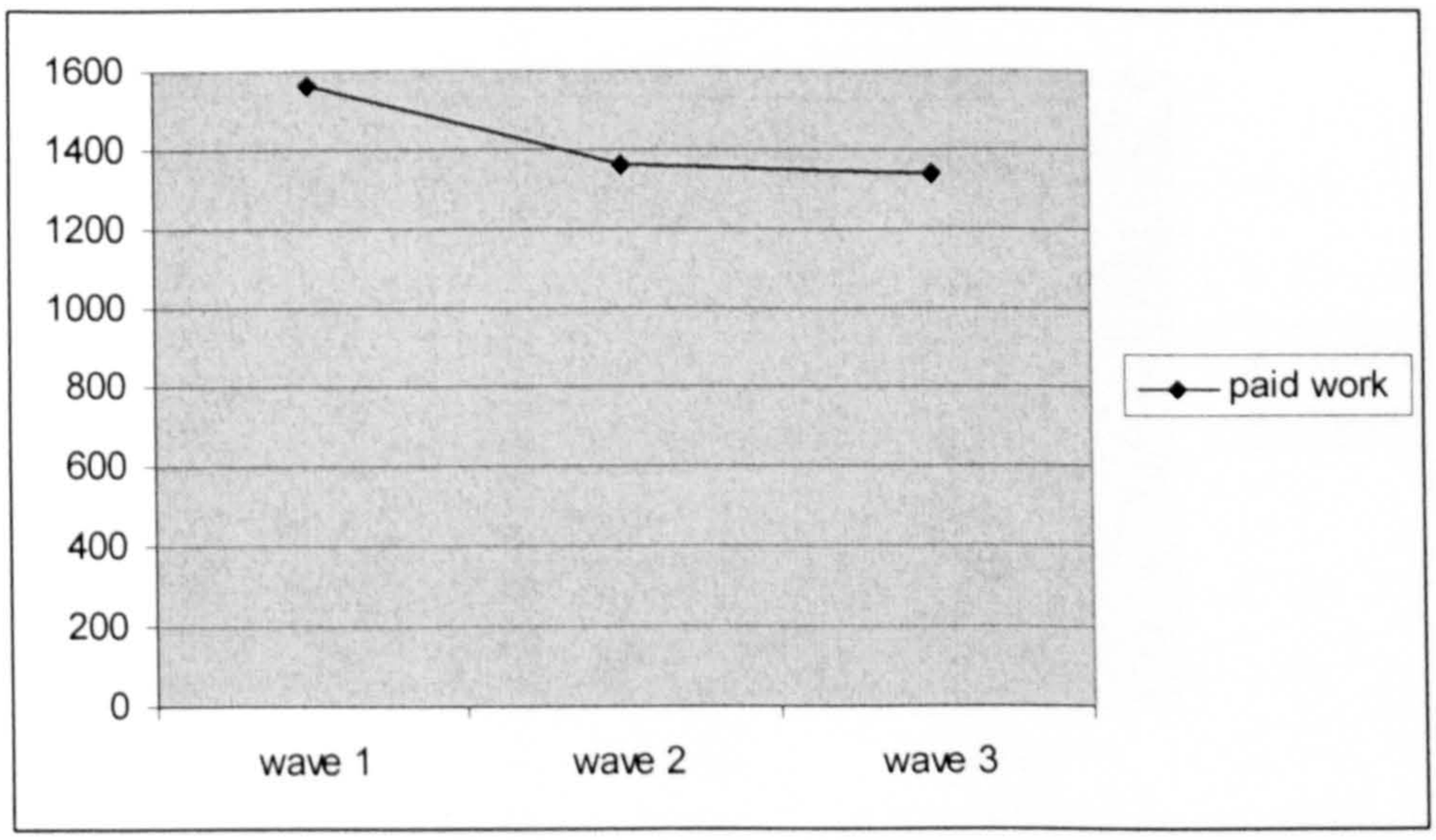


Figure 10.4. Minutes spent in paid work activities: whole sample

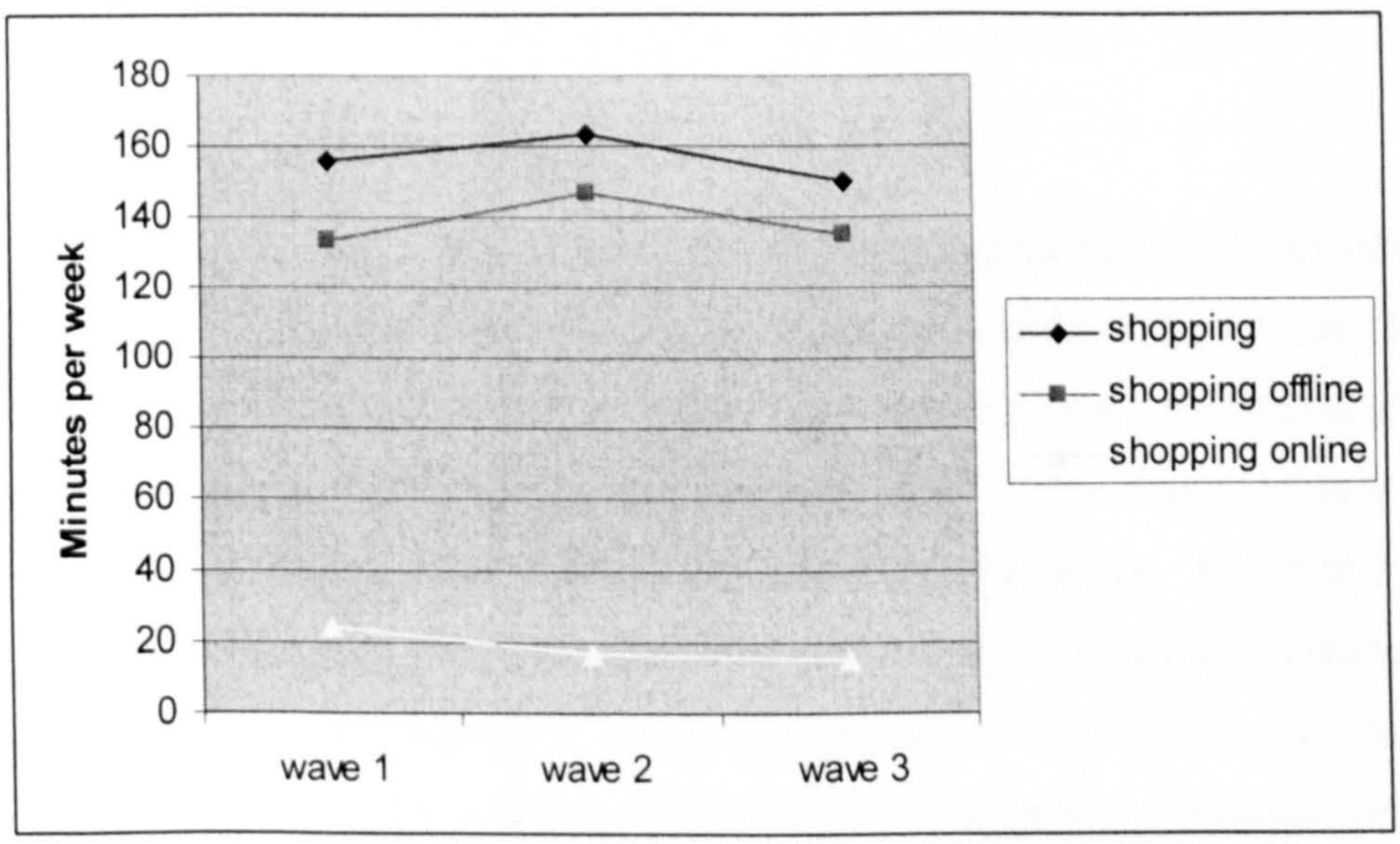


Figure 10.5. Minutes spent in shopping activities: whole sample

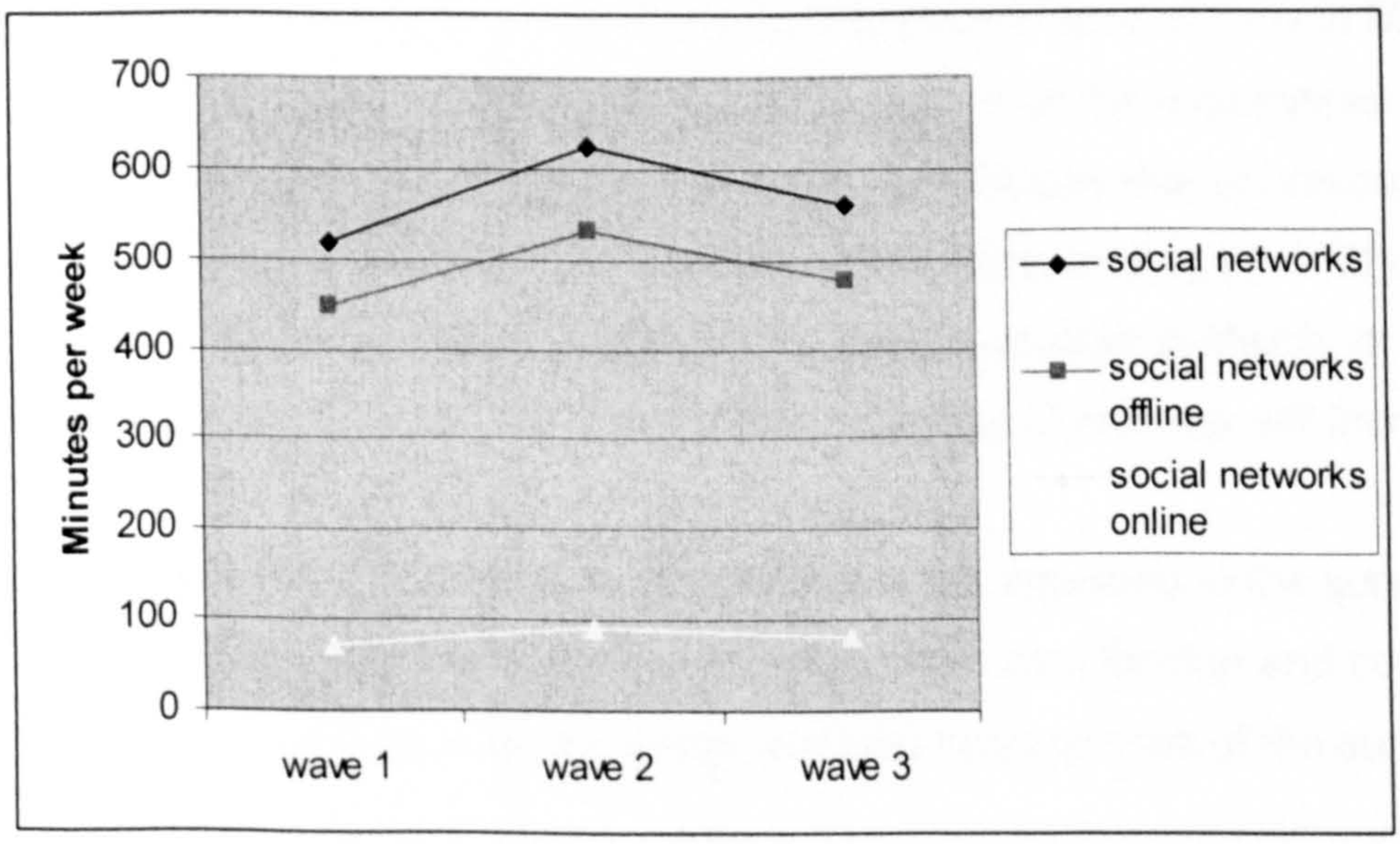


Figure 10.6. Minutes spent in social networks activities: whole sample

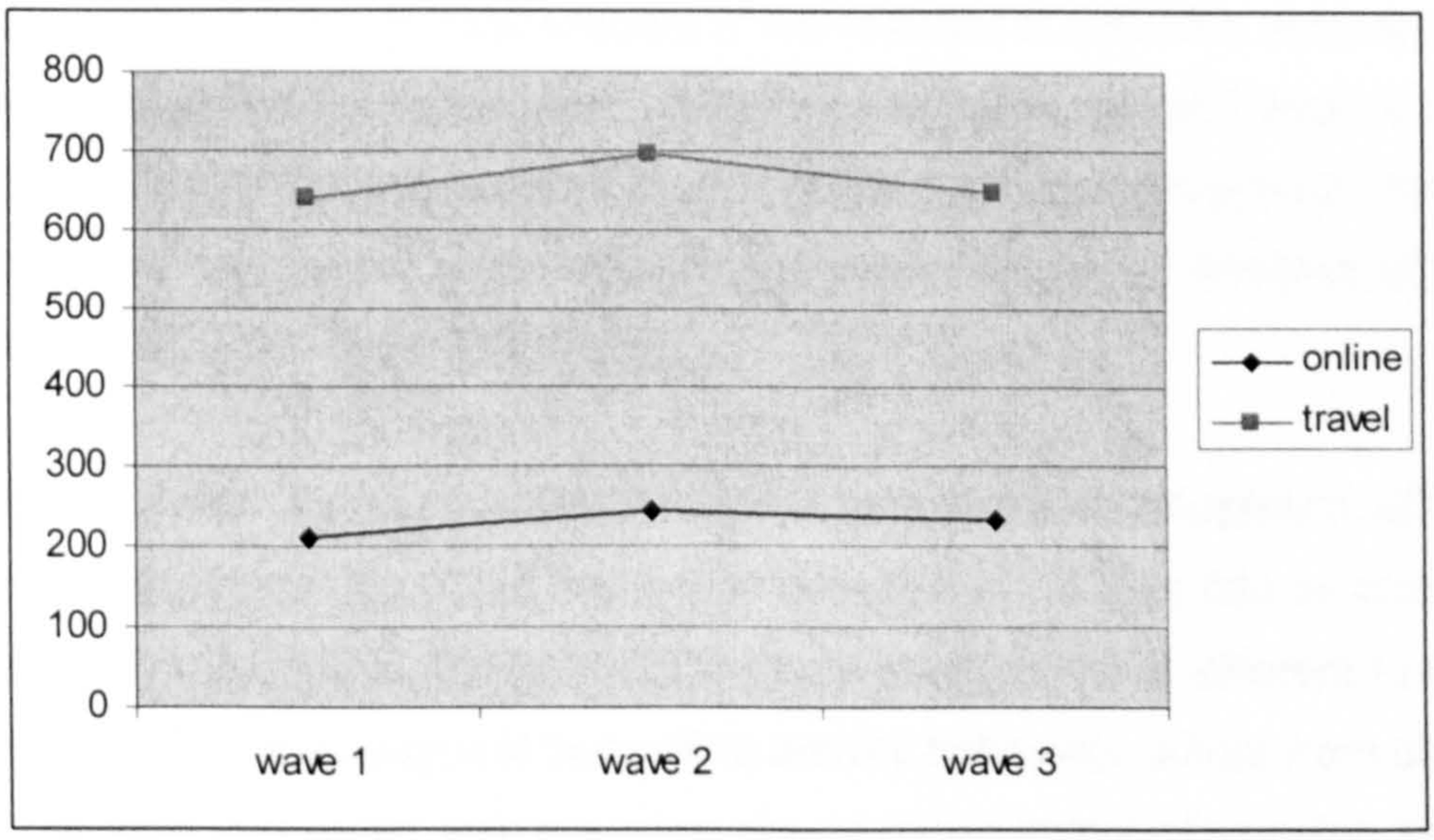


Figure 10.7. Minutes spent in online and travel activities: whole sample

10.3.1.1 Longitudinal trends

No clear longitudinal trends are observed from these data. For six of the eight key activities (employment information, information search, Internet use, shopping, social networks and travel), there is a peak in the second wave, for total and (in the main) the offline and online components of these activities[7]. The mean number of minutes then returns to a level similar to that observed in the first wave. This trend is observed for these activities both online and offline (with some difference for offline education and information search activities, in which a degree of substitution may be observed). This raises the question of whether or not there is a seasonal variation, prompting greater participation in these activities in the autumn months than in the spring. Whilst we can hypothesise reasons for increases in participation in each activity in March, it is equally likely that the opposite hypothesis could be true, thus the hypotheses have little explanatory value. For example, we might hypothesise that an increase in shopping is due to changing weather or an increase in spending leading up to Christmas. However, we can equally suggest that changing weather in March, or an increase in disposable income after the lean months following Christmas, will increase spending[8].

An alternative explanation is that participants are adjusting to the survey instrument, such that their usage increases as they become more familiar and confident in the second wave and decreases as they perhaps become tired of the survey. However,

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[7] From this point, for brevity, reference to activities and discussion of activity patterns is to total, offline and online activities, unless otherwise stated.
[8] As it is, data from the ONS (2005h) suggests that there was little seasonal difference in overall retail sales between March, 2004, October, 2004 and March, 2005.

there is no evidence from analysis of the *number* of activities recorded per survey week to suggest that this is the case. A further alternative is that it may be that this analysis confirms that there is a *lack of a clear trend* in activity participation, for this sample, over this time frame. This conclusion is supported by the absence of statistically significant inter-wave differences.

Whilst a clear longitudinal trend may not be immediately apparent, differences in the observed trends for offline and online activity participation can be observed. For the majority of activities, the trend for the time spent offline is different to that for time spent online. This may suggest that online activity behaviour differs from offline behaviour, over time. However, with the exception of employment information search and perhaps information search activities, where substitution effects may be suggested, it is not possible from these data to identify a clear relationship between the two. Despite the above discussion, it should be remembered that the differences between the waves are not statistically significant, thus that the observed difference in trends may be similarly unimportant. The differences between offline and online activity participation and the possible relationships that this may suggest are explored further in later sections of this chapter.

The above discussion has considered the longitudinal trends observed in this dataset, concluding that no clear trends can be observed. The discussion now turns to consider the reasons for this.

10.3.1.2 Interpreting the lack of a clear longitudinal trend

There are a number of possible reasons for the absence of clear longitudinal trends in this dataset, including the short timescale and the nature of the sample in terms of both size and composition (discussed in Chapter 9). It may be that the changes in behaviour are so slight as to be masked by this survey instrument, which records all activities to the nearest five minutes, or by the method of analysis, which creates aggregate activity categories and which focuses upon primary activities alone. Alternatively, the whole sample analysis may be masking individual change. By reducing analysis to the mean, increases in participation by one individual/group can be masked by parallel decreases, by other individuals/groups. In this sense, even very large changes will be obscured. This latter point is considered in the following discussion.

Initial observations highlight substantial deviation from the mean across the majority of activities, suggesting wide variation in behaviour amongst the sample. The substantial positive skewness for the majority of activities may suggest, firstly, that a small number of outliers are unduly influencing the mean and secondly, that there are high levels of null participation in key activities. This is supported by the median and mode, for the majority of activities. From this, it is evident that caution should be exercised in presenting analysis that relies upon whole sample means. Rather, it is likely to be important to disaggregate the sample, in particular to remove those recording null participation in all three waves, to gain a true measure of change in participation. When we do this, the mean increases and the skewness decreases, as anticipated (Table A13.1). However, considerable deviation from the mean remains, which again highlights the importance of further disaggregating the sample to understand individual behaviour. Whilst of course the percentage change between the waves remains the same, a greater number of interwave changes are statistically significant (though not enough to suggest a trend) (Table A13.2). This is particularly notable for education activities.

A further observation is that there is a greater degree of deviation in participation than anticipated. Whilst substantial deviation may be expected for certain activities, for example, education, in which few in a sample of 69 would be expected to participate, greater clustering around the mean was expected for activities in which all participants are expected to participate, for example, social networks. This may suggest important differences in participation, between individuals/groups. However, the possibility that this is due to different completion strategies should not, at this stage, be discounted.

Whilst the statistical tests suggest little change in the mean between the waves, change in standard deviation, skewness and kurtosis between the waves, for the majority of activities, suggests that some behavioural change is underlying (and possibly being disguised by) the aggregate sample mean. This further supports the suggestion that there may be a degree of change (or churn) at the individual or group level, which is not apparent at the whole sample level. This pattern is observed in studies of traveller behaviour (Chatterjee, 2001) and has been suggested by Lenhart et al (2003) with regard to the changing Internet population. Examination of the correlation coefficients for inter-wave activity participation may also highlight change underlying the (largely static) means (Table 10.3). Given the lack of statistically significant inter-wave differences and given that we are using panel data, we would expect activity behaviour from one wave to another to be highly correlated, if inter-wave

behaviour were indeed stable, as the means suggest. However, this is not always the case, which supports the suggestion of a degree of underlying churn.

Activity	*Type*	*Wave*	*Correlation*	*Activity*	*Type*	*Wave*	*Correlation*
Education	Total	w.1 – w.2	.569****	Paid work	Total	w.1 – w.2	.677****
		w.2 – w.3	.855****		Total	w.2 – w.3	.757*
		w.1. – w3	.580****		Total	w.1. – w3	.682*
	Offline	w.1 – w.2	.571****	Shopping	Total	w.1 – w.2	-
		w.2 – w.3	.848****			w.2 – w.3	.216*
		w.1. – w3	.579****			w.1. – w3	.299**
	Online	w.1 – w.2	.312***		Offline	w.1 – w.2	.373***
		w.2 – w.3	.434****			w.2 – w.3	.255**
		w.1. – w3	.354***			w.1. – w3	.267**
Employment information	Total	w.1 – w.2	-		Online	w.1 – w.2	-
		w.2 – w.3	-			w.2 – w.3	-
		w.1. – w3	-			w.1. – w3	.260**
	Offline	w.1 – w.2	-	Social networks	Total	w.1 – w.2	.428****
		w.2 – w.3	-			w.2 – w.3	.492****
		w.1. – w3	-			w.1. – w3	.429****
	Online	w.1 – w.2	-		Offline	w.1 – w.2	.418****
		w.2 – w.3	-			w.2 – w.3	.404***
		w.1. – w3	.280**			w.1. – w3	.367***
Information search	Total	w.1 – w.2	.375***		Online	w.1 – w.2	.429****
		w.2 – w.3	.590****			w.2 – w.3	.417****
		w.1. – w3	-			w.1. – w3	.734****
	Offline	w.1 – w.2	-	All online	Total	w.1 – w.2	.287**
		w.2 – w.3	.674****		Total	w.2 – w.3	.501****
		w.1. – w3	.225*		Total	w.1. – w3	.358***
	Online	w.1 – w.2	.604****	All travel	Total	w.1 – w.2	.502****
		w.2 – w.3	-		Total	w.2 – w.3	.595****
		w.1. – w3	-		Total	w.1. – w3	.574****

*p<.1. ** p<.05. *** p<.01. **** p<.001.

Table 10.3. Correlation coefficients for inter-wave behaviour, where correlations are significant, with indication of statistical significance (n=69)

The suggestion that there may be a deal of change, which is masked by the aggregate analysis, led to and is supported by individual-level analysis, in which many individuals are seen to substantially change their behaviour from one wave to another. Figures A13.1-A13.4 illustrate this variation, plotting individual behaviour over time for four key activities: all online activities, shopping, social networks and all travel activities[9]. The data show that participants not only vary when compared to other participants, but they also vary substantially over time. Whilst this would be expected for some activities in which participation can be time limited, for example employment information and perhaps education, it would not for activities that are not time limited, in which more constant participation would be expected, for example social networks activities. This

raises the possibility that the weeks surveyed may not have been typical weeks for the participants. Indeed, when asked in the post diary questionnaire whether or not the diary week was a 'typical week', 62 percent of participants who responded[10] suggested that it was not. This in turn raises the possibility that the survey weeks were inappropriately selected. However, given the care taken in selecting the survey weeks (Chapter 8), this is judged to be unlikely. An alternative explanation, supported by Robinson and Godbey (1997), is that 'typical weeks' are an illusion. As Robinson and Godbey state: '... when 40 percent of respondents tell us that the diary day about which we interviewed them was not typical, it may not make sense to think of time in terms of 'typical days'.' Rather, individual behaviour may be genuinely highly variant from week to week. In recent research, conducted and published following the conduct of this study, Kitamura et al (2006) present literature review and new empirical research to suggest that typical or routine travel behaviour is similarly an illusion, owing to natural variation in activity behaviour (and thus in the time-space prism[11]). Citing Hanson and Huff, the authors suggest that variance is both natural and systematic, not only prompted by truly unusual events (which Hanson and Huff term 'ephemeral or non-recurring' events), but by the fact that everyday is unusual – that no day is truly the same as another, in activity content or sequence.

Statements from participants in this study suggest the same:

> No week is typical.
> Wave 1 participant.

> No two weeks are ever exactly the same.
> Wave 1 participant.

Some participants suggested that this was because of their particular circumstances, for example, having a young child[12], or being self employed[13]. The following almost contradictory statement suggests in fact that it is typical to have atypical patterns of behaviour.

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[9] These activities have been selected because of universal participation by this sample.
[10] Wave 1: 66 responses, 37 suggested that the week was not typical (56 percent). Wave 2: 63 responses, 43 suggested that the week was not typical (68 percent). Wave 3: 53 responses, 33 suggested that the week was not typical (62 percent). Overall, 113 out of 182 responses suggested that the week was not typical (62 percent).
[11] See Chapter 3 for full discussion of the notion of the time-space prism.
[12] 'I have come to the conclusion that there is nothing typical when you have a young child.' Wave 3 participant.
[13] 'Being self employed, I don't really have a typical week.' Wave 3 participant.

> I nearly never have a typical week.
> Wave 3 participant.

It is easy to see how this might be so, in respect to all of the activities considered in this study. An unusual purchase, a forthcoming birthday, a trip to see distant friends would affect shopping, information search, social networks and travel activities. Each could conceivably occur on a weekly basis, whilst retaining enough variation – another purchase, someone else's birthday, a trip to see different friends – to be reported as 'unusual', with different space-time commitments. A final point is that, given that the mean remains largely stable, it would seem that individual variation does not have system-level impacts and as such may not be apparent in many surveys.

The above discussion raises questions regarding what is the appropriate methodological approach to measure change, alongside questions regarding the appropriate unit of measurement – that is, whether or not participation should be measured in terms of reference weeks, or if the variability in weekly (as opposed to monthly or quarterly) participation is too great to monitor constancy of participation.

Before turning to consider further analysis, an additional observation can be made from the correlations given in Table 10.3. The correlations reveal inter-activity differences, plus differences between online and offline activities. For example, shopping appears to be less strongly and significantly correlated over time than time spent in social networks. Thus, the time that participants spend in social networks is more consistent on a week to week basis than that which they commit to shopping activities. Within activities, again considering shopping, offline shopping is more strongly and significantly correlated over time than online shopping. The time that participants commit to offline shopping appears to be more constant than that which they devote to online shopping, which is more changeable. This suggests that the relationship between behaviours in each wave varies according to both the activity type and the mode of access (offline/online). Considering the latter, that there is greater correlation between offline behaviours than online, for the majority of activities, may suggest that the offline behaviour is an established part of daily life, whereas the online behaviour has yet to become so. Related to this, it may be that online activities are more likely to be 'atypical' on a week to week basis than activities undertaken offline. This is supported by the considerable variation in the time that participants spend online, between reference weeks. As discussed in Section 10.3.3, it proved impossible to assess longitudinal change defined by the amount of time spent online per week,

because of the variation in weekly online time. Almost three-quarters of the sample changed subgroups between the waves, which suggests that the place, or role, of Internet activities in daily life is still to be determined, for the majority of participants.

Finally, correlations between the waves for travel time are stronger and more significant than those for online time, suggesting that travel time has a greater stability than online time, from week to week. Because offline activities exhibit greater stability, the correlations suggest that substitution, in terms of aggregate travel time rather than activity-specific travel time, is unlikely. Rather, supplementary effects are probable.

10.3.2 Whole sample analysis: summary

Initial analysis exposed the following key findings. Firstly, considering longitudinal trends:

- The inter-wave differences in activity participation, in terms of total, offline and online participation, are not statistically significant.
- Furthermore, there is no clear inter-wave trend.

On the basis of this evidence, it is *not possible* to identify a relationship between online and offline behaviour by looking at change over time for the whole sample. Rather, the data suggest that participation in the selected key activities, at the whole sample level, is largely stable over time.

Secondly, interpreting the lack of clear longitudinal trend:

- There is substantial deviation from the mean, for the whole sample and for all activities. This persists when only those participating in the activity during at least one wave are considered.
- There is less correlation in inter-wave behaviour, for the majority of activities, than would be expected from a panel survey. This varies for different activities and different modes of access.
- There is substantial churn in individual behaviour underlying the mean.

Later sections return to consider the implications of and reasons for a lack of an inter-wave trend in greater depth. Before this, however, the analysis turns to further probe the longitudinal element of this study.

The lack of a clear longitudinal trend raises the possibility that analysis may turn away from the examination of the influence of Internet use longitudinally, turning instead to analysis using a composite database[14]. However, given the variation observed, results suggest that there are possible subgroups, which may be masking a longitudinal effect, at the whole sample level. In other words, should subgroup A increase and subgroup B decrease their participation, the mean may suggest no change, disguising these longitudinal behavioural changes. Thus, before discarding the longitudinal element of the dataset, the analysis sought to explore this possibility by disaggregating the sample into subgroups, whose behaviour may be disguised by analysis using the whole sample means.

10.3.3 Disaggregating the sample by key variables

Chapter 9 identified four variables, which are hypothesised to influence activity participation, personal travel and Internet use: income, Internet experience, mode use and residential location. The analysis described above was repeated to consider these variables, for the total, offline and online duration of participation in the eight key activities. As above, inter-wave differences were examined for wave 1-2, wave 2-3 and wave 1-3. Full details of this analysis are given in Appendix 14. Whilst this analysis indicates that there may be evidence to suggest that the subgroups are behaving differently, there is no evidence to support the hypothesis that these subgroups are hiding a longitudinal effect that is cancelled out at the whole sample level. The findings therefore support those in Section 10.3.1: that there is no longitudinal effect, for this sample, for this time frame, for the activities under consideration.

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[14] The three ways in which it is possible to do single-wave analysis with this dataset are discussed in full in Section 10.3.2.

10.3.4 Disaggregating the sample by online/offline participation

The analysis presented in Section 10.3.1, which considered total, online and offline participation for the whole sample, revealed possible differences in trends for online and offline behaviour. From this, it was hypothesised that those participating online may exhibit different behaviour to those not participating online. Thus, the sample was disaggregated into the following subgroups, to allow further analysis of inter-wave behavioural change:

- Those participating in the activity;
- Those participating offline only;
- Those participating online only; and
- Those participating both online and offline[15].

Paired samples t-tests were repeated, to examine the statistical significance of inter-wave change for these subgroups. It emerged that those participating online consistently exhibit different behaviour to those who do not participate online. This is discussed in depth in Section 10.4.5. However, as above, there was no statistically significant, inter-wave, longitudinal effect. Thus, whilst the data suggest that these subgroups are behaving differently, they do not appear to be masking a longitudinal effect.

10.3.5 Subgroup analysis: summary

The above analyses by key variables and by offline/online participation support the finding from the whole sample analysis that there is *no evidence of longitudinal behavioural change*, for this sample, for this time frame. Whilst the analysis indicates that there may be evidence to suggest that subgroups are behaving differently, as hypothesised in Section 10.3.3, there is no evidence to suggest that these subgroups are masking a longitudinal effect that is cancelled out at the whole sample level. There are caveats regarding the meaningfulness of statistical analysis on this sample and when numbers are further reduced for subgroup analysis. However, the lack of statistical significance is supported by the lack of a clear longitudinal trend, for all activities, for both subgroups, when we consider the descriptive statistics.

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[15] Analysis excluded paid work, because distinction between on and offline status was not recorded for this activity.

The further confirmation of the lack of an identifiable longitudinal trend supports the suggestion that the analysis be refocused upon a single wave. Before taking the analysis in this direction, however, the possibility that a longitudinal effect may be hidden by a subgroup not examined above must be considered. To this end, each individuals' participation in the eight key activities was plotted as an individual line chart. The analysis aimed to identify outliers exhibiting patterns of longitudinal behaviour that differed substantially from the sample. It was hoped that the characteristics of these outliers might identify important subgroups, which may be masking a longitudinal effect.

As noted in Section 10.3.1.2 and Figures A13.1-13.4, individual-level analysis reveals substantial variation in behaviour, not only between participants, but also for each participant, between each wave. Analysis of individual line charts further supports this observation. Reflecting this variation, it was not possible to identify clear outliers, whose behaviour differed substantially from the sample norm, for the norm is a high degree of variability. Activity participation behaviour varies between individuals but, for this sample and for this time frame, the analysis suggests there are no clear subgroups which may be hiding a longitudinal effect. This further confirms the lack of a clear longitudinal trend in the data.

10.3.6 Implications of the lack of a longitudinal trend in the data and direction of further analysis

A longitudinal panel-based diary study was developed for this research because change in activity participation over time as a result of Internet use was hypothesised (Chapter 4, 5). This research design was seen to be the most appropriate for the exploration of these hypotheses (Chapter 8). However, in line with Anderson and Tracey (2002), this study has found no evidence of longitudinal change in activity participation, for this sample, in the key activities and subgroups considered.

The lack of a longitudinal change would have important implications for the hypotheses detailed in Chapter 5. With regard to Hypothesis (1), the data suggest that Internet use has no positive (enhancing) effect for activity participation, measured in minutes, over time. In this sense, the study would not support the findings from the focus groups research, detailed in Chapter 6, which suggest that virtual mobility acts to increase activity participation, overcoming the accessibility deficit that can occur as a result of

too little mobility. Equally, with regard to Hypothesis (2), the data suggest that there are no negative effects of virtual mobility, in terms of decreasing participation in socially beneficial activities or enhancing physical mobility.

However, there may be explanations for the absence of a longitudinal effect in the above analysis. Whilst the above analysis suggests that the whole sample analysis is unlikely to be masking longitudinal effects, it may be that the following have influenced the findings, such that the above analysis has produced a false negative.

(1) The study timescale. Twelve months may be too short a time frame for the analysis of change.
(2) The nature of the sample. The sample size may be too small for trends to be observed, or for meaningful statistical analysis and the sample composition may be inappropriate for the study of Internet effects. This may be in terms of Internet experience, extent of weekly Internet use or the other key variables that informed the sample selection.
(3) The methodological approach. Changes in activity participation behaviour may be time limited. Whilst having a substantial effect on the individual's life, such activities may not be recorded within a six-monthly diary. For example, many types of information search, including employment information and medical information, are unlikely to be continuous activities, or even activities that take up substantial amounts of time, but they can have real benefits for quality of life and well-being. This also raises the issue of the unit of measurement, which is considered as point (7).
(4) It may be that change in behaviour took place before this study. Chapter 9 highlighted the difficulties encountered when recruiting participants who had recently gone online. In consequence, the majority of the sample have been online for a number of years. It is possible, therefore, that behavioural change in response to Internet use occurred prior to this study and has therefore not been detected.
(5) Robinson and Godbey (1997) note that individual behaviour is naturally highly variant, on a daily or weekly basis. This is further supported by evidence presented in Section 10.3.1.2 and in the data presented in Table 10.2 and Figures 10.1-10.7, in which variation in participation in activities that may have been expected to have more constant levels of participation was observed. Whilst habit may inform some activity behaviour, this natural variance suggests that much activity participation falls outside of habitual routine. In this study, the lack of

significant inter-wave changes in activity participation may be explained by the masking effect of the 'noise' of natural variance. This theory may also be supported by the fact that the technology is relatively new. As highlighted above, online activities have yet to become an established part of daily life. In this sense, there is likely to be a heightened degree of natural variance, as people adapt to the possibilities of the Internet. It is therefore likely that the lack of a clear longitudinal trend is reflecting this heightened degree of variance[16].

(6) The analytical approach. Changes may be hidden by the aggregate activity categories. In addition, change may be hidden by the focus upon primary activity participation alone. As discussed in Chapter 11, Anderson and Tracey (2002), Nie et al (2002) and Robinson et al (2002) present evidence supporting the latter supposition.

(7) Finally, the unit of measurement. This study, in common with the field of time-use studies, considers behaviour in minutes, rather than in the number of discrete activities undertaken. The use of minutes as the unit of measurement is discussed in Chapter 8. However, there is a possibility that the number of minutes spent in an activity will actually decline with increasing proficiency, particularly online (for example, online grocery shopping); or with faster connection. Should this be the case, an increase in participation may not be reflected in an increase in minutes spent in the activity but, rather, in change in the number of discrete activities undertaken.

On balance, the author considers each of the above to be possible, if not equally probable. With regard to point (1), a contrary perspective is that twelve months is a long time in the life of the Internet. This is reflected in other studies, discussed in Chapter 4 and including the yearly Pew Internet & American Life and The Center for the Digital Future (formerly the UCLA Center for Communication Policy) Internet surveys, which have found behavioural effects within this time span[17]. Thus, evidence available at the outset of this study suggested that it was not unreasonable to expect that change would be observed during a twelve month period, given the rapid developments in this new aspect of modern lifestyles. Secondly, it is not clear that a longer study would have led to substantially different conclusions, given the high degree of natural variability observed. Certainly, a study within the time frame of this

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[16] Some authors, for example Nie et al (2002), provide descriptive statistics within their papers (mean, median, standard deviation, % at zero), which support the suggestion that activity participation is highly variant, thus supporting the findings presented in this thesis.

[17] See www.pewinternet.org and www.digitalcenter.org, respectively; also note the move of many in the sample to broadband, within the lifetime of the study.

thesis, which would perhaps have allowed one additional wave, would have been unlikely to uncover a longitudinal effect, although the hypothesised seasonal effect could have been tested in this way.

Considering point (2), a larger sample was outside the scope of this study. It may be that a larger sample would produce a greater number of statistically significant inter-wave differences. However, it remains that there is a lack of a clear *trend* over time. This, coupled with the high degree of natural variance observed, which, in light of research by Robinson and Godbey (1997), is unlikely to be unique to this sample, suggests that it is unlikely that sample size would make a substantial difference.

With regard to point (3), the majority of activities considered in this study are not expected to be time limited. However, the appropriateness of this methodology for measuring the effects of online participation in employment search and, to an extent, education activities, which may be time limited, may be questioned. Point (4) raises the possibility of change occurring prior to the inception of the study. Should there be a 'threshold' amount of Internet experience, beyond which people's behaviour does not substantially change, that this study considered mainly experienced Internet users could be considered a flaw in the sample design, notwithstanding the original aim of the sampling strategy, as discussed in Chapter 9. This is addressed in Sections 10.4.5 and 10.4.7.

Point (6) considers the analytical approach. The aggregation of activities into categories is a common and necessary approach in time use research. As discussed in Section 10.2, an alternative approach, considering individual activities, is not feasible, for this study. Analysis within alternative activity groupings is outside the scope of this thesis, but may be considered an appropriate direction for further research in this area. However, the possibility that the consideration of primary activities alone may be hiding a longitudinal effect can be assessed and is presented in Chapter 11.

Finally, alternatives to the use of minutes as the unit of measurement for this study, highlighted in point (7), were considered inappropriate during the design of this study, given issues of respondent burden and the recording of secondary activities, as discussed in Chapter 8. The methodological design therefore prohibits analysis of the number of discrete activities undertaken by each participant, because the diary does not record the number of discrete activities. Rather, time spent in activities is summed

for the secondary activities data; and we cannot know the number of discrete primary activities, because a universal definition of the discrete activity is not given to participants to inform their diary completion. This latter point reflects the difficulty of defining the boundaries of the discrete activity, which becomes particularly pertinent when we consider online activity participation, where multiple activities tend to be conducted at one time, or in rapid succession – with attendant implications for respondent burden should all these activities be recorded.

In light of the above, the author finds herself persuaded by point (5) – that the 'noise' of natural variance in behaviour on a weekly basis has acted to mask change over time and that the relative newness of the Internet has heightened this natural variance, such that longitudinal change has not been observed, for this sample. The discussion above raises the possibility that the finding that there is no effect of Internet use, considering the longitudinal data, may be a false negative. Thus, further analysis is necessary to explore the possible effects of Internet use. As such, this chapter turns now to consider a new approach to the evaluation of the impacts of virtual mobility upon activity participation: the exploration of differences in activity participation between subgroups and the possible attribution of these differences to the use of virtual mobility. From this point, the analysis forgoes the longitudinal element and aggregates the data to create a single database, creating a weekly mean for each participant. This process, the analysis and results are discussed in depth, below.

10.4 Examining change: exploring difference

10.4.1 Introduction

The accessibility diary study was designed to enable assessment of the influence of Internet use upon activity participation, over time. At the outset of the study, change over time was hypothesised. From this, it was anticipated that relationships between Internet use and change in activity participation could be inferred. However, as demonstrated above, inter-wave change has not been observed. Therefore, it was not possible to follow the analytical approach for which this study was designed. In consequence, the analysis moved to consider the influence of Internet use upon activity participation through the analysis of difference between subgroups, grouped according to their Internet use, using a single database. The key questions informing

the longitudinal analysis, detailed in Section 10.3, were amended to reflect the change in analytical approach and are as follows:

(1) Is Internet use associated with an increase in activity participation?
(2) Is Internet use associated with any negative mobility or social effects?

The majority of ICT-related studies using cross-sectional databases (reported in Chapter 4) compare activity participation, in the main participation in travel and in social networks activities, between those who use the Internet and those who do not, either as participant-defined 'users/non-users' or, in time-diary studies, by Internet use on the day in question. This approach is not possible in this study for a number of reasons, including the following. Firstly, all participants in this study describe themselves as Internet users. Second, just six record no online participation (as a primary activity) during the study period. Third, because the online component of 'paid work' is not recorded and fourth, because secondary activities are not considered (in the present analysis), we cannot be *entirely* sure that the recording of zero online minutes is a true reflection of online participation.

In consequence, the analysis seeks to assess the impact of Internet use in two principal ways. First, the sample is divided into four equal groups, according to *total* weekly Internet use. The first quartile includes the participants with the lowest total weekly Internet use; the fourth quartile, those with the highest. The division of the sample into quartiles allows the consequences of different levels of total Internet use for activity participation in key activities to be probed, whilst retaining subgroups of a size that is amenable to meaningful statistical analysis. Analysis then considers differences in activity participation by extent of total Internet use.

The second strategy is activity-specific and probes differences in total and offline participation rates for those participating offline only and those participating online, within each activity. The author is not aware of any examples of this approach in the published literature. However, this will be shown to be a valuable strategy in exposing the impact of Internet use, allowing examination of the impact of Internet use within specific activities whilst (in the main) retaining a sample large enough to allow consideration of the influence of the key variables. It moves beyond Internet use as an abstract activity and towards fuller appreciation of its impact upon participation within activities that are key to the debates under examination in this thesis.

Section 10.4 progresses through a number of subsections. First, three options for the composite analysis are discussed and the approach taken, justified. Two approaches to the assessment of the influence of Internet use upon activity participation follow. In the first, analysis of activity participation is by extent of Internet use, in terms of total weekly time spent online. Each activity is considered in turn, before the potential influence of key variables is assessed. In the second approach, differences in participation between those participating in activities online and those participating offline only are considered. Each activity is considered in turn. An email survey, which aimed to probe the diary findings, is then discussed. The influence of key variables upon the whole sample findings is assessed. The section closes with a summary and conclusions.

10.4.2 Constructing a composite database from the longitudinal data

Following the decision to forgo longitudinal analysis, three options for composite analysis were considered.

The first was to treat each individual in each wave as an independent case. This would utilise all of the data collected, effectively creating 254 cases[18], which would be likely to enable more robust statistical analysis. However, this approach was rejected, because to infer relationships, it is important that data are independent. Indeed, the majority of statistical tests demand that observations are independent. Thus, only limited analysis could be undertaken on such a database.

The second was to analyse a single wave. The lack of significant difference between the waves suggests that this would not induce bias and suggests that the choice of wave would be unlikely to be of importance. Whilst wave 2 has the highest number of participants, to ensure that all participants are equally familiar with the diary instrument (remembering that new participants were introduced in wave 2), wave 1 should be selected. Incidentally, but not unimportantly given the time constraints within which this and all research operates, this option uses the existing databases, saving considerable time relative to the other options considered, each of which necessitates the creation of a composite database. Whilst option (2) is potentially attractive, particularly given that the findings from one wave may be used to validate the findings of another, this option would fail to take full advantage of the wealth of data collected for this study.

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[18] Wave 1: 86 participants. Wave 2: 88 participants. Wave 3: 80 participants.

The third option was to sum each individual's data, across all three waves, to create a single database. This option takes advantage of the longitudinal element, in two ways. Firstly, it uses all of the data collected and as such is the equivalent of conducting a three-week diary study (for the majority of participants). This would have been difficult to achieve in a single wave, because of respondent burden. Second, in creating a three-week average, this approach is likely to reduce the variability in activity behaviour that we presume, in light of the discussion and literature review presented above, to exist at an individual level. As such, it should create a more stable database, reducing (though not necessarily eliminating) the 'noise' of natural variability. This option also addresses concerns expressed earlier in this chapter regarding the ability of a seven-day period to provide an accurate estimation of behaviour. Finally, it enables the inclusion of those who participated for one or two waves, increasing the sample by 27 to 96 unique cases. This may have benefits for the robustness of statistical analysis, at the whole sample and subgroup levels.

This option is permissible because the analysis reported above has shown that there is no clear longitudinal trend and no statistically significant inter-wave difference, for any of the key activities considered. The danger that this approach will mask changes in individual circumstances between the waves is negated by the fact that few participants' circumstances (relative to the key variables) changed and, where they did, the above analysis has suggested that this had little effect upon activity participation.

There are potential disadvantages associated with this approach. The first is the considerable time and effort that is necessary to create and test an aggregate database. Secondly, participants who did not participate in all three waves may be considered to have less accurate estimates of their time use, because fewer weeks are included in the analysis of their behaviour. This is considered in Table 10.4, which takes the means for those participating in all three waves and considers the differences between the aggregate means that are produced when four different combinations of participation are considered.

Activity	*Mean wave 1*	*Mean wave 2*	*Mean wave 3*	*Group 1: mean wave 1+2*	*Group 2: mean wave 2+3*	*Group 3: mean wave 1+3*	*Group 4: mean wave 1+2+3*
Education	150.80	162.91	187.97	156.85	175.44	169.39	167.23
Employment info.	4.20	9.26	3.12	6.73	6.19	3.66	5.53
Info. search	121.72	127.51	110.17	124.62	118.84	115.95	119.80
Paid work	1564.84	1365.48	1342.25	1465.16	1353.87	1453.55	1424.19
Shopping	156.46	163.46	149.88	159.96	156.67	153.17	156.60
Social networks	518.19	623.94	559.93	571.07	591.94	539.06	567.35
All online	211.51	542.59	234.23	227.05	238.41	222.87	229.44
All travel	641.54	695.35	650.49	668.45	672.92	646.02	662.46

Table 10.4. Creating an aggregate database: comparing total mean minutes per week spent in each key activity for different combinations of waves (n=69)

Table 10.4 illustrates that, as anticipated, different means are generated when different waves are included in the calculation. However, there does not appear to be a pattern to the differences in means. That is, we cannot detect or suggest a consistent biasing effect. The differences are not substantial and paired samples t-tests confirm that, with few exceptions, they are not significant ($p<.05$)[19]. Correlations show that, in the main, the means are significantly and highly correlated. Correlations are given in Table A13.3.

The above analysis suggests that there is no substantial or significant difference in the means for different combinations of waves, which gives confidence in the inclusion all participants in the study, despite their differing levels of participation. We cannot know how many waves are needed for a *true* average. However, the potential for bias can be monitored. If participants with fewer than three waves appear to be behaving differently to the three-wave sample, their inclusion or exclusion from the analysis can be considered.

Whilst each option has its merits, following careful consideration, the third option was selected as the clearly superior choice, for three primary reasons. First, it utilises all of the data which, secondly, will enable more robust statistical analysis. Third, potential problems associated with this option can be monitored and reported. An aggregate

[19] Exceptions: social networks, w.1 – w.2 and w.1 – group 1; paid work, w.1 – w.3, w.1 – group 3, w.1 – group 4 ($p<.05$).

database was constructed and thoroughly tested[20]. This database informs the following analysis.

10.4.3 Considering the influence of online participation: disaggregating the sample by extent of Internet use

Table 10.5 breaks the sample down into quartiles, defined by the extent of *total weekly Internet use*. The table shows the mean minutes per week spent in each key activity, as total, offline and online participation, by subgroup. Table 10.6 considers the statistical significance of differences in participation between each subgroup, using independent samples t-tests. Should there be differences in activity participation, influenced by participants' total time online, this would be expected to be evident in these tables. From this, generative, substitutive and/or supplementary effects of Internet use may be assumed, where there are clear and statistically significant trends in participation between the subgroups.

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[20] The composite database is the product of extensive and complex recoding. Because of the potential for human error, the re-coding was checked at each stage. Initial analysis, including cross-checking of means with the original databases, sought to further ensure the accuracy of the re-coding.

Activity	*Status*	*Mean minutes per week, by subgroup*			
		1st quartile[1] *(n=24)*	*2nd quartile (n=24)*	*3rd quartile (n=24)*	*4th quartile (n=24)*
Education	Total	52.4	123.7	339.2	125.8
	Offline	52.4	117.9	319.4	122.9
	Online	0	5.8	19.8	2.9
Employment information	Total	2.2	3.7	13.4	7.4
	Offline	0	0	3.7	3.0
	Online	2.2	3.7	9.8	4.4
Information search	Total	25.7	73.3	133.5	216.3
	Offline	17.6	31.6	55.0	83.0
	Online	8.1	41.7	78.5	133.2
Paid work	Total	1661.9	1441.1	1294.1	1517.4
Shopping	Total	143.4	148.8	179.7	143.2
	Offline	142.3	128.2	157.1	118.8
	Online	1.1	20.6	22.6	24.4
Social networks	Total	521.8	484.0	571.3	798.9
	Offline	512.8	447.7	510.1	602.0
	Online	9.0	36.3	61.2	196.9
All online activities	Total	27.5	124.7	229.0	480.8
All travel activities	Total	676.6	760.9	649.1	642.1

1st quartile: 0-77.5 minutes per week. 2nd quartile: 77.6-175.8 minutes per week. 3rd quartile: 175.9-328.8 minutes per week. 4th quartile: 328.9-927 minutes per week.

[1] Quartiles reflect total weekly Internet use and are not activity-specific.

Table 10.5. Assessing the effect of extent of Internet use upon activity participation (mean minutes per week)

Activity	*Status*	*Difference in mean minutes per week between quartiles[1], with indication of statistical significance*					
		1 – 2	*1 – 3*	*1 – 4*	*2 – 3*	*2 – 4*	*3 – 4*
Education	Total	71.3	286.8**	73.4	215.5	2.1	-213.4
	Offline	65.5	267.0**	70.5	201.5	5.0	-196.5
	Online	5.8	19.8**	2.9	14.0	-2.9	-16.9**
Employment information	Total	1.5	11.2	5.2	9.7	3.7	-6.0
	Offline	0	3.7	3.0*	3.7	3.0*	-0.7
	Online	1.5	7.6	2.2	6.1	0.7	-5.4
Information search	Total	47.6***	107.8****	190.6****	60.2**	143.0***	82.8*
	Offline	14.0	37.4**	65.4**	23.4	51.4*	28.0
	Online	33.6****	70.4****	125.1****	36.8**	91.5****	54.7*
Paid work	Total	-220.8	-367.8	-144.5	-147	76.3	223.3
Shopping	Total	5.4	36.3	-0.2	30.9	-5.6	-36.5
	Offline	-14.1	14.8	-23.5	28.9	-9.4	-38.3*
	Online	19.5***	21.5****	23.3***	2.0	3.8	1.8
Social networks	Total	-37.8	49.5	277.1***	87.3	314.9***	227.6**
	Offline	-65.1	-2.7	89.2	62.4	154.3	91.9
	Online	27.3***	52.2****	187.9****	24.9*	160.6****	135.7****
All online activities	Total	97.2****	201.5****	453.3****	104.3****	356.1****	251.8****
All travel activities	Total	84.3	-27.5	-34.5	-111.8	-118.8	-7.0

*p<.1. ** p<.05. *** p<.01. **** p<.001 or less.

[1] Quartiles reflect total weekly Internet use and are not activity-specific.

Table 10.6. Assessing the effect of extent of Internet use upon activity participation: difference in mean minutes per week between subgroups, with indication of statistical significance

The data presented in Table 10.6 suggests that there are significant differences in activity participation between the subgroups, for some activities. The following discussion considers each of the activities in turn.

10.4.3.1 All online activities

As would be expected, there is substantial and significant difference in participation in the activity category 'all online activities', with participation increasing consistently from quartile 1 through 4. This supports the decision to divide the sample into and to focus the analysis on discreet quartiles based upon extent of Internet use. However, in the main, when we consider the online component of each individual activity, differences in online activity participation between the subgroups are not statistically significant. Thus, online time is not evenly distributed across all activities. This suggests that those

spending the greatest amount of time online are not 'netaholics', undertaking unfocussed online activities, but are, rather, online with a specific activity purpose. This finding further supports the value inherent in the analysis of the impacts of Internet use within discreet activities, as outlined in Section 10.4.1 and discussed in full in Section 10.4.5.

10.4.3.2 Education, employment information and paid work activities

Considering *total* participation in education, employment information and paid work, the absence of a consistently significant difference between quartiles, alongside the absence of a consistent trend, suggests that the amount of time that an individual spends in these activities is not associated with the total amount of time that they spend online. For education, employment information and shopping, total participation appears to increase with greater Internet use, considering quartiles 1 to 3, but it falls in quartile 4. However, the differences in participation between subgroups are not statistically significant, albeit that people in the lowest quartile are observed to participate less in education, employment information and shopping than those in the highest quartile. For education and employment information search activities, the above trends are observed for *offline* and *online*, as well as total, participation. Therefore, for these activities, the data fail to suggest an influence of Internet use upon activity participation. There is no evidence, in this study, to suggest that the amount of time that individuals spend online influences their participation in total, offline or online education, employment information or paid work.

10.4.3.3 Information search activities

A clear and consistently statistically significant trend in participation in information search activities is observed. The time spent in total, offline and online information search increases substantially and significantly across the quartiles. Thus, for this activity, those who spend more time on the Internet spend longer in information search activities than those spending less time online. This is the case for participation in total, online and, to a lesser extent, offline information search.

Considering the likely relationship between offline and online participation, on balance, supplementary effects appear to be most probable, considering the strongly significant increases in total and online participation with increasing time online, alongside less substantial and significant increases in offline participation (Table 10.6).

10.4.3.4 Shopping activities

A different trend emerges for shopping activities. The data suggest no significant or substantial differences in participation and no clear trend in *total* shopping activities. Whilst the differences in participation in offline shopping activities between the quartiles are not statistically significant, there are statistically significant differences in online participation between quartile 1 and quartiles 2, 3 and 4. However, there is no substantive or statistically significant difference in the behaviour of those in quartiles 2, 3 and 4. This raises the possibility of a 'threshold' amount of Internet use, beyond which participants are more likely to engage in online shopping.

Following the finding that the extent of Internet use may influence participation in online shopping activities, the possible relationship between online and offline shopping can be probed. The absence of statistically significant differences between *total* participation between quartile 1 and quartiles 2, 3 and 4 and the significant differences in *online* participation for the same may suggest substitution effects. However, should this be the case, significant differences in *offline* shopping between quartile 1 and quartiles 2, 3 and 4 would be expected. Whilst differences are observed, these are not statistically significant. This casts some doubt upon the suggestion of substitution. In light of the significant differences in online participation observed above and the absence of statistical evidence to support substitutive effects, it is possible that online activities are supplementary to offline activities. However, this is called into question by the absence of statistically significant differences in *total* participation between the subgroups.

Thus, for shopping activities, the relationship between offline and online activities is unclear. Whilst a threshold of Internet use may exist, beyond which participants are more likely to engage in online shopping, there are no clear effects of Internet use for total, offline or online shopping.

10.4.3.5 Social networks activities

Considering *total* social networks, the overall trend is that of an increase in participation with increasing time online. That is, the more time that individuals spend online influences their participation in total social networks activities. This trend is not consistently statistically significant. However, people in the highest quartile spend significantly more time in total social networks activities than do those in quartiles 1, 2 and 3.

Regarding *online* social networks, a clear and statistically significant trend emerges. Time spent in online social networks increases through quartiles 1 to 4. It is clear that the more time that individuals spend using the Internet, the more time they spend in online social networks. This suggests that participating in social networks is a clear reason for being online. That there is no clear or statistically significant trend for *offline* social networks suggests that they are unaffected by overall levels of Internet use.

The above findings have implications for Hypothesis (2), given in Chapter 5. There is no evidence to support fears that online time results in reduced sociability. Time spent in social networks does not decline between quartiles 1 and 4, as would be expected if there were such a link. Rather, participants in the 4th quartile, spending the greatest amount of time online, spend significantly more (total) time in social networks than others. Increasing time online is positively associated with greater sociability, through online participation in social networks. Furthermore, the absence of a clear or statistically significant downward trend in offline social networks suggests that online social networks are supplementary, rather than substitutive, highlighting virtual mobility as a tool of greater sociability.

10.4.3.6 Travel activities

Finally, the data suggest that there is no evidence to support a relationship between time spent online and time spent travelling[21]. Travel time does not increase between quartiles 1 and 4, as would be expected if Internet use generated travel. Indeed, those spending the most time online travel less than those spending the least time online. However, this difference is not statistically significant. As such, we cannot suggest substitutive effects. That there is no clear or statistically significant trend to link time spent in virtual mobility with that spent in physical mobility has further implications for Hypothesis (2), suggesting that fears of generative effects of Internet use for travel are unfounded. Equally, however, statistically, the data fail to support optimistic claims that virtual mobility can reduce physical mobility, thus contributing towards a reduction in mobility-related exclusion. This said, we equally cannot know if Internet use is suppressing growth in physical mobility. Should this be the case, such optimistic views would (to an extent) be supported.

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[21] Note: travel represents all travel activities undertaken during the survey period and is not activity specific. This method of analysis is more likely to capture displaced as well as immediate effects of Internet use upon travel than a focus upon activity-specific travel (the latter not possible in this study, as highlighted in previous discussion).

10.4.3.7 Summary

The above analysis has sought to uncover differences in activity participation, by extent of Internet use, in the eight key activities considered in this thesis. The analysis has revealed the following.

For the majority of activities, there is no evidence to suggest that the total time that participants spend online influences their activity participation. Thus, for the majority of activities, the data fail to support the hypothesis that the amount of time that an individual spends online has a substantial or significant influence upon their activity participation.

There are two exceptions to this finding. The first is for information search activities, where total, offline and online participation increase significantly and substantially with the extent of time spent online. The second is for social networks activities online, for which the same is observed. For these activities, it is reasonable to conclude that virtual mobility is positively associated with increased activity participation, offline, online and in total.

Two further findings have important implications for this study. First, there is no evidence to support an association between time online and a decline in sociability. Second, there is no evidence to support an association between time online and travel time, considering both an increase and a decrease in (existing, but not future) travel time as a result of Internet use.

10.4.4 Considering the influence of key variables upon the above findings

The above findings have suggested that, for the five of the activities under consideration, the total amount of time that an individual spends online is not associated with the extent of their participation in key activities. For two activities, information search and social networks online, an association is apparent. However, the results can only be *associated* with the extent of Internet use, for two primary reasons. The first has been mentioned throughout this chapter and relates to the need for longitudinal analysis to uncover true causality. The second concerns the possibility that factors other than extent of time spent online may be influencing the results. Multivariate analysis, including multiple regression, can draw out the influence of different factors upon the results, identifying the influence of extraneous, intervening

and moderating variables and examining the likelihood of multiple causation[22]. However, this sample is not of sufficient size for meaningful analysis in this way. Further disaggregation of the sample into key variables within the quartiles is similarly unlikely to produce meaningful statistical analysis, because of the sample size. This is compounded by the fact that it is not a representative sample and that there are uneven numbers of participants in each of the potential subgroups.

In consequence, the possible influence of external factors was explored qualitatively. The composition of each quartile was probed, relative to the key variables (detailed in Chapter 9), to assess whether or not there are substantial differences in their composition. The results are discussed in full in Appendix 15. In summary, the analysis of the composition of the subgroups used in Section 10.4.3 suggests that, for the variables considered, there are no substantial or consistent differences between the subgroups. Therefore, it is judged unlikely that the results have been influenced by other measured variables.

10.4.5 Considering the influence of online participation: within-activity differences

Sections 10.4.3 and 10.4.4 have considered the first strategy for probing the relationship between virtual mobility and activity participation, outlined in Section 10.4.1. This section considers the second strategy: assessing the differences in total and offline participation rates for those participating offline only and those participating online, within each activity.

As reported in Section 10.3.4, substantial differences between online and offline participation, within each activity, were observed during the longitudinal analysis. From the individual wave analysis undertaken as part of the longitudinal analysis, it emerged that those participating online consistently exhibit different behaviour to those who do

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[22] An *extraneous* variable is a third variable which causes the two variables under consideration, therefore negating the relationship identified. For example, it is possible that income might influence time online and the time spent shopping. An *intervening* variable is one which is a product of the independent variable and the cause of the dependent variable, breaking the identified relationship. Thus, the amount of time may influence income, which may in turn influence the amount of time spent shopping. A *moderating* variable is one that influences the identified relationship such that the finding does not apply to the sample as a whole, but only to a sub-sample. For example, the relationship between time online and time spent in social networks may be moderated by gender, such that the relationship applies only to women and not to men.

not participate online. In addition, online participation appears to be associated with increased total participation and, for some activities, increased offline activity participation. This was particularly clear for education, shopping and social networks activities and is depicted in Figures A13.5-A13.13. The analysis suggests that those participating in online education participate in education more than those who do not. The difference in participation is not only due to online activity. Rather, those participating online also spend more minutes per week in offline education than those participating only offline. Considering shopping, those who shop online do a similar amount of offline shopping to those who do not shop online. Their online shopping behaviour therefore appears to be in addition to offline shopping[23]. Finally, considering social networks, those participating online not only exhibit consistently significantly greater participation in total social networks activities[24], but they also participate in offline social networks more than those who do not participate online[25].

Thus, the analysis using individual waves data had begun to highlight important differences in behaviour between those who participate online and those who do not, considering each activity. Analysis using the composite database sought to further explore this finding, to consider the differences between these groups, such that inferences regarding the influence of Internet use upon activity participation could be drawn.

For each activity, the composite sample was divided into four groups: (1), those participating in the activity; (2), those participating offline only; (3), those participating online[26]; and (4), those not participating. Total, offline and online participation for subgroups (1), (2) and (3) was compared. Independent samples t-tests were conducted to assess the significance of differences between groups (2) and (3)[27]. Table 10.7 gives the mean time per week spent in each activity[28], as primary activity, for subgroups (1), (2) and (3). Table 10.7 also details the difference between those participating offline only and those participating online, with indication of statistical significance.

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[23] It is recognised that this could only truly be known if we had pre-Internet data on shopping activity.
[24] Wave 1: $p<.01$; wave 2: $p<.26$; wave 3: $p<.05$.
[25] Inter-group difference in offline social networks activities is significant at $p<.05$ in wave 1, but is not significant in other waves.
[26] This subgroup includes those who participated online and offline and those who participated online only. No-one participated in education online only. 1 participated in shopping online only; 2 participated in social networks online only; 9 in employment information search online only; 19 in information search online only.
[27] T-tests were conducted between independent groups only.

Activity	*Status*	*Mean minutes per week, by subgroup*			*Difference*[†]	
		All participating	*Subgroup 2: offline only*	*Subgroup 3: online*	*(mins)*	*(%)*
Education	Total	466.2	108.3	1016.8	908.5****	838.9****
	Offline	445.5	108.3	964.4	856.1****	790.5****
	Online	20.7	0	52.5	52.5****	#****
	n =	*33*	*20*	*13*		
Employment information search	Total	37.6	22.5	39.6	17.1	76.0
	Offline	9.4	22.5	7.6	-14.9	-66.2
	Online	28.2	0	32.0	32.0	#
	n =	*17*	*2*	*15*		
Information search	Total	139.9	60.5	151.7	91.2****	150.7****
	Offline	58.4	60.5	58.1	-2.4	-4.0
	Online	81.5	0	93.7	93.7****	#****
	n =	*77*	*10*	*67*		
Shopping	Total	155.4	132.0	190.4	58.4***	44.2***
	Offline	138.0	132.0	147.0	15.0	11.4
	Online	17.4	0	43.4	43.4****	#****
	n =	*95*	*57*	*38*		
Social networks	Total	594.0	465.7	636.8	171.1**	36.7**
	Offline	518.1	465.7	535.6	69.9	15.0
	Online	75.9	0	101.1	101.1****	#****
	n =	*96*	*24*	*72*		

[†] Percentage increase in time spent in activity if participate online as well as offline (subgroup 3), as opposed to offline only (subgroup 2).
Cannot calculate percentage change from zero.
*p<.1. ** p<.05. *** p<.01. **** p<.001 or less.

Table 10.7. Mean duration of activity participation per week, by nature of participation, with indication of statistical significance

Table 10.7 reveals that, for the majority of activities, there is a significant difference in level of activity participation between those who participate in the activity only offline and those who participate online[29]. The following considers each activity in turn.

10.4.5.1 Education activities

Considering education, those who participate online spend, on average, a total of 908.5 minutes per week more time in education than those who participate only offline. This represents a difference of over 800 percent, significant at p.<001. Participation online

[28] Excluding paid work, because the offline/online status of this activity is not recorded.

is not only associated with an increase in total participation, but also in an increase in offline participation. Those participating online spend 856 more minutes per week participating in offline education than those who participate only offline, significant at p.<001. Thus, the increase in total participation is not only due to participants' online activity, but to also greater offline participation.

There are a number of possible explanations for this difference, each with different implications for the hypotheses outlined in Chapter 5. Firstly, the significant difference in *total* participation between the two groups suggests that online activity may be supplementary to offline activity. Thus, considering Hypothesis (1), the data support the suggestion that virtual mobility can facilitate an increase in activity participation. Equally, however, the substantial and significant difference in *offline* participation between the groups suggests that, for education activities, online participation may generate offline participation. Should this be the case, whilst claims for the inclusionary benefits of virtual mobility persist, fears for negative mobility effects, highlighted in Hypothesis (2), may be realised, if we assume that offline participation is equated with physical mobility.

A third explanation is that substitution has occurred prior to this study. In this case, the difference in activity participation between the groups is not related to Internet use, but to other factors and existed prior to participants' Internet use. Thus, online participation has not affected total participation in this activity. Rather, online education has substituted for offline education, with attendant effects for travel, if we assume that offline education is associated with physical mobility. Finally, it may be that the difference in participation pre-existed the use of the Internet. As such, it is unrelated to Internet use. Rather, those participating online may naturally be predisposed to greater participation in education activities. This conclusion does not negate the possibility of supplementary or substitutive effects.

We cannot attribute causality with this composite dataset and this analysis. However, whatever the causal relationship, it is clear from these data that Internet use is associated with greater total and offline participation in education. Each of the above explanations can be associated with reduced social exclusion, through an increase in participation through supplementary or generative effects, or a reduction in physical

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[29] It can be assumed that the small number in subgroup 2 contributed towards the absence of statistical significance for employment information search activities.

mobility, associated with substitution. Should generation lead to an increase in physical mobility, however, greater mobility-related exclusion may occur.

10.4.5.2 Information search, shopping and social networks activities

A different pattern emerges for information search, shopping and social networks activities. Here, participation online is associated with a significant increase in total participation in each activity: a 151, 44 and 37 percent increase, respectively. Whilst, in the case of shopping and social networks, the data suggest that participation offline also increases, this increase is not significant. Thus, we can suggest that the increase in total participation stems from participants' online activity. In this sense, the data clearly suggest that online activity is supplementing offline activity, as observed in Chapter 6, meeting latent demand for increased participation, with no effect upon offline activities. Should this be the case, the data support Hypothesis (1), suggesting that virtual mobility can increase activity participation. The absence of significant difference between the subgroups for offline participation suggests that this is without the hypothesised negative mobility effects. That those participating online spend significantly more time in social networks activities than those who do not suggests that fears regarding negative social impacts, suggested in Hypothesis (2), may also be unfounded.

It is clear that those participating online experience different levels of activity participation to those participating offline only. However, as with education, from this analysis we cannot be certain of the causal relationship. It is possible that the relationship is, in fact, substitutive – that participants' total participation has not changed and that substitution occurred prior to the inception of this study. In this sense, online participation would not be causing an increase in total activity participation for this group, but rather reflecting a pre-existing difference in participation in these activities. It is also possible that generation of offline participation may have occurred before this study – that those participating online historically participated less offline, until they had Internet access. Whilst this latter effect would not negate the possibility that Internet use has increased activity participation, the net effects would be quite different.

For each of the activities considered above, it may be possible to infer the likeliness of substitution and generation by disaggregating the sample by Internet experience and this is considered in Section 10.4.6. However, it is through further qualitative work that,

in the absence of an effective longitudinal dataset, the most likely relationship may be deduced. This is presented in Section 10.4.7.

10.4.5.3 Summary

- Those participating online exhibit significantly different behaviour to those who do not participate online.
- Online participation is associated with significantly more total activity participation for education, information search, shopping and social networks activities.
- For education activities, online participation is also associated with significantly more offline activity participation.
- It is not possible, with these data and this analysis, to categorically state a causal relationship between online and offline behaviour.

10.4.6 Within-activity differences: subgroups analysis

Analysis presented in Section 10.4.5 suggests that those who participate online exhibit different patterns of behaviour to those participating offline only. From this, we have concluded that online participation is associated with increased total activity participation – that, in the main, online activities are supplementary to offline activities. For some activities, however, most notably information search and shopping, online activities can substitute for their offline counterparts. This section summarises the findings of analysis which sought to assess whether or not these findings hold true for the subgroups identified in Chapter 9. The analysis is reported in full in Appendix 16.

Analysis by key variables had three aims:

(1) To consider the validity of the whole sample finding that online participation is associated with greater total activity participation;
(2) To consider whether or not certain characteristics are likely to influence the attractiveness and use of virtual mobility; and
(3) To further explore the possibility of change occurring prior to this study, by considering the influence of Internet experience upon activity participation.

Considering the first aim, the whole sample trends were, in the main, observed, for all key variable subgroups. Therefore, this analysis supports the findings presented in Section 10.4.5.

Considering the second aim, it is unclear from this analysis whether or not certain characteristics are likely to influence use of virtual mobility. There is a lack of a clear or consistent trend across activities within any of the variable subgroups. However, there is some evidence to suggest that the following groups may benefit or be benefiting from virtual mobility, to a greater extent than their counterparts:

- Those on a low income, who are seen to: travel less and use the Internet more; spend a greater proportion of their education time online; spend a greater proportion of their social networks time online;
- Broadband users, who are seen to spend more time in online activities;
- Those living in a village, who are seen to spend less time in shopping activities; and
- Those in a town, who spend less time in social networks.

This said, none of the above can be statistically proven within this study. As such, additional research, with a larger sample, is necessary to further explore these claims.

Finally, Section 10.4.5 suggested that analysis of the whole sample findings by Internet experience might enable conclusions to be drawn regarding the likeliness of substitution and generation occurring prior to this study. However, no substantial differences in participation between the subgroups were revealed by this analysis. Therefore, considering objective (3), this analysis was unable to draw conclusions regarding the likeliness of Internet effects occurring prior to this study.

10.4.7 Probing the causal relationship: an email survey of participants

10.4.7.1 Methodology

Section 10.4.5 revealed substantial and significant differences in activity participation between those participating in education, information search, shopping and social networks *online* and those participating in these activities *offline only*. Whilst a number of explanations for the observed difference in participation between the groups have been suggested, it has not been possible to assess their probability. To this end, a short questionnaire was sent to all those participating in wave 3 of the study (n=80), with the aim of uncovering the likely effects of online participation in each of the five activities considered in Table 10.7, namely communicating with family and friends,

education, employment information search, information search and shopping[30]. The questionnaire asked participants to consider whether or not participating in each activity online has made them spend more time, less time, or had no effect upon their participation in the activity offline. Space was provided for additional comments[31]. A copy of the questionnaire is given as Appendix 17.

The survey represents a modest effort to gain qualitative feedback from participants, within the time and cost constraints of the research. Such a survey has a number of potential disadvantages, as discussed in Chapter 8. Foremost amongst these is that retrospective surveys are subject to recall error. In addition, as discussed in Chapter 6, it can be difficult to uncover accurate opinions on subjects that participants have not previously considered. As such, the results from this survey are treated as indicative, rather than statistically robust or definitive findings. Nevertheless, their inclusion in this thesis is justified, with the aim of further exploring the probability of the relationships outlined in Section 10.4.5.

10.4.7.2 Results and discussion: question (1)

43 participants replied to the email survey, representing a 54 percent response rate. Table 10.8 presents the results for Question (1). Participants answered *only* for those activities that they undertake online and percentages are for those participating in the activity only. The number of participants is indicated alongside the activity[32].

	More time (%)	*Less time (%)*	*No effect (%)*
Communications (n=42)	26.2	14.3	59.5
Education (n=21)	14.3	33.3	52.4
Information search (n=35)	2.9	82.9	14.3
Shopping (n=38)	2.6	55.3	42.1

Table 10.8. Participants' stated effects of online participation upon the amount of time spent in offline participation, in four key activities

[30] Participants were asked about communications with family and friends, rather than social networks activities, because this was judged to be more comprehensible. Employment information search is excluded from the following analysis because of low numbers participating in this activity.
[31] A second question, in which participants were asked if their online participation had been in addition to or instead of their offline participation produced unclear results and substantial missing data. This is likely to be the result of unclear questionnaire design. As such, it is not reported in this thesis.
[32] The questionnaire considered activity participation, not trips. Analysis considers change in activities and assumes a degree of association between offline activity participation and travel.

Table 10.8 supports the above finding that there are different effects of Internet use for different activities, further supporting the decision in this study to disaggregate 'Internet use' into component parts (discussed in Section 10.4.1). The findings also suggest that the effects of Internet use are not as simple as those highlighted in the literature discussed in Chapter 4.

10.4.7.2.1 Communications/social networks activities

Firstly, considering communications, our proxy for social networks activities. The majority of participants – 59.5 percent – suggest that using the Internet for communications activities has had *no effect* upon their offline communications. This finding supports that detailed in Section 10.4.5, which suggests an increase in total participation in social networks activities, with no effect of online activities upon offline activities. Taken together, these findings suggest that, for the majority of participants, online communications are *supplementary* to offline communications, supporting the assertion in Hypothesis (1) that virtual mobility can provide additional access to activity participation.

A quarter of participants suggest that online communications have increased their offline communications. When considered alongside those who suggest no effect upon their offline communications, we can see that 85.7 percent of participants suggest that online communications have *increased* their *total* communications. Therefore, considering Hypothesis (2), for the majority of participants, concerns regarding the negative social effects of Internet use have not been realised. Considering the effects of online communications upon physical mobility, if we assume that offline communications involve physical travel, the results deny substitution effects, for the majority of participants. Generation effects may be suggested for a quarter of the sample. However, the extent to which the conduct of this activity offline can be associated with physical mobility, given the virtual nature of much offline communication, is unclear.

10.4.7.2.2 Education activities

Considering education, as with communications activities, the majority of the sample – 52.4 percent – suggest no effect of online activities upon offline activities. However, unlike communications, a third of the sample suggest substitution effects. Considering the findings in Section 10.4.5, in which those participating in education online were observed to spend more time in offline education than those participating offline only,

that the majority of participants report no effect upon offline activities is likely to indicate that online education is supplementing existing participation. The lack of evidence for a generation effect suggests that the difference in the amount of offline participation between the two groups pre-existed the use of the Internet. This can be considered to have been even more pronounced for some participants, given that a third of the sample report substitutive effects.

Therefore, it seems likely that, for the majority, online education supplements offline education. However, for a substantial minority, online education has substituted for offline education.

10.4.7.2.3 Information search activities

Table 10.8 clearly suggests that online information search activities have substituted for offline information search. In this sense, the observed difference in participation between those participating offline only and those participating online is likely to reflect a substitution that occurred prior to the inception of this study.

10.4.7.2.4 Shopping activities

Of the four activities considered, shopping is likely to have the greatest impact for physical mobility. There is no evidence, from this survey, for a generation effect of online shopping. Rather, the majority of participants (55.3 percent) suggest that online shopping substitutes for offline shopping. A substantial minority (42.1 percent) suggest that online shopping has no effect upon their offline shopping. Considering the results presented in Section 10.4.5, which highlighted greater total shopping for those shopping online than those shopping only offline, yet a similar degree of offline shopping, the results support two probable interpretations: a substitution effect occurring prior to this study; and a supplementary effect. Considering the former, these data fail to support the concerns for an increase in physical mobility that are expressed in Hypothesis (2). Indeed, should this substitution result in a net reduction in physical mobility, there may be a reduction in mobility-related exclusion, as suggested in Hypothesis (1). The latter interpretation lends further credence to the hypothesised role of virtual mobility in facilitating additional access without recourse to physical mobility, detailed in Hypothesis (1).

10.4.7.2.5 Summary

Results from question 1 of the online survey reveal the following with respect to the diary study results presented in Section 10.4.5:

- For communications with family and friends, the data suggest that, for the majority of participants, online communications are *supplementary* to offline communications.
- It is likely that online education is *supplementary* to offline education.
- Considering information search, the data suggest *substitution*.
- For shopping, *substitution* is evident, with a substantial minority reporting *supplementary* effects.

10.4.7.3 Results and discussion: open text responses

Analysis of open text responses within this survey supports the above findings. With regard to *communications*, it is clear that virtual mobility allows more communication, with more people. It emerged that many online communications could not take place offline, because of monetary, spatial and temporal constraints upon face to face meetings or telephone conversations. Thus, there was a clear message that online communications are supplementary. Where substitution effects were mentioned, the relationship described was more complex than that presented in the literature. Participants discussed replacing infrequent, costly or inconvenient telephone calls with online communications, which take place more frequently and thus lead to a greater degree of communication. This may explain the principally substitutive discourse within the literature discussed in Chapter 4, which finds negative effects of online communications. This finding has implications for Hypothesis (2), for when substitution is seen as the substitution of an unsatisfactory activity with one that is more fulfilling and frequent, negative social effects of substitution can no longer be presumed.

It was common for participants to report both *generic* benefits of online activities, which suggest supplementary effects and the benefits in *comparison* to offline activities, which suggest substitution. Both generic and comparative benefits were discussed in relation to *information search* activities. However, substitution effects were far more commonly discussed, reflecting the findings in Table 10.8. Factors including the speed, ease of access and wealth of information available online were seen to result almost universally in its replacement of offline information search.

Finally, as with communications activities, the relationship between offline and online *shopping* was revealed to be more complex than is traditionally considered. Both generic and comparative benefits were discussed. Considering the former, participants discussed the greater range of goods that are accessible online, to which they would not have access without the Internet. This highlights the role of virtual mobility in supplementing access. Considering the latter, participants emphasised the benefits of substitution, including time saving, less travel and fewer problems with childcare, contrasting the offline and online experiences. This reflects the quantitative findings in Section 10.4.7.2.

10.4.7.4 Summary

The online survey represents a modest effort to probe the differences in levels of activity participation between those who participate offline and those participating online, uncovered in the analysis presented in Section 10.4.5. The findings are summarised as follows:

- The survey supports the suggestion that the effects of Internet use vary according to the activity under consideration.
- Online communications activities are likely to be *supplementary* to offline communications.
- Online education is likely to be *supplementary* to offline education.
- Online information search is likely to have *substituted* for offline information search.
- Online shopping activities are likely to be *substitutive*. However, a substantial minority report *supplementary* effects.

Therefore, in the main, the survey results support the findings of the qualitative research detailed in Chapter 6, namely that virtual mobility supplements offline activity, lending support to the hypothesis that virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion, without negative mobility or social effects.

10.4.8 Section summary: examining change by exploring difference

Section 10.4 has considered the extent to which it is possible to examine changes in behaviour, due to Internet use, by examining difference. The suggestion that a number of methodological factors are likely to have influenced the absence of a longitudinal

effect, rather than the absence of an effect of Internet use upon activity participation, is supported by this analysis. Following the discovery of a lack of a longitudinal effect in this study, the database was reconfigured. Subsequent analysis aimed to uncover the extent to which Internet use may be affecting activity participation, by comparing different groups, divided according to Internet-related variables. Two approaches have been discussed. The first considers the influence of extent of Internet use upon activity participation, in terms of the total time spent online during the survey week. The second considers an activity-specific approach, assessing the differences in activity participation between those participating online and those participating offline only. A qualitative survey supplemented the quantitative findings.

The analysis aimed to address the following questions, which relate closely to the hypotheses developed in Chapter 5.

(1) Is Internet use associated with an increase activity participation?
(2) Is Internet use associated with any negative mobility or social effects?

This section summarises the findings in relation to these questions for the quantitative and qualitative analyses in turn.

Section 10.4.3 considered the influence of extent of Internet use upon activity participation, in terms of the total time spent online during the survey week. Considering question (1), for the majority of activities, the data fail to support the hypothesis that the amount of time that an individual spends online has a substantial or significant influence upon their activity participation in the activities considered in this analysis. However, there are two exceptions: information search activities and social networks activities, where total and online participation increase significantly and substantially with the extent of time spent online. For these activities, Internet use is positively associated with increased activity participation, online and in total.

Considering question (2), there is no evidence to support an association between time online and a decline in sociability. Indeed, the opposite is suggested. There is no evidence to support an association between time online and travel time, considering both an increase and a decrease in travel time as a result of Internet use. Furthermore, Section 10.4.4 found no evidence to suggest that the above findings are influenced by variables other than Internet use.

The second, activity-specific approach, assessed the differences in activity participation between those participating online and those participating offline only. This analysis concluded that those participating online exhibit significantly different behaviour to those who do not participate online. Considering question (1), online participation is associated with significantly more total activity participation for education, information search, shopping and social networks activities. For education activities, Internet use is also associated with greater offline activity participation. Considering question (2), there is no evidence, from this analysis, to associate Internet use with a decline in sociability: indeed, Internet use is positively associated with sociability. This analysis was unable to consider travel activities. As above, the analysis found little evidence to suggest that the above findings are influenced by variables other than Internet use.

An email survey to probe the observed differences in levels of activity participation between those participating online and those participating offline only further highlighted the importance of activity-specific analysis when considering the effects of Internet use. Survey analysis revealed that, in the main, online communications, education and, to an extent, shopping, are likely to be supplementary to their offline counterparts. Online information search and, to an extent, shopping, are likely to have substituted for their offline equivalent. Considering question (1), this suggests that virtual mobility can be associated with an increase in activity participation. Considering question (2), there is no evidence of negative mobility or social effects of Internet use, rather that Internet use, for the majority, has a positive effect for sociability. This analysis was unable to consider travel activities.

In summary, therefore, the analyses of difference suggest that Internet use is associated with an increase in total activity participation, for the majority of activities and an increase, not a decline, in sociability. There is no evidence to suggest a link between Internet use and physical mobility.

10.5 Conclusions: could virtual mobility alleviate mobility-related exclusion?

To conclude, this section reflects upon the objectives listed in Chapter 7 and considers the following questions:

(1) What does the analysis of primary activities reveal with regard to the hypotheses?
(2) What are the methodological lessons?

Hypothesis (1) suggests that virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion. Whilst longitudinal analysis was inconclusive, analysis using a composite database to explore differences in behaviour according to total and activity-specific Internet use supports this hypothesis. These quantitative results from the time use data are reinforced by the results from a qualitative survey.

The analysis revealed the following:

- Internet use is associated with an increase in total participation, for education, information search, shopping and social networks activities.
- Internet use is associated with an increase in offline participation, for education activities.
- Education, shopping (in the main) and social networks activities are likely to be supplementary to their offline equivalents.
- Information search and, to an extent, shopping activities, are likely to substitute for their offline equivalents.
- To fully understand the impacts of Internet use for activity participation and personal travel, it is necessary to take an activity-specific and, where possible, individual task-specific focus.

Therefore, this study suggests that, for many activities, virtual mobility is providing additional access to activity participation. Of course, unlike the qualitative study in Chapter 6, these results cannot suggest the *reason* for the use of virtual mobility. As such, we cannot definitively state that virtual mobility is reducing mobility-related exclusion, or is being used to reduce mobility-related exclusion. However, that there is a clear association between Internet use and an increase in activity participation, for the majority of activities considered, suggests a clear role for virtual mobility in social

and transport policy, facilitating greater activity participation by supplementing existing participation and fulfilling latent demand.

Hypothesis (2) is concerned with the quality of online activities and recognises the possibility of negative physical mobility and sociability effects of virtual mobility, which could weaken the positive effects described above. Firstly, considering the quality of online activities. The quantitative element of this study has not been able to assess the quality of online activity participation. Whilst the qualitative survey revealed both generic and comparative benefits, highlighting a preference for existing online activity participation over the offline counterpart, it should not be assumed that these benefits would be felt if online activity participation were extended beyond current use. Therefore, we cannot entirely dismiss quality concerns and further research in this area is desirable.

With regard to the possible negative effects of virtual mobility, the analyses have revealed the following:

- Internet use is not associated with physical mobility. There is no evidence to suggest that virtual mobility leads to an increase in physical mobility. Therefore, concerns regarding an increase in mobility-related exclusion, stemming from an increase in physical mobility as a result of virtual mobility, are not supported by this study.
- Equally, however, in the main, there is no evidence to suggest a decrease in physical mobility through substitution. Therefore, the contribution of virtual mobility to decreasing mobility-related exclusion may be limited to its function in alleviating problems of too little mobility, not of too much.
- Concerns regarding a decrease in sociability are not proven in this research. Internet use is not associated with a decline in sociability. Rather, online social networks activities supplement offline social networks activities, increasing total sociability.

The analysis of primary activities has produced valuable research findings. With regard to the aims discussed in Section 10.4.1, the analysis has confirmed that Internet use is associated with an increase in activity participation, in the majority of activities considered; and that Internet use is not associated with negative mobility or social effects.

There are, however, caveats to the above results, which relate to the methodological approach and analytical design. It is to these that this section now turns.

An acknowledged weakness of quantitative research is its inability to resolve questions of 'why'. This research applied a longitudinal panel study because, as discussed in Chapter 8, this is the clearest way in which the 'why' questions can be addressed: the clearest way in which change can be assessed and causal factors attributed. However, the above findings are not the result of longitudinal analysis. As such, whilst online participation is *associated* with positive effects, we cannot definitively attribute causal effects. Similarly, in the absence of longitudinal evidence, we can only *suggest* a substitutive or supplementary relationship. This has been discussed throughout Section 10.4 and is reflected in the qualitative survey reported in Section 10.4.7. Whilst this survey strongly suggests behavioural change as a result of Internet use, it is acknowledged that its reliance upon retrospective recall, not only of behaviour but also of change, may affect its authority. In addition, the accessibility diary is not able to directly associate physical mobility with specific activities, prohibiting direct assessment of mobility effects. A future study intending to assess the activity-specific impacts of virtual mobility for activity participation and personal travel may consider such direct association essential in order to uncover the nature of relationships between the same.

Sections 10.3.1.2 and 10.3.6 consider seven possible explanations for the lack of a longitudinal effect. These discussions will not be repeated here. However, a number of methodological issues raised in these discussions continue to be pertinent when we consider the findings from the composite database, which are reported above. The first considers the unit of measurement, both in terms of taking a reference week and in terms of analysis by minutes, rather than by the number of discrete activities. It is possible that the above findings are influenced by the reference week recorded, such that time limited activity participation, or changes in activity participation that are time limited, each having substantial impact for quality of life, are not recognised. This study has highlighted the importance of the activity-specific, rather than generic, analysis of Internet effects. In light of the above and reflecting this, the appropriateness of this method for the measurement of activity participation (and change therein) in certain activities may be questioned.

The use of minutes as the unit of measurement is standard practice in the study of time use and has multiple benefits (as discussed in Chapter 8). However, it is possible that the number of minutes spent in an activity will actually decline with increasing

proficiency or with faster connection and therefore that minutes may not accurately reflect the volume of activity participation or subsequent well being. Should this be the case, this will not only affect perception of change but also perception of the participatory benefits of virtual mobility, which may be greater than the above findings suggest.

Because a theoretical, non-representative sample was applied in this research, whilst neither significant nor substantial differences in behaviour between sample subgroups were detected, the author is careful to acknowledge that the above findings are for this sample and may not be applicable to the general population. In addition, the substantial variation in behaviour, although commonly detected in time use studies (as discussed in Section 10.3.6), is acknowledged as a caveat to the above findings and potentially reduces the ability to generalise the results. Returning to the sample, it emerged that the sample size and structure, designed for longitudinal analysis, was not (in the main) amenable to statistical analysis when applied to the composite database analysis. Whilst not negating the findings, this does reduce the extent to which they can be statistically verified.

Finally, that the findings are activity specific is a strength of this analysis. However, the focus upon specific activities may also be considered to be a drawback. This analysis has focused upon a small selection of activities that are important to this debate. It has not considered all daily activity. Therefore, we do not know how Internet use is affecting participation in other activities. Should substitution/enhancement effects be apparent for other activities, it is possible that there may be an impact for personal travel and/or social exclusion. The aggregation of activities into broad categories may be disguising the same effects at the individual-activity level, with similar implications.

The aim of the above discussion is not to repudiate the findings reported in this chapter, but to place them in context. In taking a unique, activity-specific approach to the assessment of the impacts of virtual mobility for activity participation and personal travel, this study has moved beyond conventional debate to embrace the complexity of the interactions between the same. The study has produced valuable empirical and methodological findings, contributing towards understanding in the field of study on each of these levels.

This chapter has discussed the analysis of the primary activity data. The following chapter turns to consider the extent to which the inclusion of secondary activities in the analysis influences the findings reported above.

Chapter 11. Results and discussion: secondary activities

11.1 Introduction

Chapters 4 and 6 raised the possibility that virtual mobility may increase activity participation, by facilitating 'multitasking'. There are few published studies in the time use or transport literature which consider the double counting of time, through multitasking. Termed variously simultaneous activities, overlapping activities, concurrent activities, parallel activities, secondary activities, multitasking and polychronic time use (Ironmonger, 2003), this phenomenon has long been recognised as important (Szalai, 1972), yet it is only in the past decade that time use researchers have begun seriously to record and analyse such data[1]. As mentioned in Chapter 8, a review of the literature prior to the development of the methodology for this research suggested that accounting for multitasking can provide a more fully informed understanding of the true extent of activity participation. This, in turn, can present a more accurate picture upon which measures of change can be assessed. Conversely, failure to account for multitasking may lead to an incomplete and potentially misleading understanding of activity (and thus travel) behaviour – and of change therein.

In light of this, the accessibility diary records secondary activities and it is to the analysis of these data that this thesis now turns. The chapter develops through five further sections. First, the concept of multitasking is discussed. The definition of multitasking informing this research is presented. A brief review of the time use, ICT and travel literatures considers the importance of secondary activities in everyday life, revealing flaws in our understanding of daily activity participation in society when multitasking is not considered. Next, multitasking is situated within the context of this

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[1] Bittman and Wajcman (2000), in their study of the impacts of multitasking upon gender equity in leisure time, suggest that avoidance of multitasking in research is primarily due to methodological difficulties in the collection of such information – and the variable quality of the data, if collected. Kitterod (2001) expresses concern that the recording of secondary activities can negatively affect the quality of the primary activities data, considering that it is appropriate to avoid recording of secondary activities altogether, in order that the quality of primary data be maximised. Furthermore, Ironmonger (2003) considers the difficulties inherent in analysing data on secondary activities, suggesting that such issues have actively prevented research in this area. Each of these concerns perhaps explains the absence of secondary activity data in the majority of surveys.

thesis. The impacts of multitasking for activity participation and physical mobility, alongside the impacts of virtual mobility for multitasking, are highlighted.

The following sections support this conceptual discussion with empirical analysis. Section 11.3 highlights the prevalence and importance of secondary activities, considering how multitasking alters the perception of time use and activity participation, for this sample. Section 11.4 considers the hypothesis, presented in Chapter 10, that the focus upon primary activities alone may explain the absence of a longitudinal effect. The analysis undertaken in Chapter 10 is repeated, to assess whether or not a longitudinal effect is apparent when secondary activities are considered. This analysis reveals no clear longitudinal trends. As such, the chapter turns to assess the impact of Internet use using a composite database, presenting analysis of activity participation by extent of Internet use. Next, differences in participation between those participating in activities online and those participating offline only are considered. The chapter concludes with an assessment of the importance of multitasking for this study.

11.2 What is multitasking?

11.2.1 Defining multitasking

The following definition of multitasking has been developed by the author for use in this research:

> Multitasking is the simultaneous conduct of two or more activities, during a given time period.

There is some debate about the extent to which individuals can *truly* multitask (Hungerford, 2001; Ironmonger, 2003)[2]. However, there can be little doubt that, *in the time episodes used in the majority of surveys*, individuals can and do combine activities, both actively and passively, naturally and in response to time pressure (Baron, 2005)[3].

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[2] Indeed, one psychotherapy (EMDR) is founded upon the principal that extensive cognitive multitasking is not possible (see www.emdria.org).

[3] The recognition of the existence of multitasking has implications for definitions of time, particularly for the construct 'clock time'. Thus, Robinson and Godbey (1997) discuss the 'deepening' of time, although it may be more useful to consider the broadening of time, such that time is seen as an horizontal, non-linear entity, rather than a vertical, linear entity. In this

This definition of multitasking informed the design of the accessibility diary. As detailed in Chapter 8, participants record multitasking within the context and time frame of their primary activity. This is to allow analysis of the nature of activities being 'twinned' during multitasking and summing of time spent in secondary activities, providing a number of means of assessing the nature of time 'gained' through multitasking. Accuracy in terms of the exact timing of multitasked activities was sacrificed in favour of reduced respondent burden. Thus, where participants record a secondary activity duration as ten minutes within a primary activity of 60 minutes, the accessibility diary does not provide information regarding when the multitasking took place within that time period, or if multitasking was a continuous activity – if it was conducted for a continuous 10 minutes or, for example, in two separate time periods of five minutes each. Participants were instructed to decide for themselves which activity is primary and which, when applicable, are secondary.

11.2.2 Multitasking: a brief literature review

The following review confirms the importance of secondary activities in every day life. It reveals fundamental flaws in our understanding of daily activity participation in society, with specific reference to online and travel activities and to the implications of multitasking for social exclusion.

Studies have shown that up to 95 percent of the population report multitasking each day (Hungerford, 2001). For approximately one third of the day, people report participating in more than one activity concurrently (ibid; also Bittman and Wajcman, 2000; Floro and Miles, 2001; Ruuskanene, 2004). There is consensus in the literature that failure to recognise multitasking has distorted the picture of popular time use, leading to a biased account of the amount of time that people devote to different activities. It can also lead to errors in measuring *change* in activity participation, suggesting substitution effects where in fact activities are *added* to daily life (Floro and Miles, 2003). In this sense, activity participation is no longer reduced to a zero sum game, in which the addition of an activity requires the subtraction of another. This has potentially important implications for debates regarding the impacts of Internet use upon wider activity participation.

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sense, each constituent of clock time has multiple parallel constituents, in which activity participation takes place. It is these parallel constituents of clock time that are considered when multitasking is recorded and analysed. For further discussion of the concept of time, which is outside the scope of this thesis, see initially Adam (1995).

The literature identifies the principal activities that individuals have recorded as secondary activities (and which have thus been underreported when only primary activities are considered) to be childcare, domestic work, passive leisure and communications activities. Thus, multitasked activities are 'important' – they are not trivial activities, but are both cognitive and social activities (Baron, 2005), which impact upon quality of life and life chances. In addition, multitasking is differentially distributed across the population. It is not clear from these studies if characteristics influence participants' *ability* or *desire* to multitask, or the *necessity* of multitasking. However, it is clear that propensity to multitask is linked to factors including age, educational attainment, employment status, gender, household lifecycle and income (Floro and Miles, 2003). Through analysis of multitasking, studies have revealed: the true extent of gender inequity in unpaid productive work, particularly through the study of childcare activities; the contamination of women's leisure time; the use of passive leisure to increase enjoyment of certain tasks; the productivity of elderly adults; and the impacts of multitasking for stress and well being. Through consideration of multitasking, these studies have revealed a greater extent of factors that potentially contribute towards social exclusion, including greater inequality in unpaid work than previously recognised, reduced leisure time and increased stress – yet they have also introduced the idea of positive contamination of activities, which may reduce exclusion. Thus, analysis of multitasking could expose greater exclusion in society than previously recognised, or greater inclusion, respectively.

None of the above studies incorporate consideration of the influence of Internet use upon multitasking (being primarily based upon data from the 1990s). The author has identified just three studies that do. Anderson and Tracey (2002) use multiple waves of a time diary study to suggest that the incorporation of secondary activities substantially alters the observed patterns of change, such that changes in activity participation that *appear* to be due to Internet use when primary activities alone are considered are reduced. Nie et al (2002) concede that their failure to consider multitasking is likely to have caused underestimation of Internet use and participation in social networks within their study, thus influencing their findings[4]. Thus, these studies suggest that changes in primary activity participation that are attributed to the displacement effect of Internet use in fact disappear when secondary activities are included in the analysis. Finally,

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[4] The authors do record secondary activities within their single-wave, 6-hour time diary study. However, they have yet to analyse these data. They explain this decision thus: 'We may be able ultimately to account for some of the apparent under-estimation by examining the secondary activities in our data – but that is a substantial task that will take us some time to accomplish' (Nie et al, 2002).

Robinson et al (2002) use a single-wave time diary study and find that Internet users multitask significantly more than non-users. Whilst no direct causality is attributed, the authors are clear in their suggestion that the Internet is a 'time enhancer'. In correspondence with the above studies, Robinson et al deny that Internet use has led to a decrease in existing activity participation. '[P]eople do not seem to be forced to give up other activities to accommodate it'. Rather, Internet use enables the more productive use of time, which we can assume is linked to its role in enabling multitasking.

Few studies to date have considered the phenomenon of multitasking whilst travelling. Rather, trips have traditionally been seen to constitute necessary but unproductive periods of time, functional only in their accessibility role. The travel activity has tended implicitly to be assumed to preclude other tasks being undertaken simultaneously. However, the following studies have been identified. In his single-subject ethnography, Laurier (2004) discusses the use of travel time by mobile workers, describing the multitasking undertaken whilst driving, including reading emails, arranging meetings and communicating with clients on the telephone. Whilst not suggesting that this level of multitasking is commonplace across the population, Laurier implies that it is widespread amongst mobile office workers. Bull (2003) considers the use of sound whilst travelling, highlighting the multiple roles of music during the journey and the use of travel time to communicate with others. Lyons and Urry (2005) discuss travel time use and identify a range of types of activities that can be conducted whilst travelling, with a focus upon travel by public transport. These studies highlight the increase in time use efficiency associated with multitasking on the move, as travel time and activity time are combined. This may reduce the exclusionary disbenefits of high levels of travel. Equally, however, the risk of exclusion for those without such travel time, those who are unable to effectively use their travel time, or to use multitask-compliant means of travel, may increase.

11.2.3 Multitasking, activity participation, physical mobility and virtual mobility

This thesis defines social exclusion as the process and consequence of exclusion from activity participation. The above review suggests that multitasking enables more activity participation per day. Thus, multitasking is likely to be of fundamental importance in the reduction of social exclusion.

There are a number of reasons for suspecting that virtual mobility may enable greater activity participation through multitasking and, thus, a reduction in social exclusion. The first relates to the Internet's ability to enable spatial and temporal co-presence of activities. A pre-requisite of multitasking is that the two or more activities must be co-present. An individual may undertake two activities simultaneously, but s/he cannot be in two locations simultaneously. A key opportunity stemming from Internet use, discussed in Chapter 4, arises from the ability to 'bring' activities to the individual, rather than the individual needing to physically travel to the activity. In this sense, virtual mobility can overcome spatial barriers to participation, enabling the spatial co-presence of activities. Chapter 4 also discussed the ways in which virtual mobility can overcome temporal barriers to participation, including the need for temporal co-presence. Thus, virtual mobility may enable the simultaneous conduct of multiple activities, both online and offline, at a single location and at a single time, where previously the locations would have been separated in space and time. For example, the spatial constraints upon activity participation that are associated with childcare could be overcome through multitasking from home, online, to allow communication, education, employment, or shopping to take place simultaneously, potentially decreasing aspects of (mobility-related) social exclusion.

Secondly, with regard to travel, should virtual mobility enable greater activity participation without recourse to increased physical mobility, through multitasking, this is likely to suppress future travel growth. In allowing concurrent activity conduct at one location, there may be less need for travel: multitasking may substitute for existing travel. This reduction in travel may in turn allow greater activity participation. The ability to conduct additional activities whilst travelling may further facilitate greater inclusion, through greater activity participation.

However, not all activities are amenable to multitasking; and there are caveats which will influence the inclusionary benefits of multitasking. This thesis suggests that the following attributes influence the degree to which activities can be multitasked: (1), the degree of locational dependence of the activity; (2), the necessary degree of continuity of engagement; and (3), the required degree of active or cognitive attention. *Locational dependence* refers to the extent to which activities must be undertaken at particular locations. Thus, *off*line grocery shopping cannot take place at the same time as preparation of a meal at home. However, *on*line grocery shopping could take place at home at the same time as preparing a meal, because of the reduced locational dependence of one of the activities (grocery shopping). This also illustrates the

importance of the degree of *continuity of engagement* in the possibility of multitasking. Preparing the meal is unlikely to require continuous use of time throughout but, rather, intermittent attention. Likewise, the time devoted to the task of online shopping can be intermittent. Thus, each is amenable to multitasking. Finally, considering the degree of *active or cognitive attention* required for the task, multitasking is more likely to be possible for activities requiring less active attention. Thus, Baron (2005) suggests that, whilst social activities are highly amenable to multitasking, cognitive activities are less so, because of the higher cognitive burden of such activities.

Therefore, whilst the importance of multitasked activities has been expressed in Section 11.2.2, it may be that multitasking as a response to spatial and temporal constraints is not appropriate for all activities. We should not assume that an activity is of equal quality when conducted polychronically. In addition, it should not be assumed that multitasking will necessarily have positive effects, for the secondary activity may negatively contaminate the primary activity, or the multiple conduct of activities may increase stress – the individual may be multitasking out of necessity, rather than choice. Furthermore, multitasking whilst travelling may lead to an increase in PMT/VMT. Should this encourage car use, or greater mobility by any mode, there may be negative social and transport policy consequences.

Finally, in their review of time use research from a transport perspective, Bhat and Koppelman (1999) suggest that all individuals have the same finite number of minutes in the day and, in so doing, implicitly suggest that time is the great equaliser – whilst we can buy and sell the use of time, in the form of labour, we can neither buy nor sell time itself. However, through the double counting of time through multitasking, individuals are, in fact, able to 'use' more than 24 hours in a day. It is therefore possible that new lines of inequality will emerge, structured by the ability to multitask.

11.2.4 Summary

The above discussions have introduced the concept of multitasking. It has been shown that failure to consider multitasking leads to a misrepresentation of activity behaviour and thus to a misrepresentation of change; and that multitasking may enable greater activity participation, which may in turn facilitate a reduction in social exclusion. Furthermore, it has been hypothesised that virtual mobility may facilitate greater multitasking and thus a reduction in mobility-related exclusion by facilitating the spatial and temporal co-presence of activities. However, a number caveats, including the

nature of the activities that can be multitasked, the quality of multitasked activities, potential social and transport impacts and differential access to multitasking, have been raised.

The review has demonstrated that it is reasonable to suspect that the perception of activity participation *and change therein* will alter when we consider multitasking. In addition, the perception of the role of the Internet in activity participation (and change) may be altered. This chapter now turns to consider the empirical evidence for these suppositions.

11.3 How prevalent and important is multitasking?

This section highlights the prevalence and importance of multitasking, supporting the hypothesis that inclusion of multitasking data alters our perception of activity participation and is therefore likely to influence the results discussed in Chapter 10. In so doing, the section also presents new analysis and discussion, which contribute towards the debate on the impact of virtual mobility upon personal travel and social exclusion.

The analysis was informed by the following aims.

(1) To assess the prevalence of multitasking.
(2) To assess the importance of multitasking for our understanding of activity participation.

11.3.1 The prevalence of multitasking

Multitasking is very common for this sample. All participants report multitasking at some stage, for every survey week. Table 11.1 shows the prevalence of multitasking, during each wave. Considering the average of the three waves, an incidence of multitasking (with at least one activity recorded in parallel with a primary activity) is recorded on all but 1.5 percent of participant days during the entire study[5].

Primary activity plus...	*Percent of days during which multitasking takes place* *Wave 1*	*Wave 2*	*Wave 3*
1 or more secondary activity	97.5	98.4	99.5
2 or more secondary activities	79.9	84.6	85.8
3 or more secondary activities	50.2	51.9	55.0

Table 11.1. Incidence of multitasking: percent of days during which multitasking takes place

Table 11.2 gives the mean number of minutes spent in secondary activities, per day, for each wave and for the composite sample. Table 11.2 shows that multitasking 'adds' on average more than seven hours to each day, totalling an addition of more than 50 hours to the average week. Thus, for this sample, multitasking 'adds' 30 percent more time to each day and 45 percent more time to each waking day[6].

	Mean minutes per day *Wave 1* (n=86)	*Wave 2* (n=88)	*Wave 3* (n=80)	*Composite sample* (n=96)
Secondary activity 1	286.8	313.9	323.9	307.3
Secondary activity 2	90.5	92.3	94.2	95.2
Secondary activity 3	34.7	27.8	31.9	32.4
Total	412.0	434.0	450.0	434.9
Total (hours)	6.9	7.2	7.5	7.2

Table 11.2. Mean number of minutes spent in secondary activities per day

As with the analysis of primary activities, reported in Chapter 10, this analysis reveals large variation in the number and duration of secondary activities recorded by each participant. This is highlighted in Table 11.3.

[5] Note: the treatment of missing data. On occasion, the number of minutes spent in secondary activities is missing. We cannot assume how many minutes have been spent in these activities. Therefore, the analysis does not include activities that are recorded with missing minutes.
[6] Calculated as all time in which the primary activity was not sleeping.

	Mean minutes per day			
	Mean	*Median*	*Mode*	*Standard deviation*
Secondary activity 1	307.3	285.0	165.0*	176.4
Secondary activity 2	95.2	66.7	0	95.3
Secondary activity 3	32.4	15.0	0	46.4
Total	434.9	398.3	195.0	274.4
Total (hours)	7.2	6.6	3.0	4.6

* Multiple modes exist. The smallest value is shown.

Table 11.3. Highlighting the variability in recorded multitasking for the composite sample (n=96)

Previous studies have highlighted differing tendency to multitask according to certain characteristics (Section 11.2.2). Results from this study are mixed, but comparisons between the mean number of minutes spent multitasking for different groups hint at differences between certain characteristics and propensity to multitask. Whilst the majority of these differences are not statistically significant[7], there are substantial differences in recorded multitasking, for the following groups.

Descriptive statistics suggest that multitasking increases with income; with the number of cars in the household; with the number of cars available; with frequency of car use; and may be related to residential location in terms of the availability of services in the local area. These variables may be linked, but multivariate statistical analysis to uncover such links is inappropriate for this sample. As such, these links cannot easily be probed. However, whilst recognising this, we can suggest that there may be a link between car use and an increase in multitasking. This may indicate a propensity to multitask whilst travelling; a role for the car in facilitating multitasking; or that those with greater need to multitask are drawn towards car use.

Analysis indicates that there may be a link between multitasking and age, with those aged 65 and above multitasking substantially less and those aged 45-54 multitasking substantially more than all other groups. This may be linked to the lifecycle. Descriptive statistics also link the presence of children in the household with increased multitasking. However, it is unclear why those aged 45-54, who may be expected to

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[7] One-way ANOVA were conducted on the composite sample, comparing the mean scores for total number of minutes spent multitasking for each of the key variables discussed in Chapter 9. Car use variable (daily, weekly, less than weekly) significant at $p<0.05$.

have older children, would be seen to multitask to a greater extent than those with younger children.

Finally, contrary to expectations and to findings reported in Robinson et al (2002), there is no evidence to suggest that virtual mobility, in terms of total time spent online (for the sample divided in two and into quartiles), Internet experience or mode of access to the Internet, is linked to an increase in total time spent multitasking. Robinson et al (2002) compared users and non-users and this difference may explain these findings, as may the sample size, composition and the variables used. There is also substantial deviation from the mean. However, if there is no difference in propensity to multitask by Internet use, the extent to which change in activity participation is absorbed through multitasking, as suggested by Anderson and Tracey (2002) and Nie et al (2002), may be called into question. Table 11.4 shows mean minutes spent multitasking for the variable 'time online'.

	Mean minutes per week	*Standard deviation*
1st quartile (0-77.5 minutes)	3209.3	2184.8
2nd quartile (77.6-175.8 minutes)	2915.3	1486.1
3rd quartile (175.9-328.8 minutes)	3149.1	1295.2
4th quartile (328.9+ minutes)	3044.1	1703.8

Table 11.4. Minutes spent in secondary activities per week, by weekly Internet use quartile (n=96)

If the propensity to multitask differs according to key characteristics, the effects (which could be both positive and negative) of multitasking are likely to be unequally distributed across society. However, the extent to which the variation revealed in Table 11.3 can be explained by characteristics or, rather, different completion strategies, is unclear. Focus group research into the usability of the accessibility diary revealed considerable variation in completion strategies, despite one-to-one tuition and the provision of instructions[8]. As highlighted above, participants were instructed to judge for themselves which activities they should record as primary and which are secondary – and therefore when to record a change in primary activity, or to retain the primary activity and record an additional activity. The discussions suggested that different individuals applied different rationale to identify the primary activity. In the main, these criteria were the degree of active attention and the length of the activity. However, the

accessibility diary does not record which of these criteria were used. In light of the variability recorded, the ambiguity introduced by this methodological approach may be considered to be a disadvantage in this study.

11.3.2 The importance of multitasking

The above discussion has considered the *propensity* to multitask, for this sample. The following discussion considers the *importance* of multitasking, in terms of its influence upon our understanding of the nature of activity participation.

Table 11.5 gives the mean time spent in primary and secondary activity participation for the key activities under consideration in this thesis. In light of the inter-wave parity in secondary activity participation (detailed in Table 11.2) and for ease of use, data are for the composite sample, rather than for individual waves.

	Mean minutes per week			
Activity	*Primary*	*Secondary*	*Primary plus secondary*	*Secondary activity time as % of primary activity time*
Education	160.3	10.4	170.4	6.5
Employment info.	6.7	8.0	14.7	119.4
Info. search	112.2	44.8	157.0	39.9
Paid work	1478.6	15.8	1494.4	1.1
Shopping	153.8	32.3	186.1	21.0
Social networks	594.0	1152.9	1746.9	194.1
All online activities	215.5	128.5	345.0	59.6
All travel activities	682.2	71.3	753.5	10.5

Table 11.5. Assessing the importance of multitasking: mean minutes per week spent in primary and secondary activities (composite database)

Table 11.5 begins to highlight the importance of multitasking, demonstrating the distorted picture of time use and activity participation that emerges when only primary activities are considered. The recording of multitasking is seen to increase the time spent in all activities. Most notably, time spent in social networks activities increases by almost 200 percent, reflecting the social element of many activities that isn't recorded when only primary activities are considered. Education and paid work

[8] The focus groups study is reported in more depth in Appendix 19.

activities appear rarely to be conducted as secondary activities, perhaps reflecting the degree of active attention needed for these tasks. Time spent shopping increases by over 20 percent; time in employment information search by 119 percent; and time in information search by 40 percent.

The recording of time spent travelling increases by more than 10 percent when secondary activities are considered. This suggests that travel is being substantially underreported when studies only consider travel as a primary activity, supporting the above claims for the importance of secondary activities for travel behaviour research. Finally, recorded online time increases by 60 percent when secondary activities are considered. Online time is underreported by 37 percent when only primary activities are considered. Therefore, studies that examine the impacts of Internet use upon travel and society are likely to be flawed in their conclusions, if they record primary activities alone, because the amount of Internet use recorded is substantially underestimated.

In addition to changing our perception of the *amount* of time that participants spend in each activity, consideration of multitasking also changes our perception of the *proportion* of the day that is devoted to different tasks. Social networks activities become the most prevalent activity, of those considered. Paid work and travel are seen to be less prevalent; shopping, more so.

It is notable that the activities in which time use is most underreported when primary activities alone are considered are those that are fundamental to the travel substitution/sociability debates. The above results suggest that the failure of the studies reported in Chapter 4 to take secondary activities into account is likely to have influenced their conclusions. This becomes even clearer when we consider that multitasking does not appear to be randomly distributed across activity types. Rather, different activities appear to be more amenable to being secondary activities. This is indicated in Table 11.5. Social networks activities are the most multitasked activities (of those considered); paid work, the least. Furthermore, different primary activities, in terms of both the activity type and the online/offline status, appear to be more amenable to having additional activities appended. This is indicated in Table 11.6, which illustrates that the tendency to multitask is heavily influenced by the nature of the primary activity. Thus, primary social networks activities are the most likely to be twinned with secondary activities. Online primary activities are more likely to be multitasked than offline primary activities, for the majority of activities. This suggests

that the type of primary activity, including its offline/online status, influences the ability to multitask and/or the desirability of multitasking, therefore influencing the likelihood that multitasking will take place.

Because of the need to associate primary and secondary activities, the composite database could not be used for this analysis. Therefore, Table 11.6 presents wave 1 data only[9].

	Secondary activity time as a percentage of primary activity time		
Primary activity type	*Total time*	*Primary is offline*	*Primary is online*
	%	*%*	*%*
Education	23.0	20.8	63.3
Employment info.	52.0	28.9	66.7
Info. search	42.5	38.8	45.3
Paid work	28.4	28.4	-
Shopping	36.3	32.4	57.9
Social networks	56.3	58.9	38.6
All online activities	44.7	-	44.7
All offline activities	28.1	28.1	-
All offline activities excl. sleeping	42.8	42.8	-
All travel activities	60.0	60.0	-

Table 11.6. Percentage of primary activity time involving multitasking, by activity category and offline/online status (wave 1) (n=86)

Table 11.6 takes the total time spent in secondary activities whilst participating in each primary activity. It then calculates this secondary activity time as a percentage of time spent in the primary activity[10]. Thus, up to a third of time spent shopping is multitasked. Up to 56 percent of time spent in social networks is multitasked. Substantial differences in the propensity to multitask for offline and online activities emerge. When education is undertaken online, it is up to three times as likely to be multitasked as when it is undertaken offline. Online shopping is 25 percent more likely to be

[9] Results for waves 2 and 3 did not show substantial difference and as such are not presented here.

[10] Note: this table does *not* suggest that 23 percent of time spent in education activities is spent multitasking, rather that *up to* 23 percent of time spent in education is spent multitasking. As discussed in Section 12.2.1, the diary structure does not tell us if the secondary activities are occurring concurrently or in sequence. Therefore, we cannot calculate the percentage of

multitasked than offline shopping. A possible reason for this is the reduced degree of locational and temporal dependence of these online activities, vis-à-vis their offline counterparts, highlighted in Section 11.2.3, which enables simultaneous activity participation. Should multitasking be considered desirable, this may attract a substitute shift from offline activities to online and, where offline activities are associated with travel, from physical mobility to virtual mobility. Furthermore, this may suggest greater inclusionary benefits of virtual mobility-enabled activity participation, again vis-à-vis the offline activity, in light of the opportunity for greater activity participation, if we perceive secondary activities to be fulfilling a latent demand for activity participation.

However, this pattern is not observed for all activities. Offline social networks activities are 20 percent more likely to be multitasked than those undertaken online. This may reflect the degree of active attention required for online social networking, vis-à-vis offline social networking. In addition, considering the data for all online activities and all offline activities excluding sleeping, whilst online activities are on the whole multitasked more than offline activities, the difference is less pronounced than for the individual activities discussed above. This latter data further reinforces the importance of disaggregating 'Internet use' into its activity-specific parts, if we are to fully understand its impacts.

Table 11.6 reveals that up to 60 percent of travel time is multitasked, further reinforcing the importance of multitasking for travel behaviour research. Considering the impacts of virtual mobility upon travel, if we assume that multitasking is desirable, this may act as a barrier to the substitution of physical for virtual mobility, or the substitution of increased physical mobility. This is particularly so when we compare the prevalence of multitasking whilst travelling and whilst online (60:45, respectively). Considering Hypothesis (2), should online activities be less amenable to multitasking than travel, the requirement that virtual mobility provide the same functions as physical mobility may not be realised, therefore reducing is ability to reduce mobility-related exclusion[11].

Not only is the tendency to multitask heavily influenced by the nature of the primary activity, analysis also suggests that the type of secondary activity is influenced by the primary activity. Perhaps unsurprisingly, online primary activities are more likely than offline activities to be paired with online secondary activities. Around a quarter of total

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activity time that is multitasked, only the sum of the three secondary activity durations as a percentage of the primary activity duration.

[11] This conclusion will be influenced by the nature and importance of the secondary activity, which is not assessed here.

secondary activity time is spent in online activities, when the primary activity is online, compared to around four percent of time when the primary activity is offline[12]. There is also evidence to suggest that different secondary activities have a greater tendency to be paired with different primary activities.

11.3.3 The prevalence and importance of multitasking: summary

The above discussion has highlighted the importance of multitasking for travel behaviour and social exclusion research. The analysis has demonstrated that *our perception of activity participation alters substantially when we consider secondary activity participation.* Multitasking is highly prevalent, reported by almost all participants on every diary day. It 'adds' on average 45 percent more time to each waking day. This said, there is substantial variation in reported multitasking. Furthermore, *individual characteristics may influence propensity to multitask.*

The recording of multitasking is seen to increase the amount of time spent in *all* activities. In addition, consideration of multitasking also changes our perception of the proportion of the day that is devoted to different tasks. Different primary activities, in terms of both the activity type and the online/offline status, appear to be more amenable to having additional activities appended. The nature of the primary activity also influences the nature of the appended activity; and different activities have differing propensity to be secondary activities. Whilst total time spent online is not observed to influence propensity to multitask, a higher propensity to multitask during online activities than during offline activities suggests that *virtual mobility may facilitate greater activity participation, through multitasking.*

This analysis has supported the hypothesis that consideration of multitasking alters understanding of activity participation. Furthermore, in light of the differing propensity to multitask by activity type, including offline/online status, the analysis has confirmed that *the failure to consider multitasking is likely to distort the picture of the influence of Internet use upon activity participation.* From this, it is suggested that consideration of multitasking may be expected to influence our understanding of change in activity participation.

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[12] Figures are an average of the three waves.

The diaries provide a wealth of data on multitasking. However, further analysis in this vein is not the main focus of this thesis. As such, having demonstrated the prevalence and importance of secondary activities, this chapter now turns to integrate the multitasking data, to allow examination of the influence of multitasking upon the findings presented in Chapter 10.

11.4 Examining change: over time

Section 11.3 has confirmed that our perception of people's activity participation alters when we consider multitasking. This section considers whether or not our perception of *change* in activity participation alters when multitasking is taken into account.

As in Chapter 10, initial analysis sought to uncover inter-wave change in participation in key activities over time. Through examination of the change in minutes per week spent in each activity, as both offline, online and total time, the intention was to observe emerging patterns that might indicate the impacts of online activity upon offline and total activity participation. Thus, the following key questions informed this stage of the analysis:

(1) Is there evidence of a significant change in activity participation, between reference weeks, once secondary activities are incorporated into the analysis?
(2) Is there evidence to suggest an effect of Internet use upon participation in key activities, over time, once secondary activities are incorporated into the analysis?

The analysis below sums the time spent in each key activity, as both primary and secondary activity. It is recognised that this approach is at odds with much of the time use research presented in Section 11.2, which creates extended activity codes for each additional secondary activity, to prevent the suggestion that there are more than 24 hours in a day[13]. A number of factors prohibited this approach in this study, including the following.

- The number of activity categories. As discussed in Chapter 10, this would result in an unmanageable 58 million unique codes.

[13] For this study, talking to a friend on the telephone whilst listening to music, cooking dinner and performing childcare would result in a four-stage activity code: C2-E8-H3-H5.

- The diary structure. As discussed in Section 11.2.1, it is not possible, in this study, to suggest concurrent conduct of secondary activities. Therefore, we cannot associate secondary activities with each other, only associate them with the primary activity.
- The study aims. This study does not aim to produce a definitive account of time use, rather to advance theory regarding the interaction of virtual mobility, personal travel and social exclusion. The summing of total time spent in each activity is considered to be both a sufficient and superior option in achieving this aim.

Descriptive statistics were generated for the whole sample, for each key activity category and, within this, for total, offline and online participation. Table 11.7 gives descriptive statistics for each key activity, across the three waves. Sample means were plotted as line charts, to assist in the identification of trends (Figs. A18.1-A18.7). Paired samples t-tests were carried out to support the descriptive analysis, to indicate the statistical significance of observed difference between the waves[14].

[14] Descriptive statistics were generated for all activities and subgroups. Tables and figures are only included in this thesis where this is judged to add substantial value to the text.

Activity	*Type*	*Wave*	*Mean*	*Median*	*Mode*	*Std. Dev.*	*Skew*	*Kurtosis*
Education	Total	w.1	166.2	0	0	484.5	3.4	10.7
		w.2	172.5	0	0	537.3	3.8	15.4
		w.3	198.1	0	0	594.2	3.3	9.6
	Offline	w.1	152.9	0	0	447.9	3.4	11.2
		w.2	164.4	0	0	524.2	4.0	16.4
		w.3	185.9	0	0	565.9	3.2	9.4
	Online	w.1	13.3	0	0	60.1	5.2	27.3
		w.2	8.1	0	0	31.2	4.8	24.5
		w.3	12.3	0	0	37.7	3.5	12.7
Employment information	Total	w.1	7.9	0	0	25.4	3.9	16.4
		w.2	16.5	0	0	70.6	5.7	36.8
		w.3	15.0	0	0	64.6	6.9	52.3
	Offline	w.1	4.6	0	0	16.5	4.0	17.1
		w.2	4.7	0	0	27.1	6.6	46.5
		w.3	0.5	0	0	3.2	7.0	51.5
	Online	w.1	3.3	0	0	13.5	5.4	33.1
		w.2	11.8	0	0	49.7	4.8	22.9
		w.3	8.6	0	0	30.6	4.6	23.2
Information search	Total	w.1	177.1	110.0	0	203.7	1.9	3.8
		w.2	188.2	75.0	0	259.0	2.0	4.1
		w.3	184.5	95.0	0	249.6	2.1	4.9
	Offline	w.1	81.6	15.0	0	127.1	2.0	3.5
		w.2	81.1	10.0	0	171.7	3.7	16.4
		w.3	74.2	10.0	0	126.8	2.2	4.3
	Online	w.1	95.5	55.0	0	143.4	3.1	12.0
		w.2	107.2	35.0	0	165.2	2.3	5.9
		w.3	110.3	30.0	0	178.4	2.3	5.4
Paid work	Total	w.1	1564.8	1650.0	0	1090.6	.2	-.6
	Total	w.2	1377.0	1635.0	0	1118.4	.3	-.6
	Total	w.3	1343.8	1295.0	0	1043.6	.1	-1.1
Shopping	Total	w.1	192.6	165.0	105.0	129.2	.9	.2
		w.2	199.6	200.0	150.0*	115.5	.3	-.3
		w.3	178.6	155.0	0*	142.9	1.4	2.7
	Offline	w.1	162.0	145.0	105.0	116.0	1.3	1.5
		w.2	174.8	183.0	215.0	99.7	0	-.7
		w.3	157.0	145.0	0*	128.3	1.5	3.8
	Online	w.1	30.6	0	0	53.6	2.8	9.3
		w.2	24.8	0	0	52.8	2.8	8.9
		w.3	21.6	0	0	46.0	2.8	7.9
Social networks	Total	w.1	1494.4	1297.0	1880.0	1030.4	1.1	1.7
		w.2	1745.7	1635.0	1205.0*	1077.4	1.5	4.8
		w.3	1644.8	1665.0	168.0	989.4	.4	-.3
	Offline	w.1	1348.1	1160.0	245.0	1020.3	1.2	1.8
		w.2	1583.8	1425.0	1425.0	1064.1	1.6	5.2
		w.3	1487.8	1428.0	800.0*	986.0	.5	-.4
	Online	w.1	146.3	100.0	120.0	152.8	2.0	4.2
		w.2	161.8	105.0	0	196.8	1.8	3.2
		w.3	157.0	105.0	0	222.3	3.2	11.9
All online activities	Total	w.1	293.9	225.0	140.0*	243.2	1.4	1.6
	Total	w.2	261.1	165.0	0	300.9	2.3	6.9
	Total	w.3	367.7	315.0	0	314.7	1.2	1.1
All travel activities	Total	w.1	695.7	671.0	215.0*	371.6	.5	.2
	Total	w.2	754.0	725.0	800	415.0	1.4	3.8
	Total	w.3	687.6	705.0	235.0	341.1	.2	.3

* Multiple modes exist. The smallest value is shown.

Table 11.7. Mean total minutes in key activities per week (n=69)

Comparing Table 11.7 with Table 10.2, we can see the difference that the inclusion of secondary activities makes to our perception of activity participation, with more minutes recorded in all activities in every wave (except paid work), most notably social networks. However, as in Chapter 10, few inter-wave differences are statistically significant and, where significant differences are noted, these are not part of a consistently significant trend[15]. Furthermore, the descriptive statistics and the line charts fail to suggest clear trends over time, for any of the activities considered. Therefore, for this sample, there is no identifiable longitudinal trend for the unit of measurement considered and for the timeframe of this study. As with analysis of primary activities, it is not possible, with this dataset, to infer relationships between Internet use and activity participation, for the activities considered, through longitudinal analysis. As discussed in Section 11.2.2, Anderson and Tracey (2002) report (and Nie et al (2002) hypothesise) *reduction* in observed change when multitasking is considered. Therefore, perhaps this result is not entirely unexpected.

In light of the similarity in longitudinal data trends between Table 10.2 and Table 11.7, this chapter does not repeat the discussion of the longitudinal analysis that is given in Chapter 10. The sole amendment to the discussion concerns the hypothesis in Section 10.3.6 that consideration of secondary activities may influence the longitudinal findings. For this study and for this sample, this has been proven not to be the case. Similarly, the analysis by key variables fails to reveal either a substantial or significant inter-wave difference, for any activity, for any of the variables[16]. Rather, strong and significant correlations between the waves are observed and the trends observed for the whole sample are repeated. Given that these findings parallel those reported in Section 10.3.3 and 10.3.4, discussion is not repeated here.

11.5 Examining change: exploring difference

As demonstrated above, inter-wave change has not been observed, despite the incorporation of secondary activities into the analysis. In consequence, as in Chapter 10, the analysis moves to consider the influence of Internet use upon activity participation through the analysis of difference between subgroups, grouped according to their Internet use, using a single (composite) database. The two approaches to the

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[15] Paid work: w1-w2 significant at $p<0.1$; w1-3 at $p<0.05$. Social networks: w1-w2 significant at $p<0.05$. Online activities: w1-w3 significant at $p<0.05$; w2-w3 at $p<0.01$.
[16] Analysis used descriptive statistics and paired samples t-tests, significance considers $p<0.1$. Key variables are as in Chapter 10 and include analysis by online/offline participation.

assessment of the influence of Internet use upon activity participation discussed in Sections 10.4.3 and 10.4.5 in relation to primary activities are repeated. In the first, analysis of activity participation is by extent of Internet use, in terms of total weekly time spent online. In the second, differences in participation between those participating in activities online and those participating offline only are considered.

11.5.1 Considering the influence of online participation: disaggregating the sample by extent of Internet use

Table 11.8 breaks the sample into quartiles, defined by the extent of Internet use during the study period and shows the mean minutes per week spent in each key activity, as total, offline and online participation. Table 11.9 considers the statistical significance of differences in participation between each subgroup, using independent samples t-tests. Should there be differences in activity participation, influenced by participants' total time online, this would be expected to be evident in these tables.

Table 11.8 shows that the quartiles used in this analysis are different to those used in Chapter 10, because secondary activities are included. That one third of participants change quartiles when Internet use as a secondary activity is included further highlights the importance of multitasking in our understanding of online behaviour.

Activity	*Status*	*Mean minutes per week, by subgroup*			
		1st quartile (n=24)	*2nd quartile (n=24)*	*3rd quartile (n=24)*	*4th quartile (n=24)*
Education	Total	72.6	271.7	180.2	157.2
	Offline	71.4	257.3	166.7	146.2
	Online	1.3	14.4	13.4	11.0
Employment information	Total	5.0	7.1	18.5	28.1
	Offline	1.5	0.5	6.9	3.0
	Online	3.5	6.5	11.6	25.1
Information search	Total	68.3	100.6	229.2	257.5
	Offline	40.4	50.7	87.9	90.3
	Online	27.9	49.9	113.6	167.2
Paid work	Total	1424.3	1506.4	1428.4	1618.6
Shopping	Total	174.0	190.7	220.2	159.4
	Offline	161.2	165.9	192.2	131.2
	Online	12.8	24.8	28.0	28.2
Social networks	Total	1657.8	1470.1	1833.3	2026.3
	Offline	1625.7	1388.6	1663.7	1714.7
	Online	32.1	81.5	169.7	311.0
All online activities	Total	90.5	220.2	393.2	676.1
All travel activities	Total	731.7	666.1	843.8	772.4

1st quartile: 0-168.3 minutes per week. 2nd quartile: 168.4-315.3 minutes per week. 3rd quartile: 315.4-483.8 minutes per week. 4th quartile: 483.9+ minutes per week.

Table 11.8. Assessing the effect of extent of Internet use upon activity participation (mean minutes per week)

Activity	*Status*	*Difference in mean minutes per week between quartiles, with indication of statistical significance*					
		1 – 2	*1 – 3*	*1 – 4*	*2 – 3*	*2 – 4*	*3 – 4*
Education	Total	199.1	107.6	84.6	-91.5	-114.5	-23.0
	Offline	185.9	95.3	74.8	-90.6	-111.1	-20.5
	Online	13.1*	12.1**	9.7	-1.0	-3.4	-2.4
Employment information	Total	2.1	13.5	23.1*	11.4	21.0*	9.6
	Offline	-1.0	5.4	1.5	6.4	2.5	-3.9
	Online	3.0	8.1	21.6	5.1	18.6	13.5
Information search	Total	32.3	160.9***	189.2****	128.6**	156.9***	28.3
	Offline	10.3	47.5	49.9***	37.2	39.6	2.4
	Online	22.0*	85.7****	139.3****	63.7***	117.3****	53.6
Paid work	Total	82.1	4.1	194.3	-78.0	112.2	190.2
Shopping	Total	6.7	46.2*	-14.6	29.5	-31.3	-60.8**
	Offline	4.7	31.0	-30.0	26.3	-34.7	-61.0**
	Online	12.0	15.2*	15.4	3.2	3.4	0.2
Social networks	Total	-187.7	175.5	368.5	363.2	556.2**	193.0
	Offline	-237.1	38.0	89.0	275.1	326.1	51.0
	Online	49.4****	137.6****	278.9****	88.2****	229.5****	141.3****
All online activities	Total	129.7****	302.7****	585.6****	173.0****	455.9****	282.9****
All travel activities	Total	-65.6	112.1	40.7	177.7*	106.3	-71.4

*p<.1. ** p<.05. *** p<.01. **** p<.001 or less.

Table 11.9. Assessing the effect of extent of Internet use upon activity participation: difference in mean minutes per week between subgroups, with indication of statistical significance

The data presented in Tables 11.8 and 11.9 suggest that there are significant differences in activity participation between the subgroups, for some activities. Comparison with Tables 10.5 and 10.6 reveal few differences. Therefore, whilst (in the main) the total number of recorded minutes spent in each activity for each subgroup increases, the trends identified in Chapter 10, both in terms of the descriptive statistics and the results of the significance testing, persist. Two differences are observed, in which an observed difference in participation by extent of Internet use is reduced when multitasked activities are incorporated: online shopping; and total social networks activities.

Considering *online shopping*, the addition of secondary activities alters the primary activities findings. Chapter 10 reported statistically significant differences in online participation between quartile 1 and quartiles 2, 3 and 4, raising the possibility of a

'threshold' amount of Internet use, beyond which participants are more likely to engage in online shopping. This trend is observed in Table 11.8, but differences are not statistically significant. This finding supports Anderson and Tracey (2002), in reducing observed change in participation, which may be attributed to Internet use, when secondary activities are incorporated. Considering *total social networks* activities, the overall trend remains that of an increase in participation with increasing time online. When primary activities are considered, as reported in Table 10.6, people in the highest quartile spend significantly more time in total social networks activities than do those in quartiles 1, 2 and 3. However, this difference is not significant when multitasking is considered. As above, this supports Anderson and Tracey (2002).

Therefore, with two exceptions, the data continue to fail to support the hypothesis that the amount of time that an individual spends online has a substantial or significant influence upon their activity participation. The first exception is for information search activities, where participation increases significantly and substantially with the extent of time spent online. The second is for social networks activities online, for which the same is observed. For these activities, it is reasonable to conclude that virtual mobility is positively associated with increased activity participation, offline, online and in total. Furthermore, it remains the case that there is no evidence to support an association between time online and a decline in sociability; and that there is no evidence to support an association between time online and travel time.

As in Chapter 10, the possible influence of external factors was explored. The composition of each quartile was probed, relative to the key variables, to assess whether or not there are substantial differences in their composition. Whilst one third of participants change quartiles when Internet use as a secondary activity is included, this does not substantially alter the *profile* of the subgroups, relative to the key variables. Furthermore, for the variables considered, there are no substantial or consistent differences between the subgroups. Therefore, it is considered to be unlikely that the results have been influenced by other measured variables.

11.5.2 Considering the influence of online participation: within-activity differences

Section 11.5.1 has considered the first strategy for probing the relationship between virtual mobility and activity participation. This section considers the second strategy:

assessing the differences in total and offline participation rates for those participating offline only and those participating online, within each activity. Table 11.10 gives the mean time per week spent in each activity, as primary and secondary activity, for subgroups 'those participating in the activity', 'those participating offline only' and 'those participating online'. Table 11.10 also details the difference, in minutes and as percentage change, between those participating offline only and those participating online, with indication of statistical significance, the latter derived from independent samples t-tests.

Activity	*Status*	*Mean minutes per week, by subgroup*			*Difference*[1]	
		All participating	*Subgroup 2: offline only*	*Subgroup 3: online*	*(mins)*	*(%)*
Education	Total	419.4	107.9	867.2	759.3****	703.7****
	Offline	394.8	107.9	807.1	699.2***	648.0***
	Online	24.7	0	60.1	60.1****	#****
	n =	*39*	*23*	*16*		
Employment information search	Total	48.5	26.1	51.1	25.0	95.8
	Offline	9.9	26.1	8.0	-18.1*	-69.3*
	Online	38.7	0	43.1	43.1	#
	n =	*29*	*3*	*26*		
Information search	Total	171.2	55.3	186.1	130.8****	236.5****
	Offline	73.4	55.3	75.8	20.5	37.1
	Online	97.8	0	110.3	110.3****	#****
	n =	*88*	*10*	*78*		
Shopping	Total	186.1	155.7	211.8	56.1***	36.0***
	Offline	162.6	155.7	168.5	12.8	8.2
	Online	23.5	0	43.3	43.3****	#****
	n =	*96*	*44*	*52*		
Social networks	Total	1746.9	1879.3	1734.8	-144.5	-7.7
	Offline	1598.2	1879.3	1572.6	-306.7	-16.3
	Online	148.6	0	162.1	162.1****	#****
	n =	*96*	*8*	*88*		

[1] Percentage increase in time spent in activity if participate online as well as offline (subgroup 3), as opposed to offline only (subgroup 2).
Cannot calculate percentage change from zero.
*p<.1. ** p<.05. *** p<.01. **** p<.001 or less.

Table 11.10. Mean duration of activity participation per week, by nature of participation, with indication of statistical significance

Considering primary activities, the analysis revealed the following.

- Those participating online exhibit significantly different behaviour to those who do not participate online.
- Online participation is associated with significantly more total activity participation for education, information search, shopping and social networks activities.
- For education activities, online participation is also associated with significantly more offline activity participation.

In the main, this is also the case when secondary activities are incorporated into the analysis. Whilst there are differences in the percentage difference observed – there is less difference in participation between the groups for education and shopping activities, with greater difference in information search activities – these differences are not significant and do not challenge the above conclusions. However, the significant difference in total participation in social networks activities between the two groups is no longer observed. Rather, those participating online are observed to participate 20 minutes per day less in total social networks activities than those participating offline only, although this difference is not statistically significant. This result follows the 'normalising' effect of secondary activities, identified by Anderson and Tracey (2002) and discussed in Section 11.5.1. Additionally, whilst these results continue to oppose the suggestion that Internet use damages sociability, the claim that Internet use increases sociability, made in Chapter 10, is challenged by these findings.

The above findings were considered in relation to the subgroups identified in Chapter 9. The results compliment the findings presented in Chapter 10 and as such are not reported here.

11.5.3 Section summary: examining change by exploring difference

Following the lack of an observable inter-wave change, despite the incorporation of secondary activities into the analysis, Section 11.5 has considered the influence of Internet use upon activity participation through the analysis of difference between subgroups, grouped according to their Internet use, using a single (composite) database. The two approaches to the assessment of the influence of Internet use upon activity participation discussed in Sections 10.4.3 and 10.4.5 in relation to primary activities were repeated.

The analysis revisited the questions posed in Chapter 10:

(1) Is Internet use associated with an increase activity participation?
(2) Is Internet use associated with any negative mobility or social effects?

Considering the first analytical approach, with few exceptions, the results mirror those in Chapter 10. In respect to question (1), for the majority of activities, the data fail to support the hypothesis that the amount of time that an individual spends online has a substantial or significant influence upon their activity participation in the activities considered in this analysis. The observation that total and online participation in social networks activities increases significantly and substantially with the extent of time spent online is negated with the incorporation of secondary activities.

Considering the second, activity-specific analytical approach, in respect of question (1), this analysis concludes that those participating online exhibit significantly different behaviour to those who do not participate online. Online participation continues to be associated with significantly more total activity participation, for the majority of activities. However, the incorporation of secondary activities into this analysis affects the findings with regard to social networks activities: the inclusion of secondary activities reduces the positive effects of Internet use for sociability that were observed in Chapter 10.

Therefore, *total time online* is not seen to influence activity participation, but online participation *does* influence activity participation, in the majority of activities considered above. The inclusion of secondary activities in the analysis is observed to *normalise* the effects of Internet use for sociability.

Considering question (2), it remains the case that there is no evidence, from this analysis, to associated Internet use with negative mobility or social effects.

11.6 Conclusions

To conclude, this section reflects upon the objectives listed in Chapter 7 and considers the following questions:

(1) What does the analysis of secondary activities reveal with regard to the hypotheses?
(2) How important is multitasking, for this thesis and for the field of study?
(3) What are the methodological lessons?[17]

Hypothesis (1) suggests that virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion. In the main, the inclusion of secondary activities in the analysis does not alter the findings presented in Chapter 10. Therefore, the analysis continues to suggest that, for many activities, virtual mobility is providing additional access to activity participation. There is a clear association between Internet use and an increase in activity participation, for the majority of activities considered. Considering Hypothesis (2), which is concerned with the quality of online activities and the possible negative social and transport effects of virtual mobility, the analysis reinforces the findings in Chapter 10. Internet use is not associated with negative mobility or social effects. Thus, the inclusion of secondary activities may have produced a more accurate picture of activity participation but, in respect to the key questions under consideration in this thesis, this has not greatly influenced the results.

In light of the similarity of the results, the importance of multitasking for this thesis and for the field of study may be questioned. However, despite the similarity in the findings, this Chapter has, through the unique application of a body of literature to the field, original conceptual discussion and the novel empirical results given in Section 11.3, proven the importance of the consideration of multitasking. Multitasking is prevalent and it is important. It is not randomly distributed. Rather, certain activities are more likely to have activities appended; and certain activities are more likely to be appended. There are some activities, for example paid work, for which the inclusion of secondary activities is not important in our understanding of the true extent of activity participation. However, for others, including travel, Internet use and social participation, the extent of and, therefore, reasons for and changes in, participation cannot be fully understood without consideration of multitasking. Furthermore, given that online activities are more

likely to be multitasked than offline activities, the analysis supports the suggestion that virtual mobility is likely to facilitate greater activity participation, through multitasking.

There are clear implications for the field of study. Considering travel behaviour research, given that the failure to consider multitasking leads to the underreporting of key activities, it follows that only accounting for the primary activity will distort the picture of daily activity behaviour and thus of motivations for travel. Similarly, there are implications for research into the impacts of Internet use upon activity participation and travel; and for social exclusion research, in light of the differential experience of multitasking, in terms of both the ability to multitask and the effects (positive and/or negative) of multitasking.

Therefore, that the findings parallel those for the analysis of primary activities alone does not negate the importance of multitasking. However, a number of methodological questions have been raised during the analysis, concerning the efficacy of the accessibility diary in recording multitasking and in providing data that can be effectively analysed.

Participants were instructed to decide which activity was primary themselves. Instructions to this end were not provided, to allow the diary to reflect respondent experiences of the activities that they were undertaking and to reduce the cognitive burden. As discussed in Section 11.3.1, participants used different strategies to decide which activities were primary and which secondary, with some presenting the primary activity as that which took the most active attention, others, that which took the most time. The effect of this ambiguity upon the results reported above is unknown. However, it is likely that the substantial variability in recorded multitasking could be reduced by more precise instructions regarding the coding of activities as primary or secondary. Whilst this would be likely to affect the cognitive burden of the diary instrument, further research that has multitasking as its primary focus should aim to reduce the ambiguity noted in this research.

Because of the diary structure, this analysis has been unable to directly associate primary and secondary activities. Therefore, it has not been possible to fully assess the attributes which make multitasking possible, or desirable, nor has it been possible to assess the influence of multitasking upon mode of access. Thus, Section 11.3.2

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[17] As above, this section avoids repetition of the discussion provided in the concluding section of Chapter 10.

reveals that up to 60 percent of travel time and 45 percent of online time is multitasked, raising the question of whether or not this may act as a barrier to the substitution of physical for virtual mobility, or the substitution of increased physical mobility. More precise recording of the nature of the activities that are twinned with each may assist in the understanding of the importance of the multitasked activities and their influence upon the mode of access. Future studies may wish to impose a clearer structure upon the recording of multitasking. This would, however, substantially increase the complexity of the diary instrument, with attendant effects for data quality and attrition.

Gershuny and Sullivan (1998), in their commentary on time use research, suggest that the failure to properly account for polychronic time use and the analysis of time as though it were monochronic is a key weapon in the armoury of its critics. However, the authors continue to suggest that the exclusion of multitasking from time use studies is understandable in light of the complexity of the resulting datasets and analyses. This chapter has reported the results of a study which embraces the complexity of time use within the study of activity participation and the influence of Internet use thereon. The above literature review, conceptual discussion and empirical analysis have justified the inclusion of multitasking in this study. Whilst some concern regarding the efficacy of the methodology has been expressed, this study has produced valuable conceptual, empirical and methodological findings, contributing towards understanding in the field of study on each of these levels.

Part 4. Discussion and conclusions

Chapter 12. Summary and discussion

12.1 Introduction

At the outset of this research, two fields of transport research were in the ascendant. The first reflected technological change, considering the growth of a new information and communications technology and its impacts for transport systems and travel behaviour. The second reflected social change, considering the growth in inequality and disadvantage in society and the contribution of transport systems and travel behaviour to the same. The author recognised a potential link between the two: that the substitution of the need to travel through the provision of an alternative mode of access to activity participation, hypothesised in the first field of research, could alleviate the disadvantage caused by too little/too much physical mobility, identified in the second.

The research reported in this thesis has sought to investigate this potential link, exploring the hypothesis that virtual mobility, via the Internet, could provide a viable alternative to physical mobility in reducing mobility-related social exclusion. This thesis has presented conceptual, empirical and methodological investigation and analysis, to this end. This penultimate chapter summarises the research, before introducing discussion of the key findings, considering the hypotheses, other technical findings and methodological challenges. The chapter assesses the contribution of this research to the field(s) of study, before concluding with a discussion of the next steps for research in this area, considering further applications of the datasets and further avenues for the research.

12.2 Thesis summary

Part 1 of this thesis detailed the conceptual framework for this study. Chapter 2 reviewed the social exclusion literature, considering its definition, dimensions and measurement. It emerged that no single definition, or conceptualisation through dimensions, adequately represented the author's understanding of the concept. In consequence, a new definition of and dimensional framework for social exclusion were presented. The definition has as its focus the denial of access to activity participation;

the nine dimensions, aspects of daily life from which exclusion from activity participation can originate and/or be manifested. In addition to providing the theoretical framework underlying the research, the definition and dimensions provide new insights into the concept of social exclusion, contributing to the theoretical debate and providing a framework within which policy can be situated.

The definition and dimensions developed in Chapter 2 structured the debate in subsequent literature review chapters, informing the hypotheses and therefore the design, conduct and analysis of the empirical research. Chapter 3 focused upon the mobility dimension to social exclusion, exploring the concept more fully to illustrate the role that mobility can play in both causing and reinforcing social exclusion. The literature review identified two discourses, which have shaped research into mobility-related social exclusion. The recognition of the twin discourses of too little and too much mobility is fundamental to this thesis. An increase in mobility to alleviate mobility-related exclusion is seen as counter-productive. Therefore, solutions to mobility-related exclusion must be those which increase activity participation, without an increase in mobility. This premise represents a new insight into the phenomenon, informing the definition of mobility-related exclusion developed for this research and shaping the hypotheses and empirical research.

Chapter 3 continued to consider the causes and consequences of mobility-related exclusion, situating the concept within the nine dimensions of social exclusion and assessing policy responses in light of the conceptual framework for mobility-related exclusion, outlined above. This led naturally to the discussion of virtual mobility as a solution, enabling access to activity participation without recourse to physical mobility by the individual undertaking the activity.

The capacity of virtual mobility to reduce mobility-related exclusion, whilst avoiding the negative externalities associated with policies that increase physical mobility to achieve this end, was considered in detail in Chapter 4. The chapter provided both a theoretical and empirical background for the subsequent research. Specifically, the chapter discussed the theoretical basis for the supposition that virtual mobility can provide alternative and/or additional access to activity participation, with reference to the concept of accessibility; and presented a review of the empirical evidence for the same, with reference to the literature and to existing web sites. Whilst there is considerable evidence to suggest positive effects of virtual mobility, there is also

substantial debate within the literature concerning the negative effects of virtual mobility. Chapter 4 presented a review of the principal concerns in this regard.

Part 1 concluded with a short chapter summarising the findings of the literature review and establishing the hypotheses informing the direction of future research.

> Hypothesis 1
>
> Virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion.
>
> Hypothesis 2
>
> For virtual mobility to reduce mobility-related exclusion, it must provide the same function as physical mobility or, at the least, fill the gap that a lack of physical mobility leaves. It must also not have any negative mobility or social effects, which may worsen mobility-related exclusion.

Part 2 presented the findings from the first empirical study in this thesis: the focus groups study. The study provided valuable insights into the causes and effects of mobility-related exclusion, alongside the acceptability, accessibility, affordability and availability of virtual mobility, both at present and as a policy solution to mobility-related exclusion. It emerged that virtual mobility is having an impact upon quality of life, for many participants, substituting for existing offline activities but, more importantly for this study, supplementing the same, providing access to participation where previously access had been denied. The research provided a new insight into the interactions between physical mobility and virtual mobility, suggesting a fifth interaction in addition to the four-way interaction conceptualised by Mokhtarian and Salomon (2002): namely, that virtual mobility can substitute for an increase in physical mobility, stemming future traffic growth. Considering the hypotheses, this study confirmed that virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion. The study was unable to fully investigate the second hypothesis. However, there was no evidence to suggest negative effects from the use of virtual mobility.

In addition to the empirical insights, the study had important implications for the next stage of the research. A number of methodological issues emerged, concerning behavioural awareness, retrospective recall, cognitive dissonance and the quantification of the effects of virtual mobility. These findings shaped the design of the longitudinal, panel-based diary study, reported in Part 3.

In light of the methodological difficulties uncovered in the focus groups study, a key aim of the second study was to contribute towards methodological advance. To this end, Chapter 8 presented in depth discussion of a novel methodology, the accessibility diary, developed for this research, which aimed to fill a 'methodological gap' that was identified during the review of existing methodologies. The following chapter considered the sample structure and sampling strategy. Theoretical sampling, designed to enable conceptual advance, was presented as the most appropriate strategy for the subject and the methodology. Full discussion of the nature of the sample, designed in light of the focus group findings and the literature review evidence, followed.

Results from the diary study were presented as Chapters 10 and 11. Chapter 10 considered the results from the analysis of primary activity data; Chapter 11, the secondary activities data. The longitudinal analysis did not prove fruitful in the analysis of primary or secondary activities. As such, the chapters turned to consider a composite database, assessing the influence of virtual mobility upon activity participation and personal travel through the analysis of difference. This analysis, alongside further qualitative research presented in Chapter 10, provided valuable empirical findings. Considering the hypotheses, it emerged that virtual mobility is providing additional access to activity participation, within the key activities considered within this thesis. Therefore, it was suggested that virtual mobility could provide a viable alternative to physical mobility in reducing mobility-related exclusion. There was no evidence to suggest that the positive participatory effects of virtual mobility are negated by negative mobility or social effects. Further technical findings included the confirmation of the importance of secondary activities in the analysis of activity behaviour and change therein, with specific reference to Internet use and travel behaviour; and discussion of the utility of the accessibility diary for research into the implications of virtual mobility for personal travel and social exclusion.

12.3 Discussion of key findings: the contribution of the research

This thesis has brought together three academic and policy strands, to examine the links between them. In so doing, the thesis has contributed to theoretical, empirical and methodological advance, with implications for academic understanding and policy. Methodology is considered in detail in Section 12.4. This section reviews the key

conceptual and empirical findings, considering their meaning and contribution. The discussion is structured in relation to the three strands referred to above: transport and social exclusion; transport and virtual mobility; and virtual mobility and social exclusion.

12.3.1 Transport and social exclusion

Firstly, considering the conceptual findings. This thesis has offered new definitions and understandings of social exclusion and of the relationships between social exclusion and physical mobility. Each had implications for the direction of this thesis. However, it is suggested that there are also important implications for academic understanding and policy.

The definition of social exclusion as activity participation-based, alongside the conceptualisation of causes and consequences in terms of nine dimensions, provides a step forward in the understanding of disadvantage, which can be applied to better frame the discussion of social exclusion in academic and policy terms. Thus, the definition gives shape and the nine dimensions give content to this (formerly) nebulous concept. Whilst not providing a *measure* of social exclusion, the dimensions provide a more tangible basis for the structuring of social policy responses to social exclusion and for the assessment of the impacts of transport policy, for example, road user charging and park and ride, for social exclusion (Bonsall and Kelly, 2005 and Parkhurst, 2003, respectively[1]). In addition, the uniting of two previously disparate literatures – the empirically-based transport studies literature and the more theoretically-based sociology literature – produced a novel understanding of mobility-related exclusion as both too little and too much mobility. As discussed in Chapter 3, this understanding led to the conclusion that, whilst effective at the individual level and in the short term, initiatives to tackle mobility-related exclusion through the provision of greater mobility are likely to produce negative effects at the system level and in the long term.

The implications of this understanding of mobility-related exclusion for policy are profound. At its simplest level, it raises questions regarding the appropriateness of existing policies to tackle mobility-related exclusion and highlights the importance of reducing the need to travel (through future restraints upon land use and virtual service

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[1] Parkhurst (2003) frames his discussion around the author's nine dimensions. Bonsall and Kelly (2005) use the author's definition of mobility-related exclusion to shape their paper.

delivery) within the government's five-dimensional strategy to tackle accessibility problems (SEU, 2003)[2]. However, at its most comprehensive, it raises questions regarding the appropriate balance between individual and societal well-being and between the well-being of different individuals, with which political philosophers and political parties have struggled for centuries. It necessitates the reduction of physical mobility, throughout society, to tackle mobility-related exclusion, alongside the reorganisation of land use, to reduce distance between residential location and the opportunities, services, social networks and other goods that are essential to the same. And there are likely to be implications for social policy. Many current social policies have transport effects. For example, Chapter 3 discussed the implications of centralisation of healthcare services and of parental choice in education. An increase in university students will have long-term transport effects, widening social networks both in size and in geography; 'widening horizons' (SEU, 2003) with regard to employment will increase mobility; and reducing poverty is likely to lead to the same. The desirability of these social policies may be affected by these transport effects, if the transport effects are judged to worsen social exclusion, at the individual and/or societal levels.

If it is considered appropriate to increase the physical mobility of those with insufficient levels of the same in the short term, the understanding of mobility-related exclusion presented in this thesis highlights the necessity of an equivalent (or greater) decrease in mobility by others in society. In parallel, it becomes essential to tackle the values inherent in the car culture, to make such changes acceptable. However, given that Illich (1974) suggests that cars and mobility are the mechanical embodiment of capitalism and authors including Aird (1972), Flink (1972) and Freund and Martin (1993) suggest that mobility represents individuality, freedom, escape, self-expression and control, such changes are likely to be close to impossible and certainly (economically, politically and socially) unpalatable.

Turning now to consider the empirical findings, this thesis has both confirmed and clarified the nature of the links between transport and social exclusion. At the outset of this research, whilst a number of authors had discussed and developed theories about reduced accessibility as a result of inadequate access to physical mobility, few studies had been undertaken into the experience of mobility-related exclusion with those experiencing this exclusion. This research has presented examples of the reduced

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[2] The five are: improving physical accessibility and service delivery; making travel more affordable; widening travel horizons; safer streets and stations; and reducing the need to travel.

access and consequential exclusion from activity participation that can arise from inadequate mobility, for a number of key groups, including young people, older people, those on a low income, lone parents, minority ethnic groups (including refugees), people living in urban areas and people living in urban areas. Therefore, the research links into a growing body of social policy literature which highlights the contribution of mobility-related exclusion to social policy concerns including crime, education, employment, health, poverty and regeneration; and into a transport literature, which recognises the absence of many groups from the transport system and the consequences thereof.

12.3.2 Transport and virtual mobility

At the outset of the research, the links between transport and virtual mobility were not only inadequately understood, but very much contested. Therefore, in this regard, this thesis has aimed to contribute not only to understanding, but also to the debate.

Chapter 4 provided critical analysis of the literature. Whilst the majority of studies cite four possible interactions between virtual and physical mobility, taken from Mokhtarian and Salomon (2002), it emerged that the literature can largely be divided into two opposing groups: those who believe that virtual mobility will substitute for physical mobility; and those who believe that virtual mobility will generate physical mobility. This research has made two principal contributions to this debate. Firstly, empirical evidence from the focus groups study and the diary study suggests that a fifth interaction (in addition to the above four-way conceptualisation) between virtual mobility and physical mobility is likely: namely, that virtual mobility may substitute for an *increase* in physical mobility. Therefore, virtual mobility is *supplementing* access, providing access to activity participation where previously access was unavailable, or denied. Secondly, this thesis finds that, in the main, there is no evidence to support a link between physical mobility and virtual mobility, considering longitudinal trends, the analysis of physical mobility by Internet use quartiles and the novel activity-specific analysis.

These findings have important implications for the hypotheses. In supplementing access, it becomes clear that virtual mobility can fulfil a role in reducing mobility-related exclusion. In light of the lack of evidence to suggest an increase in physical mobility as a result of Internet use, concern regarding an increase in physical mobility and therefore in mobility-related exclusion appear unfounded. Importantly, these findings

persist at the macro and micro levels: both in terms of total and activity-specific Internet use.

The literature review highlighted the methodological limitations of many of the studies in this area, in terms of the sample structure, sample size, lack of longitudinal panel data and the activity-specific focus, which restrict the impact of their findings. Despite attempts to overcome these methodological issues, the research reported in this thesis is similarly restricted, as discussed in previous chapters and in Section 12.4. Therefore, the research is not conclusive in its findings. This said, that the results are confirmed in two different quantitative analyses and in two qualitative studies increases their validity.

As ever, more research is necessary. However, should further research support the above findings, the implication is that virtual mobility can be used as a tool of transport policy. Central and local government could pursue policies which include the Internet as a mode of access to opportunities, services, social networks and other goods. The Internet could be integrated into policies to reduce car use (with the Internet as an alternative mode), to promote public transport use (travel time benefits) and alleviate social exclusion (supplementary access), through incentives for its use, the inclusion of virtual mobility within local transport plans and perhaps even the appraisal of virtual mobility as an alternative to road building schemes.

12.3.3 Virtual mobility and social exclusion

As above, at the outset of the research, the relationship between virtual mobility and social exclusion was both inadequately understood and contested. Whilst research existed that associated virtual mobility with community regeneration, the primary focus of this literature, reflecting government policy, was upon the reduction of poverty through an increase in skills and employability. Whilst there was consensus that Internet use is effective to this end, there was little consideration of the impacts of Internet use within the other dimensions of social exclusion, except the social networks dimensions. Research into the benefits of virtual mobility for social networks was divided into two camps: those extolling the virtues of virtual mobility for sociability; and those denouncing the disbenefits. Therefore, this thesis has aimed to contribute to the understanding of and to the debate regarding the existing and potential contribution of Internet use to social exclusion.

This research finds benefits of virtual mobility for the reduction of social exclusion through increased activity participation; and unequivocally finds that virtual mobility has positive effects for sociability, understood as participation in social networks activities. These results are for the focus groups study and both the qualitative and quantitative elements of the diary study. Chapter 6 reports that virtual mobility enables participation in activities that were previously inaccessible; Chapters 10 and 11, that online participation increases total participation in key activities; and Chapter 10, that online participation is, in the main, in addition to offline activities. In each study, the clearest example is participation in social networks activities. Of course, there are methodological caveats to these findings, which have been reported in previous chapters and are considered in Section 12.4; and, in the absence of longitudinal trends, we must be careful not to attribute relationships in the quantitative data. However, the triangulation of the findings from different methods, their strength and their combination with the findings from the literature review allows us to confidently state that virtual mobility can have positive impacts for the reduction of social exclusion; and that there is no evidence to suggest a decline in sociability as a result of Internet use.
Furthermore, whilst it is important to recognise the methodological limitations of this research, it is important also to recognise its strengths. Unlike the majority of studies reported in the literature, this research has been conducted with those experiencing, or vulnerable to, aspects of social exclusion. As such, it is more likely to reflect the true benefits of this technology for these groups than research without such a sample. In addition, it is not focused upon early Internet adopters and has been conducted at a time of increased cultural and social acceptance and use of the technology, which further increases confidence in its validity.

Further research is needed into the extent to which online activities fulfil the same functions and provide equal levels of benefit as offline activities. It is clear from the qualitative research in Chapters 6 and 10 that online and offline activities can fulfil different functions. Therefore, it may not be appropriate to indiscriminately endorse the online conduct of activities. However, this research supports the use of virtual mobility as a tool of social policy, to enable greater participation in activities and, therefore, a reduction in social exclusion.

12.4 Discussion of methodological challenges

The methodological barriers to effective research into the effects of Internet use for personal travel and social exclusion have been apparent throughout this thesis. Chapter 4 highlighted a number of methodological issues, which reduce confidence in the existing studies into these effects, including: the use of single-wave or cross-sectional data; the nature of the sample; and the design of the research questions, such that the researcher's perception of reality is imposed and the complexity of the interactions are reduced to simple, quantifiable outcomes. Indeed, the limitations of existing methods for research in this area have been discussed by authors including Axhausen (1998), Golob (2001), Gershuny (2002a, 2003) and McCray et al (2003). Reflecting upon these, the first study employed a qualitative methodology, to allow the exploration of key issues; and applied a novel sample. However, as discussed in Chapter 6, in addition to producing valuable empirical findings, this study encountered a range of methodological difficulties, including low behavioural awareness, difficulties in retrospective recall and a substantial degree of cognitive dissonance. The accessibility diary study was designed with these methodological problems in mind. The diary addressed each of the problems identified in Chapters 4 and 6, overcoming the limitations by: taking a longitudinal, panel approach; collecting data contemporaneously; reducing researcher intervention through the collection of time use data; and allowing the quantification of effects. Considering the data-focused aims and objectives for the accessibility diary, given in Sections 7.1 and 8.2, the methodology has been successful. However, further methodological issues emerged. This section eschews detailed technical discussion of the efficacy of specific aspects of the accessibility diary – this is presented in Chapters 10 and 11 and Appendix 19. Rather, the section reflects upon the difficulties of research in this area, considering the lessons from this study that can be applied to further research.

It is tempting, in the design and/or assessment of research, to consider just one requirement from the research. It is the one that we, as researchers, are most aware of: the need for data, which we can apply to our theories, to test and enhance the same. As our understanding grows, so does the number of questions that we wish to answer and, consequently, the amount of data that we wish to collect. It is tempting to continue to enhance existing methodologies, continuously adding recorded variables. However, as the complexity of survey instruments increases to incorporate the additional variables, so do problems of non-response, to individual questions within a survey and to the survey as a whole, because of the failure of the researcher to

recognise and prioritise the primary requirement from research: that it be usable, designed with the needs and abilities of participants in mind.

This is the central dilemma in research in this area: how to balance researcher needs for increasingly complex data and user needs for a survey instrument that is quick and easy to use. The accessibility diary represents an attempt to simplify data collection for a complex subject area, by combining recorded variables, or by accepting less precise data. A number of compromises were made in the design of the accessibility diary, which may have reduced the number of different *types* of data collected and, as such, restricted the analysis. For example, Chapter 10 identifies an inability to directly associate physical mobility with activity participation and an inability to assess change in the number of activities undertaken; Chapter 11 identifies data gaps regarding the ability to directly associate secondary activities with the primary activity; and Appendix 19 reports issues regarding the quality of the data recorded within the location variable. However, these compromises acted to increase the *volume* and *quality* of data available, because of the consequent usability of the survey instrument. Attrition rates – just 20 percent attrition over three waves, compared with 30 percent with each wave, experienced by van der Loop (1990) – suggest that this approach has been successful in reducing respondent burden; and analysis has uncovered important empirical findings.

It is relatively easy to identify solutions to many of the technical methodological problems noted in this thesis. To ensure that participants record activities contemporaneously, provide an electronic diary that records the time of data entry, or telephone at appropriate intervals; to reduce variability in the number of recorded primary and secondary activities, implement a diary structured in five-minute intervals. To tackle issues relating to the unit of measurement (i.e., the survey week), implement a four-week survey, or one with more frequent waves, over more years; to enable assessment of the impact of Internet use upon the number of discrete activities, instruct participants to record every activity, including secondary activities, as a new entry, imposing instructions regarding the definition of 'an activity'; to assess the positive/negative impacts of multitasking, ask participants to detail how they felt during the day. It is less easy, however, to recruit and retain participants willing to bear the burden of such surveys; and less easy to input, process and analyse such complex datasets.

Reflecting upon the above, it becomes clear that we cannot collect all of the data that we wish to have, in a single survey. Therefore, it is appropriate for further research in this area to consider the following methodological options. Firstly, to be more restrictive in the subject under investigation. Following the literature review and focus groups study, this thesis recognised the importance of several variables to the debate. The accessibility diary was designed to collect data on all of these variables. However, the volume of data collected for each variable was restricted, to increase the usability of the survey instrument. It may be that a diary with fewer variables, but greater detail in selected variables, would be more effective in enhancing understanding of specific, micro-level aspects of behaviour. Such incremental advance in understanding could lead to greater progress in the field of research, with individual studies drawn together in the development of wider theory.

Secondly, to take a mixed methods approach. A substantial body of literature exists that considers the benefits of mixing research methods (Lockyer, 2006). In the main, this literature highlights the benefits in terms of the increased validity of the results if more than one method reaches the same conclusions. This thesis, however, suggests that different methods are appropriate for different research questions and different stages of understanding/stages of theoretical development. With reference to this thesis, for example, aside from the advantages for increased activity participation, the advantages and disadvantages of multitasking could not be assessed. Qualitative research, in the form of interviews or focus groups, might be a more appropriate method to investigate this than the addition of an additional variable in the diary. The advantages of mixing methods are demonstrated in Chapter 10, when the diary data used in conjunction with the online survey (which itself provided both quantitative and qualitative data) enabled far greater understanding of the impacts of Internet use upon activity participation than either could alone; and in Section 12.3, which discusses the findings from the focus groups study in combination with those from the diary study.

It should not be taken from the above discussion that diary or focus group studies are redundant. However, it is suggested that it may be more appropriate to accept the limitations of individual survey instruments than it is to seek their continual improvement. The solution may lie as much in better understanding of the benefits of combining studies and research methods, rather than in seeking to expand single studies and/or methodologies. Axhausen (1998) accepts that it may not be possible to collect all of the data that we wish to obtain in a single survey: perhaps the next step is

to accept that it may not be possible to collect all of the data that we wish to obtain in a single study, or using a single methodology.

The third methodological observation relates to the use of longitudinal methods. As discussed in Chapter 8, longitudinal research is seen as the gold standard in research that aims to uncover change, particular that which wishes to attribute change to a particular (set of) variable(s). However, in this study, a longitudinal method failed to reveal change. Not only this, the discussion in Chapter 10, which considers the possible reasons for the absence of a longitudinal effect in this study, suggests that the absence of a longitudinal change is a false negative. Further analysis of the data then suggests that an 'Internet effect' is observable, using non-longitudinal data. The discussions in Chapter 10 raise the possibility that, to invert Goodwin's (1987) observation, there may be classes of phenomena that can*not* be observed using longitudinal panel data. In light of the high costs of data collection, particular those associated with reducing attrition, it may now be appropriate to consider a cost-benefit appraisal of longitudinal studies; and to question whether or not the suggested benefits of longitudinal data are, in fact, observed.

Finally, to return to the question of the evaluation of the accessibility diary. Designed to overcome the limitations of other methods, the diary succeeds in many of its aims. A number of flaws have been highlighted. However, whilst imperfect, it is considered that the accessibility diary provides methodological advance as much in the lessons from these flaws as in its successes.

12.5 Recommendations for further research

Opportunities for further research have been considered in Chapters 10 and 11; and much of the discussion above, regarding the conceptual, empirical and methodological findings and their implications, has highlighted areas in which further research would prove fruitful. This section does not repeat these discussions. Rather, the focus is upon three areas for further research: opportunities for further analysis with this dataset; further research into the importance of secondary activities for travel behaviour research; and future methodological development.

12.5.1 Further analysis of the existing dataset

As discussed in Chapter 10, the diary collected detailed data on daily activity participation. This analysis has focused upon just three variables: the primary activity; the duration of the primary activity; and the nature and duration of secondary activities. Furthermore, the analysis has not included all recorded activities, focusing instead upon a subset of activities, amalgamated into eight key activity categories. Therefore, there are considerable opportunities for further analysis, through the incorporation of the unused variables, the use of activities not included in this analysis and the recombination of activities into different categories. Firstly, considering the *sociability* and *location* variables, which have not been included in this analysis. The analysis of change in the extent to which participants report others participating in the activity with them, or being around at the time, may enable further conclusions regarding the impacts of Internet use for sociability. Through the association of online and offline activities with the sociability variables, it may be possible to assess the extent to which participation offline enables greater sociability than participation online, or vice versa, both for offline/online activities in general and at an activity-specific level. Participants recorded their location to varying degrees of accuracy, such that the data has been recoded into four location types: home; work; travelling; other (as discussed in Appendix 19). Whilst this does not allow detailed examination of changes in the location activities over time, which might then be attributed to Internet use, it is possible to assess the relocation of specific activities from outside the home to inside the home and vice versa. For example, it would be possible to sum the duration of education, shopping or socialising in the home and out of the home for each wave and to compare this over time, or by other characteristics, including extent of Internet use.

Through the inclusion of *unused activities*, the dataset could be used to investigate the impacts of Internet use for a range of activities not included in this analysis. For example, the data could be used for activity-specific analysis, such as to contribute to the debate regarding the impact of Internet use upon use of other media, for example the television, or reading; the impact of Internet use for political participation; for childcare; or for sleeping. The disaggregation of activity categories could enable closer examination of activity-specific changes and relationships than is presented in this thesis. For example, analysis could consider the impacts of Internet use or, more specifically, of email, for telephone use, or face-to-face conversations; of online grocery shopping for offline grocery shopping; of Internet use for travel by car; or the role of Internet use in modal shift over time. Furthermore, it would be possible to more closely

assess the transport effects of Internet use: for example, the impacts of Internet use upon mode choice; or upon time spent 'travelling for pleasure'. Considering the latter, it may be revealed that constancy in travel time over time and between Internet user types is related to an increase in travelling for pleasure, which exists in parallel to a decrease in activity-related travel, therefore supporting claims in Mokhtarian and Salomon (2001) that Internet use will not substitute for travel, because travel is not entirely a derived demand. Alternatively, analysis could take a whole-day approach, such that all 24 hours of the day are considered, perhaps by aggregating the data into the categories used in other studies, for example Gershuny (2003, 2005) and Robinson (1999), to allow comparability of results. Such analysis would be subject to the same constraints regarding sample size as the analysis reported in this thesis. However, the analysis of activities common to all participants (therefore minimising variation and the percent at zero), as are many of those mentioned, should overcome these constraints.

Finally, through less precise analysis, with appropriate caveats, it may be possible to *associate* activities with travel; and secondary activities with the primary activity. For example, it may be possible to identify the most recent travel episode prior to a shopping trip, or to sum all travel since leaving home prior to the same, to provide an indication of shopping-related travel. Of course, this form of analysis would carry many caveats regarding accuracy, but as an indicator of change, if constant across diarists and across the waves, it may prove fruitful. The association of a single secondary activity with the primary activity would provide a useful indicator of the types of activities that are likely to be twinned. It would not be possible to associate secondary activities with each other, but this would enable some assessment of the qualities of primary and secondary activities that make them compatible, with implications for our understanding of the nature of multitasking and the influence of Internet use thereon.

12.5.2 Secondary activities

The analysis reported in Chapter 11 highlights the importance of secondary activities to travel behaviour research. It is demonstrated that accounting for multitasking provides a more fully informed understanding of the true extent and nature of activity participation. In consequence, it is suggested that, whilst activity-based approaches to travel behaviour embrace the context in which travel occurs, the failure to consider multitasking distorts the picture of daily activity behaviour and, in so doing, distorts our understanding of motivations for travel. This has implications not only for the understanding of change in travel behaviour as a result of Internet use, but for all

research and policy that considers travel behaviour and/or promotes behavioural change. For example, it is likely that efforts to effect a modal shift, or to reduce passenger or vehicle miles travelled, have been and continue to be hampered by a failure to consider multitasking, for two principal reasons. Firstly, because the ability to multitask whilst travelling may be informing the modal choice, either as a positive reaction to the benefits of the chosen mode in enabling multitasking (for example, in providing a quiet environment), or as a negative reaction to its disbenefits (that is, people may be multitasking because their journey is lengthy, or unreliable). Considering the first of these options, there are likely to be implications for policy which aims to reduce travel time. Secondly, our understanding of the reason for travel must include consideration of the full activity 'packet' if we are to understand the activity-related factors informing modal choice. Additionally, as discussed in Chapter 11, multitasking is likely to affect our understanding of the nature of mobility-related exclusion if it can be shown that the mode of transport influences the ability to multitask, considering both multitasking whilst travelling and the range and number of activities to which the individual has access.

Further research into multitasking should be present, prospective and retrospective. That is, it should seek to understand the importance of multitasking at present; the importance of multitasking for behavioural (future) change, both natural and policy-driven and both positive and negative; and it should reflect upon previous research and existing theory, to consider how much of our understanding of travel behaviour is compromised by the failure to take account of multitasking. It is likely to be important to consider the reasons for multitasking; and the impacts of multitasking for modal choice and well-being, considering whether or not multitasking makes the primary activity more pleasurable, or more demanding. This research agenda should take full account of the finding that multitasking is more pronounced for certain groups. Furthermore, as discussed in Chapter 11, there are likely to be implications for the understanding of social exclusion, not only in terms of mobility-related exclusion, but also in terms of the volume and nature of activity participation and of well-being. Therefore, it is likely that this research agenda will be important for the field of social, as well as transport, policy and research.

12.5.3 Methodological development

The methodological barriers to effective research have been highlighted throughout this thesis, in Chapters 4, 6, 10, 11 and Section 12.4, above. Rather than repeating the discussions of specific data needs, this section highlights two areas of methodological development that are likely to be important for further research: the increased specificity of studies; and greater understanding of the attributes of surveys that increase response rates and minimise attrition.

It has become apparent that we cannot collect all of the data that we would wish to have, in a single survey. Not only is the participant burden so high as to reduce response rates and increase attrition to intolerable levels, but we do not have the analytical methods to cope with such complex datasets. Further research could usefully explore the benefits (or otherwise) of shorter, simpler surveys, perhaps activity-specific, the results from which can then be combined. Therefore, rather than collecting data on all daily activities, a shopping-specific survey could collect data solely on offline and online shopping activities, plus associated travel and the quality of/satisfaction with each activity; a similar but separate survey could consider social networks; another, education. The results from these surveys could be compared with a composite survey, such as the one reported in this thesis, to enable conclusions regarding usability and utility to be drawn. Similar research could usefully consider the efficacy of mixed methods in enabling the collection of greater volumes of data.

Finally, research into the attributes of surveys which increase response rates and minimise attrition is essential, if we are to increase the volume and quality of data that we collect. A retrospective analysis of surveys, assessing the main attributes of the survey using a pro forma and comparing response rates and accuracy would provide considerable advance in this respect. The research should begin with a focus upon single-wave questionnaires within the academic transport community but widen to consider other methods, disciplines and sectors. A similar survey with a focus upon attrition in longitudinal (panel) studies, considering attributes of the survey, interventions to reduce attrition and the nature of the panel, would substantially increase the ability to design usable and useful research.

12.6 Summary

This chapter has brought together the different strands of the thesis. It has summarised the research and introduced discussion of the key findings, considering theoretical, empirical and methodological advance with reference to three key areas: transport and social exclusion; transport and virtual mobility; and virtual mobility and social exclusion. The chapter has assessed the contribution of this research to the field(s) of study in each of these areas. A discussion of the considerable methodological challenges of the research followed. The chapter concluded with a discussion of the next steps for research in this area, considering: further analysis of the existing dataset; present, prospective and retrospective analysis of the importance of secondary activities for travel behaviour research; and research into the usability and utility of different methodological approaches to study in this area.

Chapter 13. Conclusions

13.1 Introduction

The final chapter in this thesis summarises the key findings. The first substantive section considers the key findings in relation to the hypotheses. Next, other technical findings, including the confirmation and clarification of a link between transport and social exclusion, the importance of multitasking and methodological findings, are considered. The penultimate section summarises the importance of the research for the field of study and public policy. The chapter concludes with a summary of recommendations for further research.

13.2 Hypotheses

13.2.1 Hypothesis 1. Virtual mobility can provide a viable alternative to physical mobility in reducing mobility-related exclusion

This research supports the hypothesis that virtual mobility can provide a viable alternative to physical mobility in reducing aspects of mobility-related exclusion.

Chapter 4 presented the theoretical basis for the hypothesis that virtual mobility could provide an alternative to physical mobility in reducing mobility-related exclusion, with reference to the concept of accessibility, previous studies and example web sites. Chapter 6 provided qualitative evidence to this end. Virtual mobility is substituting for some existing offline activities. More commonly, virtual mobility is supplementing existing activity participation, providing access to participation where previously access had been denied. Furthermore, it emerged that virtual mobility is substituting for an increase in physical mobility. The discussions suggest that virtual mobility is not only overcoming the problem of too little mobility but, by substituting for existing offline activities (and therefore travel) and for an increase in travel, it may also be tackling the problem of too much. Finally, Chapter 6 highlighted the acceptability, accessibility, affordability and availability of the use of virtual mobility as a tool to overcome mobility-related exclusion.

Quantitative evidence to support the hypothesis is given in Chapter 10. Specifically, Section 10.4.5 demonstrates that those participating online exhibit significantly different behaviour to those who do not participate online. Online participation is associated with significantly more total activity participation for the majority of activities. For education activities, online participation is also associated with significantly more offline activity participation. It was not possible, with these data and this analysis, to categorically state a causal relationship between online and offline behaviour. However, further research in the form of an email survey, reported in Section 10.4.7, demonstrated that, for the majority of participants and the majority of activities, online activities are supplementary to their offline counterparts, fulfilling a latent demand for participation.

13.2.2 Hypothesis 2(a). Secondary effects of virtual mobility: physical mobility

There is no evidence in this research to support a link between physical mobility and virtual mobility.

A critical review of existing studies, presented in Chapter 4, found a lack of conclusive evidence to support claims of a link between physical mobility and virtual mobility. Chapter 6 found some evidence of substitution of offline for online activities, primarily considering daily chores, with some impact for travel. However, the empirical evidence presented in Chapters 10 and 11 failed to find evidence of a link between physical mobility and virtual mobility, in terms of both substitution and generation, for both the longitudinal and composite analyses. As mentioned in Section 13.2.1, this research suggests that the principal effect of virtual mobility for physical mobility is in substituting for an increase in physical mobility, therefore stemming future traffic growth.

13.2.3 Hypothesis 2(b). Secondary effects of virtual mobility: sociability

There is no evidence in this research to suggest a negative effect of virtual mobility for sociability.

A critical review of existing studies, presented in Chapter 4, found a lack of conclusive evidence to support claims of a negative effect of virtual mobility for sociability. The empirical evidence in Chapters 6, 10 and 11 supports this. Chapter 6 revealed greater

sociability as a result of virtual mobility; and no evidence of negative effects (Section 6.6.2.2 and 6.6.2.3, respectively). The diary data highlights an increase in participation in social networks with increasing time online, considering the analysis of difference by Internet use quartiles; and that those who participate in social networks online spend more time participating in social networks in total than those who do not participate online. Furthermore, the email survey reveals an increase, not a decline, in sociability, as a result of online communications (Section 10.4.7).

13.3 Other technical findings

13.3.1 Theoretical advance

This research has contributed to understanding of the concept of social exclusion; and to understanding of the nature of mobility-related exclusion.

In addition to the empirical findings, Chapters 2 and 3 have presented substantial theoretical discussion. Social exclusion has been redefined and conceptualised within a nine-dimensional framework, which can be applied to better frame the discussion of social exclusion in academic and policy terms. In addition, the uniting of two previously disparate literatures led to the novel conceptualisation of mobility-related exclusion as both too little and too much mobility. As discussed in Chapter 3, this understanding led to the conclusion that, whilst effective at the individual level and in the short term, initiatives to tackle mobility-related exclusion through the provision of greater mobility are likely to produce negative effects at the system level and in the long term, with profound implications for social and transport policy.

13.3.2 The links between transport and social exclusion

This research has confirmed and clarified the links between transport and social exclusion.

At the outset of this research, there was little literature on the subject of mobility-related exclusion. Chapters 2 and 3 demonstrate that studies of social exclusion had not tended to consider the mobility perspective; and that the subject was, at this time, under-researched in the transport studies literature. Whilst a number of authors had

discussed and developed theories about reduced accessibility as a result of inadequate access to physical mobility, few studies had been undertaken into the experience of mobility-related exclusion with those experiencing this exclusion. The research presented in Chapter 6 confirms and clarifies the experience, giving valuable insights into the nature and effects of mobility-related exclusion and reduced access to activity participation.

13.3.3 Multitasking

This research confirms the importance of multitasking for the understanding of travel behaviour, Internet use and activity participation.

Chapter 11 highlights the importance of multitasking for the understanding of travel behaviour, Internet use and activity participation. The findings support the theoretical and (limited) empirical evidence presented in the review of the existing literature (Section 11.2). Multitasking is highly prevalent, occurring on the majority of days and adding 45 percent more time to every working day (Section 11.3.1); and it is important, affecting our perception of, amongst other things, the sociability of activities, the amount of time that we spend online and the amount of time that we spend travelling. Section 11.3.2 demonstrates the distorted picture of time use and activity participation that emerges when only primary activities are considered, highlighting that the activities in which time use is most underreported when primary activities alone are considered are those that are fundamental to the travel substitution/sociability debates. Whilst the inclusion of secondary activities did not affect the overall findings in relation to the hypotheses, the importance of multitasking for the understanding of behaviour and change therein is proven.

13.3.4 Methodological conclusions

This research has uncovered and confronted many challenges in capturing and understanding human behaviour, providing insights into the possibilities of overcoming the same.

The methodological barriers to research into the effects of Internet use for personal travel and social exclusion have been apparent throughout this thesis, from the critical appraisal of existing studies in Chapter 4 to the analysis of the focus groups and diary

studies. In consequence, this thesis has been as much an investigation of methodological challenge as of behaviour, culminating in the development of a novel methodology. Through full and open reflection upon and appraisal of the methodologies employed, this thesis has tested the efficacy of a variety of approaches, concluding that a reduction in the volume of data recorded, alongside increased use of a mixed methods approach, provides the most fruitful avenue for further research in this area.

13.4 The importance of the research

This research has provided conceptual, empirical and methodological advance, with implications for the field of study and public policy.

The implications of the conceptual, empirical and methodological findings for the field of study and for social and transport policy are discussed in Chapter 12 and summarised in Section 13.2 and 13.3, above. Whilst virtual mobility is being used as a tool of social policy, as highlighted in Chapter 12, it has yet to be integrated into transport policy in the UK. In highlighting the benefits of virtual mobility for the alleviation of mobility-related exclusion and in finding benefits in the substitution of existing (to an extent) and future physical mobility, this research suggests that virtual mobility be accepted as a tool of transport policy, in the ways highlighted in Chapter 12.

13.5 Recommendations for further research

This thesis has made advances in the understanding of the interactions between virtual mobility, personal travel and social exclusion. However, as ever, the research and the reflection upon the same has exposed many questions. As such, there is much still to do. Recommendations for further research are discussed in detail in Chapters 10 and 11, in respect to specific aspects of the analysis; and in Chapter 12, with a focus upon further analysis of the existing dataset; present, prospective and retrospective analysis of the importance of secondary activities for travel behaviour research; and research into the usability and utility of different methodological approaches to study in this area. Progress within each of these areas, building upon the research in this thesis, will ensure a greater capability to both capture and understand behaviour in this complex aspect of social reality.

Part 5. Appendices

Appendices

Appendix 1. Meetings with community informatics professionals and visits to online community centres, August/September 2001.

Appendix 2. Focus groups composition.

Appendix 3. Focus groups topic guide.

Appendix 4. Focus groups visual aids.

Appendix 5. The online survey.

Appendix 6. The diary instructions.

Appendix 7. The information booklet.

Appendix 8. Study locations: further detail.

Appendix 9. Screening questionnaire.

Appendix 10. Risk assessment and safety procedures.

Appendix 11. Inception questionnaire.

Appendix 12. Prevalence Tables.

Appendix 13. Supporting Tables and Figures: Chapter 10.

Appendix 14. Supporting text for Section 10.3.3. Considering the influence of key variables upon the results presented in Section 10.3.1.

Appendix 15. Supporting text for Section 10.4.4. Considering the influence of key variables upon the results presented in Section 10.4.3.

Appendix 16. Supporting text for Section 10.4.6. Considering the influence of key variables upon the results presented in Section 10.4.5.

Appendix 17. Questionnaire to probe the impact of Internet use.

Appendix 18. Supporting Figures: Chapter 11.

Appendix 19. A technical appraisal of the accessibility diary.

Appendix 1. Meetings with community informatics professionals and visits to online community centres, August/September 2001.

I visited a number of people and communities in August and September, 2001, to find out more about the use of community informatics for community regeneration and personal development. Those listed below have worked to bring the Internet to individuals and communities who would not otherwise have had the opportunity or inclination to go online. At the online community centres, I was able to spend a number of hours talking informally with users about their use of physical and virtual mobility.

Whilst these conversations were not recorded and do not form a formal part of this thesis, they proved invaluable in developing my theories about the use of the Internet to overcome mobility-related exclusion. They were also invaluable in developing contacts with communities for recruitment for the focus groups. It can be difficult to recruit in deprived communities (Mumford, 2001). There can be an unwillingness to take part in research due to issues including low trust in researchers, which can result from a feeling of being over-researched by people who only take from the community. Low confidence of the community is also an issue. For example, Krueger (1994) emphasises the courage needed to express one's opinions. Kitzinger and Barbour (1999) highlight the strength of focus groups in facilitating the involvement of people who are nervous of being the sole focus of the researcher's attention. My meetings and high visibility in the centres helped me to ensure that my research was informed by user needs and thus helped to encourage trust in me and my agenda. By demonstrating that I was genuinely interested in community members as people, rather than subjects, I was able not only to recruit participants for the study, but also to inspire honest discussion within the focus groups.

Smithson (2003) highlights the differential power relations between the researcher and the researched, which can lead to stifled discussion and the construction of the 'other'. I was aware that my background was very different, in age, class, education and ethnicity, to many of the participants from these communities. Spending time within these communities before the groups helped to reduce the perceived level of difference between myself and the participants, encouraging more open discussion. Participants also gained confidence from their relationships with each other – they were, if not

directly known to each other, from the same community and thus known by sight, or reputation. In addition, whilst I was careful not to reveal my research interests in detail, or to discuss the topic, to avoid biasing the results from the groups, many of the quotes used in the focus groups visual aids were inspired by these conversations.

A1.1 Individuals

Iane Ames, Outer Shirley Regeneration Board, Southampton.

Sacha Bedding, Stockton International Family Centre, Teesside.

Pat Cummins, formerly manager of the Stockton OnLine network.

Fred Dickson, Manor Residents' Association, Owton Manor Estate, Stockton on Tees.

Mark Haynes, Director, Tees Valley Informatics Partnership.

Clive Hudspith, Stockton OnLine, Kiora Hall Community Centre, Stockton on Tees.

Brian Loader, Director, CIRA, University of Teesside.

Michael Mulquin, Director, IS Communications.

Sean Ridgeway, Stockton International Family Centre, Stockton on Tees.

Steve Thompson, Project Manager, Tees Valley Communities Online.

Kevin Vasey, Manor Residents' Association, Owton Manor Estate, Teesside.

A1.2 Online community centres

Children's Anti Crime Club.

Kiora Hall Community Centre.

Manor Residents' Association.

Stockton International Family Centre.

Appendix 2. Focus groups composition

Through careful consideration of the composition of the focus groups, it was possible to gain input into the research from representatives from a wide population. Studies with very specific groups who experience exclusion have been undertaken by authors including Hellawell (2001) with regard to ICT access/use and Lucas, Grosvenor and Simpson (2001) with regard to transport – however, for the purpose of generalising results to the general population, this approach was rejected at this stage of the research. The aim of the groups was to gain an overview of the influence of travel and ICTs upon the lifestyles of a significant number of the population, before considering more detailed studies with more specific groups in future stages of research.

Focus groups were undertaken with people who, traditionally, may be expected to experience mobility difficulties and/or social exclusion. Group characteristics were also selected to reflect both the clustered nature of exclusion, drawing participants from defined geographical communities and the scattered nature of exclusion, selecting participants from person-centric criteria. Representation was sought from people living in both rural and urban areas, to ensure that the differences between urban and rural areas in terms of transport, Internet access and access to other ICTs, access to services and the different experience of poverty and exclusion as a result of differences in living space were considered.

More person-centric attributes informing recruitment include older people, young people and lone parents. Each of these characteristics can indicate a higher propensity to the experience of exclusion. It was felt that individual interviews with people with disabilities and/or ill health may be more appropriate than discussion in a group setting. As such, we did not seek, in these focus groups, to consult with people with disabilities and/or ill health, although, serendipitously, people with disabilities were present in a number of focus groups.

Whilst an online focus group was considered, which could enable participation from residents in isolated rural areas, it was decided that the high level of computer literacy necessary to participate in this group and the high level of experience of participants in using virtual mobility may bias the results of the discussion too much in favour of the benefits of the Internet and virtual mobility.

A2.1 Group 1. Silver surfers

Older people (of retirement age) number 18% of the UK population, a figure which is forecast to increase in the coming years[1]. Older people are likely to be vulnerable to a number of dimensions of social exclusion, in particular poverty; isolation; and ill health. It is estimated that more than one in three pensioners are living on low incomes and almost a third of pensioners have an income which places them in the bottom fifth of the population[2]. 39% of the elderly population, but almost half of people aged 75+, live on their own, increasingly isolated as family and friends move away in our increasingly dispersed society. Older people account for more than two thirds of people with physical disabilities in the UK and are more likely to suffer ill health, failing eyesight and hearing than the general population. A disproportionate number of those living in poor or inadequate housing are elderly people. A greater number of the rural population than the urban population are aged over 65, with the greater need of, yet reduced access to, services, that is common in rural areas.

There are many restrictions on the mobility of elderly people, including: the cost of public transport; the location of interchanges; design of vehicle and infrastructure; and reduced access to car travel, owing to ill health and legal restrictions on driving, related to age. Difficulties in accessing healthy food, social networks and healthcare can all contribute towards the deterioration of quality of life for older people (ACL, 2001). Whilst approximately four million (Age Concern, nd) out of an estimated 19 million (ARP, nd) of over 50s in the UK are estimated to be online, with an estimated one in ten of over 65s having accessed the Internet (ONS, 2001a), older people can be considered more likely than the general population to experience exclusion from ICTs, owing to lack of skills and ICT exposure; and physical factors, including failing eyesight and dexterity.

Thus, it was felt to be essential that this group of the population were targeted in the focus groups.

All focus group participants, bar one, are retired and their ages range from 55 upwards. The focus group was conducted in a rural area and participants live in rural, semi-rural and sub-urban locations and are from social class C2 and above. Just over half the

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[1] All statistics in this section are current for 2001, the year in which the focus groups were undertaken.
[2] Unless otherwise stated, statistics in this section are taken from Help the Aged, 2001.

participants own and use a car as their primary form of transport. Others are reliant upon lifts from friends and/or family members, walk or use the bus for local journeys. The majority of participants use the train for longer journeys.

All participants were aware of the web and email prior to the focus group, to ensure that a fruitful discussion about the Internet could take place without participants feeling excluded. However, within the group were non-users, occasional users and regular users, to ensure a spread of experience and views about the Internet. Four participants have Internet access at home; two can access the Internet at the house of a family member and one at a friend's house. Three participants, all of whom have Internet access at home, describe themselves as regular Internet users. In a similar way to which participants are dependent upon others for transport, some rely upon family and friends to access information from the web or to send emails to other friends and family members on their behalf.

A2.2 Group 2. Young people

Approximately a quarter of the population are under the age of 20, with a quarter of these (about 6% of the population) aged 15-19 (ONS, 2001b). Young people in this latter age group are likely to have different mobility needs and to face different mobility restrictions to children and the older population, as a desire to participate more in activities and thus to travel more combines with restricted independent mobility yet also increasingly restricted dependent mobility, via parents. Members of this age group face great upheaval in their lives, as compulsory education ends, leading to further education, attendance at university, or work, often resulting in departure from the family home, changes in disposable income and changing relationships. Group 2 aimed to discuss the impact of these life changes upon mobility patterns and mobility aspirations, encompassing young people aged 16-18, an age group including people both before and after the age at which it is legal to drive a car. Participants had completed full time education but had not yet started university and were either working, or continuing their studies at college.

Young people in this age group have grown up with ICTs as a normal part of every day life. Particularly in the classroom, this age group have been used to the presence and use of computers, throughout their school careers. The popular Internet, seven years old at the time of the focus groups, has also been a staple part of their lives since a

young age, becoming commonplace in classrooms, homes, advertising and culture before these participants reached secondary school[3]. It was thought to be essential to capture the views of this age group towards the Internet and the concept of virtual mobility, in part to counteract the expected enthusiasm of older age groups, for whom the Internet is a new addition to life, with the expected view of the Internet as a more ordinary part of every day life.

Six participants in this group are in further education and two are temporarily working, before going to university. All participants currently have access to the web and email and all used to use the Internet at school. Six use the Internet at home, six at college and one at the local pub. Only one participant holds a driving licence, driving his parents' car; one holds a provisional licence and uses a scooter. The group was held in a rural area. Participants live in rural, semi-rural and suburban locations and are from social class C2 and above.

A2.3 Group 3. Users of an online centre on a deprived urban estate

Many key indicators of deprivation – poverty and child poverty, unemployment, low skills/educational attainment, lone parenthood, physical isolation, poor housing and poor health – are concentrated in urban council estates (SEU, 2000a). Many people in deprived neighbourhoods experience multiple deprivations and, alongside this, reduced opportunities to participate, in part through deprivation of local services, including shops, transport, healthcare/medical facilities and education. Reduced accessibility to services is reinforced by lack of adequate transport to services outside of the local area.

In addition to low car ownership in poorer households, poor neighbourhoods are often poorly served by public transport, becoming 'no go' and 'no exit' areas (Murray, 1998), with a reduced number of services, routes, frequency and off-peak services, despite being in urban areas, which are usually thought to have good levels of public transport

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[3] Statistics reflecting how many children are online are imperfect and tend not to show how many children have used the Internet, rather, how many are currently using the Internet. Nevertheless, statistics from December 2000 suggest that 65% of 7-16 year olds and 78% of 11-16 year olds use the Internet – a figure which will have increased in the year since the survey was conducted (Nua, 2001). In surveys, young people are consistently shown to be the highest users of the Internet (ONS, 2001a).

services. Poor levels of service are due in part to low perceived market advantage by bus companies and also to unwillingness of drivers to serve in these areas. The cost of (public) transport can often be prohibitive to its use; or can lead to 'deprivation by expenditure' (ACRE, 2001) – poverty reinforced by high spending on transport.

Data from the Office for National Statistics (ONS) shows a clear 'digital divide' in the UK, according to income, with just 7% of households in the lowest income decile having access to the Internet, compared with 71% of households in the highest decile (ONS, 2001c). If we examine the statistics by class, we see that 78% of households in social class A have access to the Internet, compared to 27% of households in social class E (ONS, 2001d). Coleman (2001) finds that people in social class AB are four times as likely as those in class DE to have Internet access in the home. Given the extent of measured deprivation and the low computer access in deprived neighbourhoods, it was thought to be essential to capture the views of this population, to observe their experiences of exclusion, their use of and perceptions of transport, the Internet and virtual mobility.

The Owton ward in Hartlepool, within which lies Owton Manor Estate, is the 25th most deprived ward in the UK (DTLR, 2000). The Manor Residents' Association (MRA) is a community resource centre based on the Estate. It is community-run and staffed by volunteers, with the exception of a community development worker and (recently appointed) administration assistant. The MRA houses: the benefits advice project; a credit union; a drop in centre, providing support services including a photocopier, fax machine, telephone, informal childcare and tea and coffee facilities; a book exchange; and a computer suite, offering free, always-on access to the Internet and community run computer courses. The centre participates in Adult Learners' Week and organises and subsidises day trips and activities for children and families on the estate.

All participants in group 3 attend the MRA on a regular basis. All have used the Internet and have attended courses to teach them how to use the web, with some completing more advanced computer skills courses, including web design and desk top publishing. One participant has recently completed an advanced IT course at college. However, few have independent access to email, although the majority have used email at least once and can use the central MRA email address for enquiries and correspondence.

Only one participant has a car, an essential luxury because of her husband's disability. The novelty of car ownership in this area was highlighted by participants throughout the discussion. Other participants use a combination of buses and taxis, or, more commonly, walk to destinations within a five mile radius, because of the prohibitive cost of public transport. Few participants can rely upon friends or family members for lifts, reflecting the low car ownership in the area. Only one participant is currently in employment. With the exception of two participants, one a full time carer and one unable to work due to illness, all other participants are seeking employment.

A2.4 Group 4. Users of an international family centre

Latest figures available from the ONS suggest that minority ethnic groups now make up 7.1% of the UK population. 50% of the minority ethnic population are first generation British citizens/residents (ONS, 2001e). There is a greater likelihood that people from minority ethnic groups will experience social exclusion because people from these groups face a 'double disadvantage' (BRF, 2000). Not only are they more likely to live in deprived areas and to experience deprivation factors including poverty, unemployment, poor health, poor housing, low pay and low skills, but they must also contend with racism and social isolation, exacerbated by cultural and language barriers.

Between July 2000 and July 2001, approximately 6000 people on average per month applied for asylum but, again on average, only one in three of these were granted refugee status or exceptional leave to stay in the UK (Home Office, 2001). Whilst waiting for a decision on their application, asylum seekers are provided with housing, social security and a minimum income, in the form of vouchers and £10 cash per week. Employment for the first six months of residence is prohibited. Accommodation is provided on a 'no choice' basis and it is a condition of their residence that they do not relocate from their given residence whilst their application is being considered and, if granted asylum, they must remain in their given area for a minimum of six months. However, the majority of asylum seekers are housed in deprived areas with few employment opportunities; and, despite government aims to create language and cultural clusters, asylum seekers/refugees may be housed away from friends, family members or people from their own country, culture or speaking their own language. Poverty, unemployment and social isolation can therefore characterise asylum seekers' and refugees' experience on entering the UK.

Stockton-on-Tees is an area of sharp contrast, with severely deprived urban areas bordering wealthy rural areas. It encompasses the 15th most deprived ward in the UK – yet also the ward ranked 6896 most deprived, out of a total of 8414 (DTLR, 2000). The closure of heavy industry in the urban areas heralded their economic decline and in Stockton, unemployment stands at almost three times the national average (JSU, 2001). Stockton-on-Tees is listed as a designated cluster area for accommodating asylum seekers. Stockton has a large minority ethnic and asylum seeker population.

The experience of exclusion of minority ethnic groups, asylum seekers and refugees, their transport needs, the use and the usefulness of ICTs are likely to differ from the white, resident population and it was felt that consultation could make a significant and valuable contribution to understanding of exclusion and the use of virtual mobility by excluded populations.

The Stockton International Family Centre (SIFC) is a community resource centre providing Stockton residents with information, advice, support and a variety of educational courses, for all age groups, from needlework and music to language lessons. It is a multi-ethnic centre serving all faiths and cultures. The centre is proud of the tolerant, safe environment that has been built by community workers and residents. There is free, always-on Internet access at the centre. SIFC offer formal, non-compulsory computer courses and both formal and informal accreditation is available. An ICT support worker is always on hand to provide help and support to computer users.

All participants are users of the centre and all use the SIFC computers, for Internet and email. Three also have Internet access at home. Three participants have access to and regularly use a car. Other participants are largely reliant upon lifts, with fewer participants regularly using public transport. The group contained a mix of ethnicity and a mixed length of residence in the UK. One participant is white and of UK origin; two participants have recently immigrated into the UK from Pakistan; one participant immigrated into the UK from India more than thirty years ago; two participants are second-generation Asians; and one participant is a refugee, recently granted asylum, from Burkina Faso.

A2.5 Group 5. Lone parents

Like all of the groups targeted in this phase of the research, lone parents are vulnerable to social exclusion, reflected in the number of indicators of deprivation and exclusion that include the number of lone parent households in their calculations (Foley, 1999; PAT 18, nd). One in four children live in a lone parent household (Sewell, 1999). Three in five lone parent households live below the poverty line and two in three children in lone parent households live in poverty (OPF, nda). Although lone parents represent only 8% of the population, 20% live in poverty.

Lone parent households are vulnerable to poverty in part because they tend to possess a concentration of the characteristics that make a household vulnerable to poverty. The Households Below Average Income measure suggests not only that lone parent households are likely to be in poverty, but also that attributes that are common to lone parent households – unemployment, part time work, being economically inactive and having children – make a household more vulnerable to poverty (Oppenheim, 1998). The majority of lone parent households (90%) are headed by a female (Gingerbread, 2001), who is more likely to be employed in part time or low paid work than a male. Many lone parents will be unable to work or will work part time, because of childcare difficulties and costs. Supporting children on a single wage, a part-time wage or no wage, supporting more than one family and running more than one household, as is common when a parent enters a new relationship, plus the high costs of childcare if the parent is working, can all impact upon the economic status of lone parent households.

Many deprived estates hold a concentration of lone parent households, reflecting the economic exclusion that many lone parents experience and making lone parents and children of lone parents more vulnerable to the multiple exclusions experienced by residents of deprived estates. However, lone parents can experience exclusion at both the clustered and scattered levels (Hine and Grieco, 2003). With regard to mobility, the additional trips that are generated by children (including travel to childcare, school, extra curricular activities, shopping) are borne by a single individual. Without adequate transport, trips will be sacrificed and time for other activities reduced, affecting ability to work and to socialise.

In addition to enhanced economic exclusion, lone parent households can be vulnerable to stress, social isolation and loneliness, intensified by the higher cost of travel with children, the cost of childcare and reduced free time, which can reduce opportunities

for socialising; and the loss of a partner with whom to share experiences on a day to day basis.

Whilst there is no direct correlation between family structure and childhood outcomes, the poverty experienced by lone parent families has a direct impact upon the educational, health and economic outcomes of children from lone parent households (OPF, ndb).

As the group in UK society that is most vulnerable to social exclusion on multiple levels, consultation with lone parents was fundamental to this phase of the research. Lone parents were naturally represented in the groups conducted in urban estates, thus with this group, we felt it important to consult with participants representative of a different socio-economic background. The group was conducted in a rural area, with participants drawn from rural, semi-rural and suburban areas and from social class ABC1C2. Five participants are female and two male. The age of participants' children ranged from one to eleven and the children live full time with the participants. Five of the participants in this group are currently employed, two of whom are self employed and work from home. Whilst all participants are aware of the Internet, only three regularly use the Internet, with two using the Internet occasionally. Two have never used the Internet. There is a spread of access methods, with two having Internet access at home, two at work and two at a family member's house. One participant has no means of access. Four participants have a car.

A2.6 Group 6. Users and non-users from an urban estate that is about to receive community Internet facilities

Whilst an estimated 60% of the UK population accessed the Internet between April and June 2001 (Jupiter MMXI, 2001), with 40% having Internet access in the home (Oftel, 2001), more than one in three of the population have yet to use the Internet. According to research by the National Statistics, reasons for non-access include: lack of interest; lack of perceived need; lack of confidence or skills; lack of access device; lack of time to access; and an inability to afford to access (ONS, 2001a). Consultation with people without access to the Internet was felt to be important, to assess the perceived need for and uses of the Internet and to observe the extent to which people without Internet access feel excluded – and why.

A number of urban estates in the UK are receiving grants to provide community Internet facilities, through both government and European funded regeneration programmes. The Outer Shirley regeneration area, in Southampton, is one such area. Outer Shirley consists of five of the most deprived communities in Southampton and is located on the periphery of the city, with a population of approximately 23,000, living in 10,000 households, many council owned. With European SRB6 money, the regeneration team are hoping to put Internet facilities into homes and community centres in Outer Shirley. We consulted with members of this community to observe the enthusiasm for the Internet and to observe the perceived impact of such a scheme on themselves and their communities.

The group held an equal mix of Internet users and non-users. Whilst other groups also held current non-users, all had used the Internet at least once. This group was the only group to be recruited to specifically include non-users with no prior experience of the Internet. Of the users, three have home Internet access and are regular users. Whilst some can access the web at work or at home, three participants have no access and have never used the Internet. Three participants have access to a car. The remainder are reliant upon public transport, particularly buses and taxis, the occasional lift from family members or, for shorter journeys, walking. The group was held in an urban area and participants are all parents, four of whom are currently employed in paid work, drawn from socio-economic groups C2DE.

Appendix 3. Focus groups topic guide

Introduction
- us, project, rules, them
- What is it like being (characteristic)? +/- Is there anything that being (characteristic) stops them from being able to do?

Mobility patterns – warm up
- What is it like where they live? General, then transport links
- **Flip chart** - thinking about their travel and daily activities?
- How do they normally travel (mode) and why? What kind of journeys – where do they go?
- **Flip chart**: Is there anywhere that they wanted to go recently, but couldn't because they couldn't get there? E.g.:
    - seeing family and friends, going out, babysitting,
    - shopping (groceries, other)
    - getting to work, getting a job
    - accessing other services – health, education, social services
- **Increasing physical mobility** – what impact?

- **Visual aid** – some quotes re: transport and exclusion – agree, disagree? Discuss.
- What would happen if they didn't have access to their car/public transport/lifts... refer to today/recent journeys if necessary
- Do they think they should restrict their mobility – government views – impact?
- Would they like to be able to get about more? Where would they go/what do with unlimited mobility
- What are the types of exclusion that could be affected by changes in accessibility?
- What do they think +/- of increased mobility are (cost, environment...)

Break

Internet use (– explain what the Internet is)
- Current use of ICTs – phone, mobile, Internet... 'virtual mobility readiness'
- Access device – PC, TV, WAP, home/work/other: restrictions on access to ICTs?
- **Flip chart** - current net use – email, web? What do they think the Internet could be used for
    - Shopping
        - Friends and family, entertainment/leisure
        - Services
        - Work

Virtual mobility – impact and acceptability?
- Thinking about the things they could do on the net from previous discussions
- **Flip chart**: Would access to virtual mobility allow them to do the things that lack of transport prevents them from doing? E.g.s from their previous discussions
- What are the types of exclusion that could be affected by changes in accessibility?
- Substitute for things? Perceived acceptability of virtual mobility – general feelings
- Is access to web affordable and available? Able to access – accessibility
- Their view on the role that the Internet could play in combating transport poverty

Appendix 4. Focus groups visual aids

A4.1 Transport-related

1. 'To me, having a car is absolutely essential, unless you want to do all of your business, entertaining and live your entire life here, in this village. As far as I'm concerned, you need a car to live.'

2. 'I'd be lost without the car. How would I get around? The woman next door, she hasn't got a car and I see her waiting at the bus stop with her bags of shopping. I couldn't carry all that. Her kids get the bus on their own.'

3. 'I had to go to the hospital... I waited for the bus for an hour, there is a ten minute service to town but I couldn't get on because there were already buggies on it and I couldn't get mine on the bus. Missed my appointment. Can't get another.'

4. 'My parents won't take me out any more, they say I'm 16 so I can get there myself but I can't, because I can't get home unless I leave really early. So I just don't go out. My friends do, but I don't.'

5. 'The other day, I had to buy some sugar so I popped to the local shop. 85p it was! It's 45p at Tesco's, but I can't get there, so I have to pay that much, or get a taxi, which is a fiver. If I had a car, I could get the cheaper sugar.'

6. 'I travel more now than I did when I worked. I go all over the place. It's mainly to hobby clubs or to see people. I drive and give other people a lift. If I didn't drive, they wouldn't get to go out.'

7. 'As soon as I can, I'll get a car. Now I'm not at school, I can do what I like, but I can't really because I can't get there until I get a car.'

8. 'If I didn't have a car, I couldn't get to work. It's as simple as that. You want to work, you get a car. And my son, he wants to go to college next year so he'll need a car, because I can't take him.'

9. 'My kids have to do homework and they seem to need to know so much nowadays. I can't help them, so sometimes we go to the library but I've not got much time to take them. They ring their friends, but it's not the same as having books.'

10. 'I get the bus and it's alright. I don't know what all the fuss is about. You get on, you pay your money and you get to where you want to go, without having to park or drive there. Easy. People should try it and see what they're missing.'

A4.2 Internet-related

1. 'I keep in touch with my family with daily emailings. I also belong to a chat group about my work. It's a useful tool to keep in touch. Email is now a major part of my life.'

2. 'I looked for medical information on the web. My daughter is hyperactive and the doctors don't seem to be able to help, so I looked on the web and found a really helpful web site. I told my doctor about it.'

3. 'I do shop on line but it is mainly CDs. I have bought clothes but they are usually the wrong size. I don't do my grocery shopping online because the delivery prices are so high.'

4. 'I didn't know what to do when I left school. We had the Internet at school and we all looked on there for jobs and I found something.'

5. 'Like the telephone, the Internet has become one of those technologies that I simply take for granted and would be a bit lost without. Basically, it cuts down the time that would otherwise be wasted.'

6. 'I frequent gardening web sites, which provide me with a wealth of garden-related information and find relevant gardening shops where I request on-line or mail order catalogues. I also seek recipes and search for information on just about any topic. If myself or anyone is seeking information, my first point of call is the Internet, whether it be for health-related information, finding out about an author / poet, holiday-related information...'

7. 'I did recently lose the guidance booklet for filling in the self-assessment tax form, so downloaded one, with great difficulty; it was very hard to track down precisely the right one.'

8. "Me and my friends talk on the web. It's easier because you haven't got your mum listening in like if you're on the phone and she likes it because she doesn't have to take me round their houses and pick me up afterwards.'

9. 'I have Parkinson's disease. It means that I can't go out much and I've noticed that the phone calls have just stopped... but now I've got the Internet, I'm talking to people online, I've met new people. It's not the same, but...'

Appendix 5. The online survey

Whilst not forming part of this thesis, an online survey undertaken by the author in July 2001 as part of research into the impacts of virtual mobility was important in informing further research in this area. This appendix outlines the nature of this consultation and results.

A5.1 The consultation

In August 2001, a web site for the research was launched. Alongside information about the project, the web site contained a facility for users to contact the project team to describe their use of the Internet. This consultation was widely publicised, via a press release and the web site received coverage in the national press, including the Times Higher Educational Supplement and the local press, including the Southampton Daily Echo and the Hampshire Chronicle. Online, the web site was featured on BBC Online; in online newsletters; and on a number of mailing lists. Thus, a variety of (national and international) audiences were made aware of the project and the consultation.

The aim of the consultation was to gain an overview of the ways in which people are currently using the Internet. There was at this time little evidence in the public domain appraising the types of activities that people undertake online, yet this knowledge could strengthen the call for universal access by highlighting whether or not people are excluded from activities that can affect quality of life if they do not have Internet access. The online consultation provided an opportunity to focus specifically upon Internet use, (largely) targeting 'netaholics', people who have experience of using and who frequently use the Internet. Whilst no data regarding number of years online was recorded, it could be assumed that, because of the nature of the publicity and the self-selecting nature of respondents, the majority of respondents are experienced Internet users and are likely to be enthusiastic about the possibilities of the Internet.

The response form contained a single text box, with instructions requesting that respondents discuss the activities that they undertake online, whilst also telling us why they use the Internet for these activities. The aim was not to collect demographic data to allow correlations between demographics and Internet activity, thus no attempt to

record the personal data of respondents was made, other than a request that respondents include their email address in the body of their response, if they were willing to be contacted in the future. Approximately 60 responses were received.

A5.2 Findings

The findings suggest that people are using the Internet in all aspects of their every day life, for a wide range of activities and for a variety of reasons.

Table A5.1 presents a summary of the activities that respondents are undertaking online. Activities have been separated into three activity types. Firstly, activities undertaken in work, including voluntary work, education and activities undertaken on the behalf of others, which this report terms the 'escort search'. Secondly, activities undertaken for entertainment, including leisure activities and the pursuit or maintenance of social networks. Finally, activities which are undertaken in the course of daily life, usually chores and other activities undertaken that are neither work/education related, or entertainment related. On occasion, some activities are listed under more than one activity type.

Work, voluntary work, education and escort	*Entertainment / leisure / social networks*	*Daily life*
Using the Internet when working both out of the office and in the office	Entertainment listings – cinema listings, clubs, local activities listings	Shop: for groceries, clothes, footwear, holidays, flights, CDs, games, books, gardening, gifts, household goods (e.g. freezer, cooker, furniture), house, event tickets
Development and maintenance of work-related networks via web, chat rooms: communicate, collaborate	Entertainment reviews	Window shop for all of the above; request catalogues for offline purchase
Marketing / presentation of work	TV listings	Book travel
B2B	Purchase cinema/theatre tickets	Plan travel
B2C	Information about hobbies and interests – e.g. sports, gardening, recipes	Online vehicle/bicycle maintenance guides
Find addresses, telephone no.s	Groups to join	Weather information
Book travel and other work-related goods, e.g. venues	Downloads – ring tones, music, games, software	Banking
Information to use in course of work, especially in academic, media, medical jobs	General surfing	Medical information
Electronic newsletters (send and receive)	Browse online encyclopaedia	Medical diagnoses – ask consultants, communicate with doctor/nurse
Street maps to use in course of work	Reading, poetry	Medical support – from experts, fellow sufferers, families of sufferers
Job search, application	Listen to radio, watch TV, films	News(papers), UK and overseas
Funding search, application	Play games, often with others online	Job search, application
Community building	Role play in chat rooms	Teaching and being taught
Online experiments, e.g. usability studies	Communicate with friends and family both nearby and overseas – email, web cam, personal web pages, voice chat	Contact local and national politicians
Benefits advice	Making arrangements to meet face to face	Read about local and national politics and politicians
Support organisations	Keeping friends in touch with each other – forwarding news	Download government documents e.g. self assessment tax form
Research for (offline) college work	Find address/telephone numbers	Contact and gain advice from support organisations – housing, health
Online courses	Find old friends (friendsreunited.co.uk)	PC manuals
Closed discussion group for online courses	Communicate with persons unknown and make new friends (even, in one case, a wife!) – chat rooms, web pages, mailing lists, bulletin boards, support organisations, etc.	PC help
College/university information	SMS from PC	Recipes
Finding information for others, print and send		
Research for children's homework		
Pictures to colour, posters, stories		
Medical information, diagnosis		
Shopping for others – primarily gifts, groceries		

Table A5.1. Respondents' Internet activities

Table A5.1 shows that a great number of activities that are undertaken offline can now be undertaken online. Thus, the Internet is pervasive in the lives of respondents to this survey. Indeed, the Internet,

> ... like the telephone, [has] become one of those technologies that I simply take for granted and would be a bit lost without.
> *Online survey respondent*

Descriptions of the activities that respondents undertake online were interspersed with the reasons underlying the choice to participate in the online activity. No respondents stated that use of the Internet was forced, because of an inability to undertake the activity in an alternative way, or unwelcome, or a second-choice option. Indeed, it is apparent that the use of the Internet to undertake activities is a positive choice, because of the benefits, to the Internet user, of using the Internet: primarily, cost and time savings; the ease with which activities can be undertaken online; and access to activities, goods, opportunities, services and social networks that were previously unavailable to the respondent. In this sense, as will be illustrated below, people without access to the Internet can be considered to be disadvantaged, vis-à-vis those with access.

The primary use of the Internet is as a communications device. Respondents suggested a number of reasons for their use of the Internet for communications. Communication via the Internet, specifically, email, is seen to be easier than communication by letter, or telephone. It is also quicker and cheaper to communicate by email than by other modes and, some suggested, more likely to prompt a response. Via email, respondents stated, one can communicate with a number of people at the same time, which is particularly valuable when arranging to meet for a night out, or when sending news to family and friends. Email is instant, requiring little planning and the perception is that emailing can be fitted into the working day with little effort – thus, it is convenient. Writing letters requires finding pen, paper, stamps, addresses (in contrast to email, where addresses are available instantly) and the writer must set aside the time to write. Respondents also save money by using the Internet to send text messages to mobile telephones.

Respondents suggested that they undertake more communications and keep in touch with more people now that they are online. They are also able to create new personal and work-related social networks online, primarily through email discussion lists, or contacts gained through interest-related web sites. In work, the Internet is now seen to be a vital tool in making and maintaining contacts, facilitating collaboration and providing access to customers, tenders for funding and other opportunities. In their personal lives, respondents suggested that, via email, they are able to maintain contact with people that they would previously have lost touch with, particularly friends abroad, because of the ease and speed with which communications can be undertaken online. The Friends Reunited web site was highly popular and receiving a lot of press attention

at the time of the survey and many respondents mentioned their use of this site to get back in touch with old friends. One respondent had even met his wife via the Internet.

The survey findings suggest that without the Internet, respondents' social networks would not be so effectively maintained. Clearly, however, the value or depth of these contacts can be questioned, in light of the fact that they would so easily have fallen by the wayside without access to email; and one can ask whether or not the increased quantity of contacts is to the detriment of the quality. There is the danger, also, that those without email will find themselves excluded from their existing social networks, as online contact becomes 'the primary medium' through which communications are made, as one respondent suggests, particularly when arrangements to meet face to face are increasingly being conducted online.

The majority of respondents have used the Internet to purchase goods, primarily groceries, CDs, books and travel, primarily holidays and/or flights. There appears to be a trust barrier for many respondents in purchasing a greater variety of goods. More adventurous respondents have purchased clothes and white goods, including freezers, cookers and vacuum cleaners. Whilst respondents may not buy the goods online, they do source information about goods, particularly pricing information, online, to inform offline purchases.

Reasons for purchasing online include cost savings and ease of purchase. Participants can save time shopping online, removing the need to 'trawl round the shops' and goods are delivered to the door, eliminating travel time for the purchaser and overcoming problems of transporting goods, particularly problematic for respondents who do not have access to a car or other adequate, convenient transport. The Internet also gives access to a wider variety of goods, particularly those from abroad; and banking is easier and faster online.

It would appear, therefore, that offline shoppers could be disadvantaged, financially, temporally and in terms of the variety of goods to which they have access, vis-à-vis online shoppers.

The Internet is a valuable source of information for respondents:

> If myself or anyone I am speaking [to] is seeking information about a particular topic, my first point of call is the Internet.
> *Online survey respondent.*

Respondents seek information for work; about job vacancies; for education; medical information; the weather; travel... indeed, in every area of life, as highlighted in Table A5.1. Again, the reasons behind the use of the Internet as an information resource is that it is quicker to find information online, vis-à-vis looking for information offline, for example, in a library, or by telephoning or writing to request information; and that it is easier to find the information online. One respondent states that it is quicker to consult online medical information than to wait to see a doctor; that it is easier to understand many forms of medical information online, than it is to understand offline information; and another suggested that online information was more reliable and more informed than their GP. Again, therefore, the findings from the online survey suggest that lack of access to the Internet is a considerable disadvantage in considering access to information.

The Internet is also being used to distribute information, because it is quick, easy, cheaper than printed material, or call or drop in centres and will reach a wider audience than offline information, particularly valuable when targeting people who are socially excluded, or who lack access to traditional information sources.

Finally, respondents suggest that the Internet excels as a news and entertainment medium. Respondents listen to the radio online; read newspapers, or access news sites from across the globe; access information about TV and other entertainment listings in the area; and also book entertainment online. In being able to access news from across the globe, respondents feel that their perceptions and values are challenged as never before. Again, the reasons given for this include cost savings, time savings and convenience, because respondents do not have to actively seek this information, it is delivered to them.

The message from all respondents is that the benefits of the Internet are, broadly, two-fold. Firstly, the Internet can make access to existing activities easier, quicker and cheaper, freeing up time and money, which can then be invested in other, more satisfying, online or offline activities. Secondly, the Internet provides access to activities, goods, opportunities, services and social networks that were previously inaccessible. In both scenarios, the possible disadvantages of exclusion from access to the Internet are clear. However, it is only in the former scenario that Internet use may affect travel patterns, replacing some offline activities requiring travel with their online equivalent; or, conversely, as more time is made available to undertake offline activities, following the transfer of some offline activities to online, Internet users may

travel more, or change the distribution of their travel patterns, both of which could have negative implications for environmental, social and transport policy.

This said, a number of caveats were drawn by respondents. A number of responses were received from people who are unable to use the Internet, because of poor eyesight; poor co-ordination and dexterity; poor memory, because of illness; and photo-sensitive epilepsy, which makes the use of conventional computer screens impossible. Other barriers to use highlighted by respondents include the skills needed to use the Internet, not just PC skills but those related to the 'literate nature of the web', skills including literacy, numeracy, the ability to speak English, to retain information and to concentrate. Lack of these skills, or fear of PCs and related technology can, respondents cautioned, provide considerable barriers to virtual mobility and could result in virtual mobility-related exclusion for many.

Other barriers include cost of access; and the point of access. Many respondents are only able to access the Internet from work, which can mean that they are unable to use the Internet for personal uses. Some respondents suggested that the Internet is not necessarily an appropriate medium for all information, particularly advisorial information, for example, housing or benefits advice, which is better delivered verbally, face to face, to allow individual questions to be answered. The trend towards delivery of these services via the Internet was worrying for some.

This latter point is related to the 'need', as perceived by some participants, for social contact in the delivery of services including advice, education and healthcare. A minority of respondents wrote of their concerns regarding the long term social and community impacts of an Internet society, discussing the loneliness that will accrue from an increase in, or a promotion of, virtual mobility.

Concerns regarding the social and community impacts of the Internet are well noted in the literature and represent a valid caveat to enthusiasm about virtual mobility. It is essential that these impacts are considered before virtual mobility is promoted as part of a social policy which has, as an aim, the reduction of social exclusion and the promotion of community. However, the expressed desire of respondents to reinvest time saved by conducting activities online, in other activities, suggests that Internet users are unlikely to want to live solely in the online world.

The desire to undertake a greater number of offline activities, in response to the redistribution of activities online could, however, have wider transport implications. Respondents were not asked specifically to discuss transport in their responses to the survey; nor did many respondents mention travel. However, where activities are transferred online, greater time is available to undertake additional activities, which may be undertaken offline. It is by no means certain that this will be the case, despite a desire to free up time being a key stated motivation for the conduct of activities online, for many respondents; nor is it certain that additional offline activities will require travel, or an increase, rather than a redistribution, of travel. However, it is a key possibility that an increase in virtual mobility may result in an increase in physical mobility. It is thus clear that the transport implications of virtual mobility must be fully considered before virtual mobility is promoted as part of an integrated transport policy.

A5.3 Concluding remarks

The online survey was a valuable exercise, allowing communication with and feedback from a wide audience. The survey has highlighted the pervasive nature of the Internet in the lives of respondents, people who, it can be assumed, are experienced and regular users. In examining the uses of the Internet, listed in Table A5.1, the incursion of the Internet into almost all areas of life can be seen. A great many offline activities can now be and are now being undertaken online. In communications, purchasing, information seeking and entertainment, access to the Internet is allowing users to undertake activities faster, more easily and more cheaply than if the activities were completed offline. In removing the necessity of travel, further time and cost savings accumulate. The implication is that those who do not or cannot access the Internet could be considerably disadvantaged as a result of non-access.

Appendix 6. The diary instructions

Please read these instructions before you start – they will help you to complete the diary

Please use this diary to tell us about the things that you were doing, when and where you did these things, plus whether or not you were with others, on each of the diary days.

We have produced these instructions to help you to complete the diary as easily and quickly as possible. There is also an example of a completed diary. If you have any questions about how to complete the diary, you can call Susan at any time during the diary week, on 0117 328 3996. You can also email Susan.Kenyon@uwe.ac.uk (email during office hours only).

When should you complete your diary?
You should complete your diary whenever it is convenient to you: either as each activity changes; at regular intervals, e.g. every two hours; at the end of the day; or even the morning after. It usually takes up less time to complete the diary at regular intervals – and this tends to be more accurate, too.

You don't need to start a new diary page for every day. Just continue using the same page. If you think that you are going to run out of space in your diary, please call Susan and she will send additional pages to you.

Activity codes
We have produced a list of all of the things that you might do during the day. We have grouped these activities into eight different categories:

- Communicating;
- Entertainment/recreation;
- Formal activities;
- Household and personal;
- Information search;
- Shopping;
- Travel; and
- Other/personal

Next to each activity, you will find a code. The code is starts with a category letter – for example, 'S' is for 'shopping' – and is followed by a number. Where the activity is done on the Internet, the code is followed by an additional letter, the letter 'I', for 'Internet'.

Please use these activity codes to describe what you did each day. This will make it easier for us to classify your answers. You should get used to using the codes quite quickly, but if you find it easier, there is space to write down your activity, then add the code later. In case you cannot find one that explains what you did, there are codes in each category for 'other' activities.

What did you do?
In this column, please write down, using an activity code, the main activity that you were doing. You might have been doing more than one thing at once, but you should decide which is the main activity that you were doing at that time.

If the main activity changes, you should start a new row in the diary.

Note:

- Everything that you do is important, however uninteresting or routine you think it is. Even if you were just resting, or sleeping, please tell us.
- If you were travelling, please make sure that you tell us about each stage of your journey. If, when travelling to work, you walk to the bus stop, take a bus to the train station, take the train, then walk into to work, you should record this as four different main activities. This is shown in the example.
- Please include waiting time as travel time. For example, if you wait for ten minutes before getting on a bus, please include it in your bus travel time.
- It is especially important that you note down all of the different things that you do on the Internet. So, if you go online and first check your email, then do some grocery shopping, then do some general surfing, please record this as three different main activities. This is also shown in the example.
- When you are at work, please record this as a single activity. We don't need to know about the things that you do at work, unless they are not work-related. This is shown in the example.

Start time / end time
In these columns, please write down the approximate start and end times of the main activity, within the nearest five minutes. All of the time in your day should be accounted for.

Where did you do it?
In this column, please tell us where you were when you did the main activity. This could be, for example, 'at home', 'at office' or 'at leisure centre'. If you were travelling, please tell us that you were 'between home and work', or 'between bus stop and train station'.

Did anyone else do this with you?
In this column, please tell us if anyone was participating in the main activity with you. So, if you were surfing the web with a friend, please write 'yes' in this column. If you were surfing alone, but you were in a room where there were others around you, please write 'no' here.

Was anyone else around at the time?
Here, please tell us if there was anyone around you, who wasn't directly involved in the activity with you. Taking the example above, if you were surfing the web on your own, but you were in a room where there were others around you, please write 'yes' in this column. If you were surfing on your own, in a room where no one else was present, please write 'no' here.

Secondary activities
Many people do a number of things at the same time, like eating dinner and watching TV; or driving a car and talking to a friend. If you were doing something at the same time as your main activity, please tell us about it in these columns. We need to know what you were doing and roughly how long you were doing it for.

For example, if you are at work, you might spend about 15 minutes of the day sending personal emails; or perhaps you spend 10 minutes of your lunch break walking to the shops, with 10 minutes shopping for groceries. This is shown in the example.

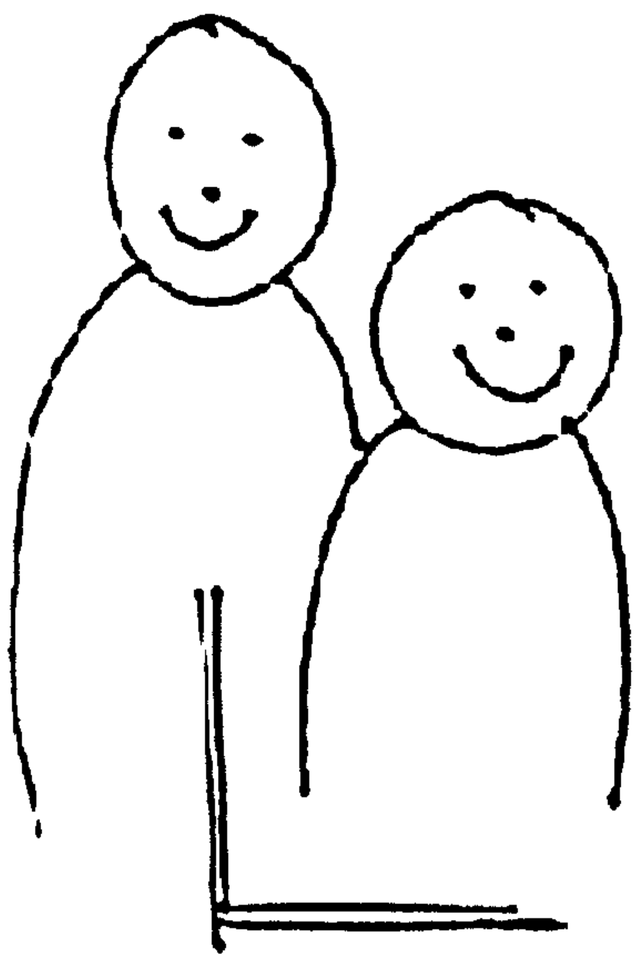
Appendix 7. The information booklet

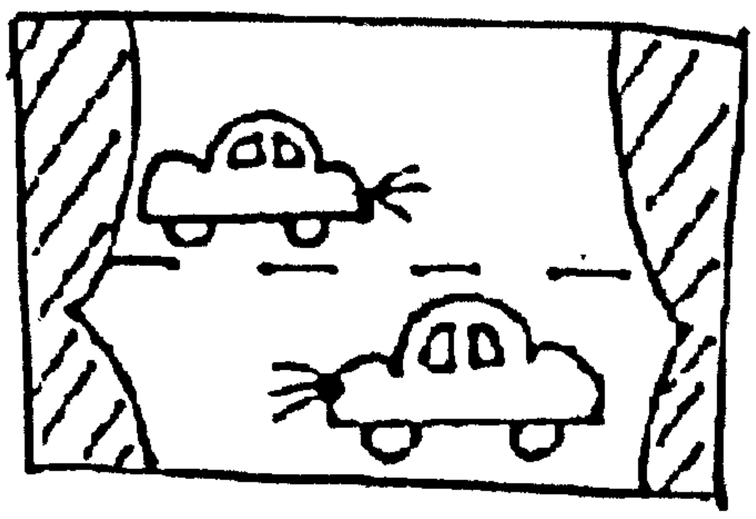
The following information booklet was published as an A5 pamphlet and given to all participants during their inception interview. Participants were talked through the booklet and received training in how to complete the diary, by completing the practice diary.

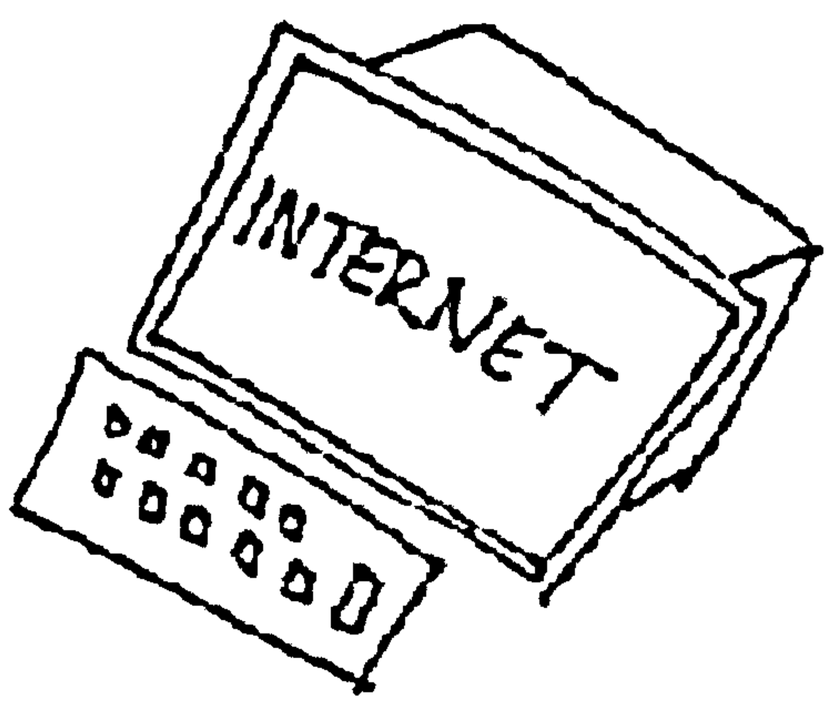
Minor revisions were made to the booklet in Wave 2, to reflect the minor alterations to the diary itself. The booklet given here is for Wave 1. The formatting has been amended for inclusion in this thesis. However, the content remains the same.

INTERNET

Investigating New Technology's Evolving Role, Nature and Effects for Transport







Information booklet for participants

Thank you for agreeing to be part of the INTERNET project.

The INTERNET project is looking at the ways in which Internet use is affecting people's travel and their participation in activities. It is the first study in the UK ever to do this. We believe that the information that you give to us could influence the development of transport and Internet policy in the UK and elsewhere.

This booklet has been designed to tell you about your role in the study - and why this research is important. Inside, you will find information about:

- your role this study, including what your participation will involve;
- how to keep in touch;
- payment;
- what happens to the information that you give to us; and
- the wider INTERNET project.

Please do not hesitate to contact me if you have any questions about the research.

Yours,

Susan Kenyon
Principal researcher, INTERNET project

About the diary study

The INTERNET project is looking at the ways in which Internet use is affecting people's travel and their participation in different activities. It is set to run for three years. We are collecting information in a number of different ways, in a number of stages. You are part of Stage 2: the diary study.

You are one of 100 people, in six different locations in the south west of England, to be involved in Stage 2. You have been especially selected to take part in this survey because of where you live, how you travel and how long you have been online. We think that these things might influence how people travel and how they use the Internet.

So what will your participation involve?

You will be asked to complete an 'accessibility diary', for seven days. You are asked to do this three times, once every six months, for a year. The diary should take you less than 15 minutes to complete each day.

In the diary, you will be asked to note down the things that you do during the day, including the things that you do on the Internet. We will also ask you to tell us what time you did the activity, where it took place and what else you were doing at the time.

This sounds like a lot of information, but we have designed the diary to be as easy and as quick to use as possible. We have also drawn up a list of different activities that you might do during the day, to help to reduce the workload. You will be shown how to use the diary at your inception meeting and instructions, plus an example of a completed diary, are included within the diary itself.

We have also included an example of the diary and full instructions in this booklet, to show you what you will be asked to do.

Please remember that all of the information that you provide will be treated confidentially and will be used anonymously. Nobody outside of the project team will be able to connect you with the information that you give to us.

There is a list of 'do's and 'don't's included in this booklet. The most important thing to remember is that you should try not to change your behaviour because of the survey, or tell us what you think we want to hear! There are no right or wrong answers and we won't judge you on what you do - or for what you don't do.

Focus groups and interviews

You might also be asked to take part in a focus group, or an interview. These will be entirely voluntary and at your convenience.

A focus group is an informal discussion group, containing around 8 people. It will last about an hour and a half and will take place near where you live. If it is difficult for you to get there, we will arrange transport for you.

An interview should last around 30 minutes and will be conducted at your home, or at another place that is convenient to you. Interviews will usually be conducted by Susan.

Completing your diary

In this section, you can read about how to complete the diary. This section should be read for the first time with a member of the project team, who will talk you through the instructions and answer any questions that you have.

After the instructions, there is a blank diary, which you can use during your inception meeting to describe your day so far. There is also an example of a completed diary, alongside a description of the day that the example describes.

When should you complete your diary?

You should complete your diary whenever it is convenient to you: either as each activity changes; at regular intervals, e.g. every two hours; at the end of the day; or even the morning after. It usually takes up less time to complete the diary at regular intervals - and this tends to be more accurate, too.

You don't need to start a new diary page for every day. Just continue using the same page. If you think that you are going to run out of space in your diary, please call Susan and she will send additional pages to you.

Activity codes

We have produced a list of all of the things that you might do during the day. We have grouped these activities into eight different categories:

- Communicating;
- Entertainment/recreation;
- Formal activities;
- Household and personal;
- Information search;
- Shopping;
- Travel; and
- Other/personal

Next to each activity, you will find a code. The code is starts with a category letter - for example, 'S' is for 'shopping' - and is followed by a number. Where the activity is done on the Internet, the code is followed by an additional letter, the letter 'I', for 'Internet'.

Please use these activity codes to describe what you did each day. This will make it easier for us to classify your answers. You should get used to using the codes quite quickly, but if you find it easier, there is space to write down your activity, then add the code later. In case you cannot find one that explains what you did, there are codes in each category for 'other' activities.

What did you do?

In this column, please write down, using an activity code, the main activity that you were doing. You might have been doing more than one thing at once, but you should decide which is the main activity that you were doing at that time.

If the main activity changes, you should start a new row in the diary.

Note:

- Everything that you do is important, however uninteresting or routine you think it is. Even if you were just resting, or sleeping, please tell us.
- If you were travelling, please make sure that you tell us about each stage of your journey. If, when travelling to work, you walk to the bus stop, take a bus to the train station, take the train, then walk into work, you should record this as four different main activities. This is shown in the example.
- Please include waiting time as travel time. For example, if you wait for ten minutes before getting on a bus, please include it in your bus travel time.
- It is especially important that you note down all of the different things that you do on the Internet. So, if you go online and first check your email, then do some grocery shopping, then do some general surfing, please record this as three different main activities. This is also shown in the example.
- When you are at work, please record this as a single activity. We don't need to know about the things that you do at work, unless they are not work-related. This is shown in the example.

Start time / end time

In these columns, please write down the approximate start and end times of the main activity, within the nearest five minutes. All of the time in your day should be accounted for.

Where did you do it?

In this column, please tell us where you were when you did the main activity. This could be, for example, 'at home', 'at office' or 'at leisure centre'. If you were travelling, please tell us that you were 'between home and work', or 'between bus stop and train station'.

Did anyone else do this with you?

In this column, please tell us if anyone was participating in the main activity with you. So, if you were surfing the web with a friend, please write 'yes' in this column. If you were surfing alone, but you were in a room where there were others around you, please write 'no' here.

Was anyone else around at the time?

Here, please tell us if there was anyone around you, who wasn't directly involved in the activity with you. Taking the example above, if you were surfing the web on your own, but were in a room where others were around you, write 'yes' in this column. If you were surfing on your own, in a room where no one else was present, write 'no'.

Secondary activities

Many people do a number of things at the same time, like eating dinner and watching TV; or driving a car and talking to a friend. If you were doing something at the same time as your main activity, please tell us about it in these columns. We need to know what you were doing and roughly how long you were doing it for.

For example, if you are at work, you might spend about 15 minutes of the day sending personal emails; or perhaps you spend 10 minutes of your lunch break walking to the shops, with 10 minutes shopping for groceries. This is shown in the example.

Practice diary

On the next pages, you will find a blank diary, with activity codes. This can be used to write down your activities so far today, during your inception meeting, to practice using the diary.

Communicating:

C1 Face to face
C2 By telephone (landline)
C3 By mobile telephone
C4 By text, or video messaging
C5 By letter
C6 By fax
C7 By email
C8 In chat room

C0 Other communicating
C0I Other communicating – Internet

Entertainment / recreation

E1 Resting, relaxing
E2 Reading
E3 Do hobbies
E4 Play sports
E5 Cinema, theatre, watch sport, etc.
E6 Social (pub, club, bingo...)
E7 Watching TV, video, DVD
E8 Listening to music, radio
E9 Travelling for pleasure
E10 Surfing (no specific purpose)
E11 Playing computer games

E0 Other entertainment / recreation
E0I Other entertainment / recreation – Internet

Formal activities

F1 Paid work
F2 Education
F2I Education – Internet
F3 Voluntary work
F3I Voluntary work – Internet
F4 Religious activity
F4I Religious activity – Internet
F5 Campaigns, civic
F5I Campaigns, civic – Internet

F0 Other formal activities
F0I Other formal activities – Internet

Household and personal

H1 Sleeping
H2 Personal care
H3 Eating, drinking, inc. preparation
H4 Housework, household maintenance
H5 Childcare
H6 Other caring activities
H7 Running errands (e.g. posting a letter)
H8 Escort (includes school run)
H9 Banking, financial
H9I Banking, financial – Internet
H10 Medical (includes GP, hospital)

H0 Other household and personal

Information search

I1 Trivia
I1I Trivia – Internet
I2 Window shopping
I2I Window shopping – Internet
I3 Journey information
I3I Journey information – Internet
I4 Employment information
I4I Employment – Internet
I5 Hobbies
I5I Hobbies – Internet
I6 Medical (inc. NHS Direct)
I6I Medical – Internet
I7 News (includes TV, newspaper)
I7I News – Internet

I0 Other information search
I0I Other information search – Internet

Shopping for:

S1 Groceries (main)
S1I Groceries (main) – Internet
S2 Groceries (top up)
S2I Groceries (top up) – Internet
S3 Clothing
S3I Clothing – Internet
S4 Music
S4I Music – Internet
S5 Journeys (**not** holidays)
S5I Journeys (**not** holidays) – Internet

S0 Other shopping
S0I Other shopping – Internet

Travel

T1 Driving the car
T2 Travelling in car as passenger
T3 Travelling on bus
T4 Travelling by coach
T5 Travelling on train
T6 Riding motorcycle or similar
T7 Travelling in taxi
T8 Riding bicycle
T9 Walking
T10 Travelling on an aeroplane

T0 Other travel

Other / Personal

O1 Other activities
O1I Other activities – Internet

O2 Personal activities
O2I Personal activities – Internet

Day(s) .....

What did you do? *Please write code for **one main** activity*	Start time	End time	Where did you do it? *E.g. at home; at office; between home and work...*	Did anyone else do this with you? *Yes / No*	Was anyone else around at the time? *Yes / No*	What else were you doing? *Please enter code and duration for up to three additional activities*					
						Code	Dur.	Code	Dur.	Code	Dur.
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Example of a completed diary

1 The person completing the diary is sleeping (H1) until 7am. They are at home, with their partner.

2 They spend half an hour, from 7 until 730, having a shower and getting dressed (H2). At the same time, they listen to the radio (E8), for about 30 minutes.

3 They eat their breakfast (H3) between 730 and 745, whilst listening to the radio. They eat alone, but others are around in the house at the time.

4 They then leave the house and the diary shows that they walk (T9), alone, from home to the bus stop.

5 Between 8 and 815, they are travelling on the bus (T3), between the bus stop and the train station. The bus journey is only ten minutes long, but they waited for the bus for about five minutes so they have included this time in their reporting of the time that they spent travelling on the bus. The diary shows that they are travelling on their own, but others are present on the bus.

6 Between 815 and 840, they are travelling on the train (T5), between train stations. Whilst they are travelling, they are able to do some work, for about 20 minutes (F1).

7 They then walk between the train station and work, between 840 and 845. They also talk on their mobile phone (C3).

8 They are working (F1) from 845am until 6pm. Whilst they are at work, in addition to their normal work activities, they spend about 15 minutes sending personal emails (C7). They also walk to the shops and back, which takes about ten minutes; and shop for groceries for ten minutes (S2).

9-12 We can then see that they repeat their journey, in reverse, to go home, but this time, instead of working whilst travelling by train, they read a book (E2), for about 15 minutes.

13 Arriving home at 7pm, they rest and relax (E1) for about 30 minutes. We can see that someone else is involved and that at the same time, we can see that they are watching TV (E7) and having a chat (C1).

14 After this, between 730 and 830, they prepare and eat their dinner (H3). At the same time, they watch TV (E7).

15 They then talk on the phone (C2) for about 20 minutes.

16 Next, they use email (C7), for about 25 minutes, between 850 and 915. At the same time, they are listening to some music (E8).

17 Next, they do their grocery shopping, using the Internet (S1I). This takes about ten minutes. No one else is directly involved, but we can see that someone else is around in the house at the time. We can also see that they are listening to music at the same time.

18 Between 925 and 945, they surf the web (E10).

19 At 945, they take a bath, clean their teeth and get ready for bed (H2), which takes about 45 minutes. They also read a book (E2) in the bath, for about 30 minutes.

20 Finally, they go to sleep at 1030 (H1).

Day(s)... Monday .....

What did you do? *Please write code for one main activity*	Start time	End time	Where did you do it? *E.g. at home; at office; between home and work...*	Did anyone else do this with you? *Yes / No*	Was anyone else around at the time? *Yes / No*	What else were you doing? *Please enter code and duration for up to three additional activities*					
						Code	Dur.	Code	Dur.	Code	Dur.
H1	:	07:00	At home	Yes	Yes						
H2	07:00	07:30	" "	No	Yes	E8	30				
H3	07:30	07:45	" "	No	Yes	E8	15				
T9	07:45	08:00	Home to bus stop	No	No						
T3	08:00	08:15	Bus stop to train station	No	Yes						
T5	08:15	08: 40	Station to station	No	Yes	F1	20				
T9	08:40	08:45	Train station to work	No	No	C3	5				
F1	08:45	18:00	At work	No	Yes	C7	15	T9	10	S2	10
T9	18:00	18:05	Work to train station	No	No						
T5	18:05	18:30	Station to station	No	Yes	E2	15				
T3	18:30	18:45	Train station to bus stop	No	Yes						
T9	18:45	19:00	Bus stop to home	No	No						
E1	19:00	19:30	At home	Yes	Yes	E7	30	C1	30		
H3	19:30	20:30	" "	Yes	Yes	E7	60				
C2	20:30	20:50	" "	Yes	Yes						
C7	20:50	21:15	" "	No	Yes	E8	25				
S1I	21:15	21:25	" "	No	Yes	E8	10				
E10	21:25	21:45	" "	No	Yes	E8	20				
H2	21:45	22:30	" "	No	No	E2	30				
HI	22:30	07:00	" "	Yes	Yes						

'Do's and 'don't's

Do remember that everything that you tell us will be treated confidentially and will be used anonymously.
Do contact Susan if you have any difficulties completing the diary, or if you have any questions about the research.
Do include as many activities as you can remember. Every activity, or journey and all time on the Internet counts, however short!
Do contact us if you are moving house.
Do remember that it is OK to drop out of the survey if you want to. We hope that you won't, because we value your participation! But we will understand if you are unable to continue.
Do tell us if you would like to leave the survey. We won't ask why, or pressure you to stay - it will just help us with the rest of the survey if you let us know.

Don't let anybody else complete your diary: you have been specially selected and we are only interested in what *you* do!
Don't miss out any activities just because you can't recall all of the details: just write down as many details as you can remember.
Don't tell us what you think we want to hear! There are no right or wrong answers and we won't judge you for what you do – or don't do!
Don't change your behaviour because of the survey. Just try to do things as you would normally.

What happens to your information?

Firstly, we will enter all of the information that you and the other participants have given into a database. We won't use your name in the database. You will be given an identity number, to ensure that your responses remain anonymous and confidential.

We will then look to see how the things that people do are related to their characteristics. For example, we will look to see if the number of years that someone has been online affects the kinds of things that they do; or if people who drive a car use the Internet in different ways to those who use public transport.

When you have completed a number of diaries, we will look to see how people's behaviour has changed over time. We will look especially to see if people are using the Internet more and, if they are, how this is affecting other things that they do.

We will send project updates to you, to tell you what we are finding out from the information that you and other participants have given to us. We will also try, towards the end of the project, to send you a personal summary of how your own Internet use, travel and participation in activities have changed over the year.

Everything that you tell us will be treated confidentially and anonymously. No one outside of the project team will be able to identify you from the information that you provide.

Payment

To thank you for participating in the research project, you will receive payments that could total £120.

For each seven-day diary that you complete, you will receive £25, which will be paid after we have received the diary. The way in which you are paid will have been discussed at your inception meeting.

For each interview that you attend, you will be paid £5 and for each focus group, £15, which you will receive at the time of the interview or focus group. Interviews will always take place in your home, or at a location convenient to you. Focus groups will take place within your immediate locality and, if it is difficult for you to get there, we will arrange transport for you.

In addition, you will receive a project pen with each diary, plus a specially-designed project mug. We will also write to you to tell you what we have found out from the survey.

Keeping in touch

If you have any questions about the study, please do not hesitate to contact Susan.

It is also important for us to be able to keep in touch with you, so that we can send you the diaries, or arrange for you to participate in an interview or focus group - and, of course, so that we can pay you! We need to know your postal address, telephone number and email address. So, if any of these change, please let us know.

We also need to know if you wish to leave the study. We won't try to persuade you to stay and we won't be angry, but it is important for the overall quality of the study that we know if you would like to leave.

You can contact Susan in the following ways.

By email: susan.kenyon@uwe.ac.uk

By mail: Centre for Transport and Society, Faculty of the Built Environment, University of the West of England, Bristol. BS16 1QY.

By telephone: 0117 328 3996

You can contact Susan in any of these ways from 9-5, Monday to Friday. You will be able to contact her by telephone at any time during the survey weeks, including weekends.

More information about the study is available at http://www.transport.uwe.ac.uk/internet

Appendix 8. Study locations: further details

A8.1 Small village: Stogumber, Somerset

The parish of Stogumber, which includes Stogumber, a smaller village and a number of outlying hamlets, has a population of c. 600[1]. Stogumber hosts a small shop, which contains a post office and has limited opening hours. There is also a pub, church and small lower[2] school. The village is four miles from a larger village, Williton, which has a small supermarket, GP and middle school. The upper school is 11 miles away in the nearest town, Minehead, which has a small range of shops and a cottage hospital. Further and higher education, large hospital and rail station are in a large town, Taunton, 14 miles away. The village has a mix of private, social and sheltered housing and a mix of socio-demographics. With the exception of the local services mentioned above, there are no employers.

There is no public transport in the village. The nearest bus stop, linking Stogumber to Williton, Minehead and Taunton, is 2.5 miles away. The road links into the village are single lane, without pavements. They are unlit and surrounded by tall hedgerows. There is a school bus for middle and upper school pupils and a private coach company runs a weekly service to the large town. A doctor's mini bus service runs to the large village twice weekly. Broadband is not currently available.

A8.2 Large village: Sandford, Devon

Sandford has a population of c. 2,000. There are two pubs, a church, primary[3] school and post office. The village shop closed shortly before the study began. There are a number of local businesses, including a vehicle maintenance centre, publishing house and various self-employed businesses. The village is 2 miles from a market town, Crediton, which is also featured in this study and has a range of food and non-food

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[1] Population figures are from the 2001 census. All observations are correct at the start of the study (March, 2004).
[2] Children attend first school from the age of 5-9; middle school from 9-13; and upper school from 13-18.
[3] Children attend infant school from 5-7 and junior from 7-11 (collectively, termed 'primary'); secondary from 11 to 16; and further education college from 16-18.

shops, a supermarket, medical and education services, with some employment opportunities in the agricultural, manufacturing and service sectors. However, the majority of education, health and retail services are in the nearest city, Exeter, which is c. 10 miles from Sandford. Crediton and Exeter are discussed more fully, below. Sandford has a mix of private and social housing and a mix of socio-demographics.

There are just eight buses a day from and to Sandford, linking the village with Exeter, via Crediton, the first outbound service at 0745 and the last inbound service leaving Exeter at 1740. The services are timed to coincide with school hours and routed to serve key education sites and the hospital in Exeter. Road links into the village are two lane. A footpath has recently been built, linking Sandford with Crediton, providing a safe walking route between the settlements. There is a local train station in Crediton and good bus services to Exeter. Broadband facilities have recently been extended into the village.

A8.3 Market town: Crediton, Devon

Crediton has a population of c. 7,000. There are a number of food shops, including a supermarket and a small selection of non-food shops. There is a cottage hospital, alongside doctor, dentist and veterinary surgeries. Secondary school education is provided in the town. There is also a library, council house and a number of entertainment venues, including a range of pubs, restaurants and social clubs. There are a number of local employers, in the agricultural, manufacturing and service sectors. For other sectors, residents are largely dependent upon the nearest city, Exeter, for employment, which is 8 miles away. Large hospitals, further and higher education and full range of retail outlets are similarly located in the city. The town has a mix of private and social housing and the Indices of Multiple Deprivations (IMD) suggests that the area has a mix of socio-demographics, with super output area (SOA) IMD scores ranging from 25.2 to 7.18 (ODPM, 2004)[4].

Crediton is on the main route of a number of bus companies and as such there are frequent bus services to Exeter, which run with a good service throughout the day and link the town directly to services including further and higher education, hospitals and shops. However, public transport between towns and villages in the area is underdeveloped. In addition, the buses serve key routes and public transport within

the town itself is not well developed, restricted to key routes. This said, Crediton is of a size where walking to the town centre from all residential areas is judged possible for the majority of residents. There is a local train station, which links to a mainline station in the city and to a small number of larger towns in Devon. Road links into Crediton are two lane, but are minor roads, which are unlit, isolated and challenging. Broadband had been introduced to Crediton shortly before the study began and access is gradually being extended throughout the town.

A8.4 Large town: Taunton, Somerset

Taunton has a population of 64,500. It is the largest town in and administrative centre of Somerset and, as such, hosts a wide variety of shops, leisure facilities, a large library with free public Internet access, the regional hospital and a number of further and higher education colleges, with plans for a university in the pipeline. As with many large towns, there is a mix of socio-demographics. Statistics show considerable contrasts between wards in Taunton. The IMD 2004 highlights the most deprived SOA with an IMD score of 44.51; the least, with 4.33 (SCC, 2004).

Taunton is a compact, flat town and thus many areas are accessible to the majority on foot or by bicycle along the network of cycle routes. Bus services within the town tend to serve radial routes, with moderate services to outlying towns and villages. Bus services are currently under council review, following the withdrawal of services by the local bus provider from unprofitable routes. The town has a mainline rail station, with links to London, Bristol, Exeter and the south west, although there are few rail stations in towns and villages in the south west. Taunton links to the motorway network via the M5, but congestion within the town is heavy at peak times. Broadband services are available.

A8.5 Outer city: Bradley Stoke area, Bristol

Five miles from Bristol city centre, Bradley Stoke and the surrounding area have local services and facilities including shops, supermarkets, six primary schools, GP surgeries, a library with free public Internet access, large sports centre, pubs/restaurants and a number of faith centres. The area is five miles from a major out

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[4] IMD figures are not available for Stogumber or Sandford, because of population size.

of town retail park. Developed largely over the past 15-20 years, the area has a mix of private and public housing and these areas are clearly demarcated. This said, Bradley Stoke and the surrounding areas are fairly homogenous when considered as SOAs, all ranked in the least deprived quintile, nationally, in the IMD.

Public transport links within the area are limited, with services largely limited to main routes between the city and the retail park. There is a mainline rail station 2-3 miles south of Bradley Stoke, with frequent connections to London, the north including Scotland, Wales to the west and the south west. The M4/M5 interchange is minutes from the area and, as such, the area has good road links to the UK, with easy access to Bristol and the surrounding area. Broadband services are available.

A8.6 Inner city: Bristol

Bristol has a population of over 380,000 and is the largest city in the south west of England. As such it is the regional centre, with a wide variety of shops and leisure facilities. There are two universities and a number of further education colleges. Bristol also hosts a number of specialist hospitals, which serve the south west. In addition to central facilities, key services are available in the majority of the inner suburbs. The socio-demographics of Bristol vary considerably between areas, with the Index of Multiple Deprivation scores suggesting that Bristol has areas in both the most and least deprived deciles, nationally – with IMD scores of 79.98 and 3.55, respectively (Mills, 2004).

There are frequent bus services within the city, running a good service along radial routes, on and off peak and to outlying towns. The city has a mainline rail station, Bristol Temple Meads, with frequent services to London, the north including Scotland, Wales to the west and principal links to the south west. There are also a number of small, local railway stations. Bristol also has a large coach station, with services across the UK. Bristol has an international airport, linking the city to mainland Europe. Bristol links to the motorway network via the M32, M4 and M5. However, congestion within the city is a problem, affecting the ability to travel by both public and private transport. Broadband services are available.

The study used the definition of the inner city of Bristol given by Bristol City Council (2000), but excluded areas seen to be extremes in terms of wealth or deprivation.

Appendix 9. Screening questionnaire and on-street recruitment questionnaire

The screening questionnaire and questionnaire used for on-street recruitment are given on the following pages. Each was slightly modified in Wave 2, to reflect the shorter duration of the survey. The questionnaires given here are for Wave 1.

INTERNET

Investigating New Technology's Evolving Role, Nature and Effects for Transport

Screening Interview

Name		Male / Female
Telephone		

Hello, please may I speak to _____

My name is Susan Kenyon and I am calling from the University of the West of England in Bristol. _____ gave me your name and suggested that I call you. We're doing some research with Internet users and _____ suggested that you might be interested in taking part. This isn't a survey – I'd just like to tell you a little bit about the study, to see if you would like to take part. Is it convenient to talk to you now, for a few minutes?

If no, ask if there is a time that I can call back:
Yes / No / Date _____ Time _____
Would they like to call me back? Date _____ Time _____
Would they like further information? Web site / Post GET DETAILS

Thank you. We are doing a study to look at the Internet and how people travel. We are looking for people to tell us about their Internet use and travel, in a specially designed diary. It should only take about ten minutes a day and you will be asked to do this for seven days in a row, three times – once every six months – starting in March.

In return, we will pay you up to £120.

Do you think that this might be something that you would consider taking part in? Yes / No

Yes:
- That's great, thank you. We are looking for a range of different types of people to take part in the study. Could I possibly ask you a few questions about yourself, to see how suitable you are for the project? It will take a couple of minutes – would this be ok?

Uncertain:
- I can send you a short summary detailing what participation would entail – and the payment structure – to you, either by post or email – would you like to read this before making up your mind?
- Would it be ok to ask you a few questions about yourself at this stage? We are looking for a range of different types of people to take part in the study. Could I possibly ask you a few questions about yourself, to see how suitable you are for the project? It will just take a couple of minutes.

No:
- OK, thank you for your time. Before you go, can you tell me if you can think of anyone else in your area, who has the Internet at home, who may be interested in taking part?

Name	
Telephone number	
Email address	

INTERNET

Investigating New Technology's Evolving Role, Nature and Effects for Transport

Screening questionnaire

Time online	Less than 6 months		More than 2 years		Year:	
Mode use	Please can you tell me roughly how often you use... is it every day...		Every day	Every week	Every month	Never
		Car				
		Motorbike				
		Bicycle				
		Bus				
		Train				
		Coach				
Age	Year _____	Under 25	25 – 34	35 – 44	44 – 60	60+
Household type	Please could you tell me how many other adults live with you? And how many children live with you? How old are they?	Alone				
		No. adults				
		No. children				
		Children age				
Address						
Email						
Location	Small village	Large village	Market town	Large town	Outer suburb	Inner suburb	Urban / Rural

Thanks very much. Would you like me to send you a letter, outlining your role in the study?

Finally, I wonder if I can arrange a time some time soon, to pop by and tell you a little bit more about the study? I would just need to tell you a bit more about the project, ask you a few more questions and show you how to use the activity diary. It should take about half an hour?

Date agreed: _____ Time agreed: _____

And can you think of anyone else who I can contact, who has the Internet at home?

Name	
Telephone number	
Email address	

Faculty of the Built Environment

Centre for Transport & Society

Hello

My name is _____ and I work for the University of the West of England in Bristol. We are doing a study about Internet use and are looking for people who have access to the Internet at home to take part. You could be paid up to £120 for taking part. Do you have a couple of minutes to talk to me just now?

Yes / No

We are asking around 20 people in your area to tell us about their Internet use in a specially designed diary. We will ask people to do this for seven days in a row, three times: the first in the second week of March, then again in September, then in March next year. We will teach you how to use the diary and we will pay £25 for each diary that you complete and return to us. We will also pay you to participate in discussion groups, or in interviews.

Does this sound like something that you would consider doing?

Yes / No

I would like to ask you a few questions about yourself, to assess your suitability for the study. I will then pass your details to a colleague, who will call you to arrange a time to visit, to tell you more about the study and to teach you how to use the diary.

1. Do you have access to the Internet at home? If no, terminate

2. Do you have any plans to move away from the area in the next year or so? If yes, terminate

3. Will you be on holiday or living away from the area during the second week of March? If yes, terminate

UWE BRISTOL

Faculty of the Built Environment

Centre for Transport & Society

How long do you think that you have been using the Internet?					
Please can you tell me roughly how often you use... is it every day...		Every day	Every week	Less	Never
	Car				
	Motorbike				
	Bicycle				
	Bus				
	Train				
Please tell me the year in which you were born?					
How many other adults live with you?					
And how many children?					
How old are the children?					
Address					
Telephone number					
Email address					

Appendix 10. Risk assessment and safety procedures

Following guidance given by organisations including the University of Bristol, the Social Research Association and the Suzy Lamplugh Trust, the following risk assessment and safety strategy were developed for use during lone interviewing away from the workplace.

A10.1 Risk assessment

Possible risks

- Physical or psychological harm to the interviewer as a results of actions by interviewee or objects in the environment .
- Physical or psychological harm to the interviewee, other members of the household or objects in the household as a result of actions by interviewer or objects in the environment.

Evaluation of the risk

The risk is judged to be slight, given actions to minimise risk detailed below, but risk remains present.

Risk control

Harm to interviewer:

- Cold calling will not be used. Recruitment methodology employed (where possible) will ensure that all interviewees are known to and recommended by other participants.
- Telephone contact with all participants prior to meeting.
- Interviewer will call a nominated member of UWE staff after each interview. If the interviewer fails to call within half an hour of the designated time, UWE staff will first call the interviewer, then the interviewee and will notify local policy within an hour of the designated call in time.
- Interviewees will be informed at the outset of the interview of the need to call in.
- Interviewer will carry a visible screech alarm and a mobile phone.
- Provision of secure private transport for the interviewer.

- Recognition of social and cultural context of interviewees and location.
- Recognition of any sensitivities of the topic under consideration and awareness of inter-personal skills necessary to defuse potential conflict.

Harm to interviewee:

- Clear explanation of the purpose and process of research at the outset of research, both verbally and in written form, including the option to leave the study at any time, despite payment.
- Guarantee of confidentiality and anonymity.
- Commitment to debrief participants at the end of the study.
- Provision of contact details for the institution in case of query or complaint.

Lone door knocking

- To minimise risk, a buddy will always know the street and start time of door knocking. The interviewer will call in every half an hour and a contingency plan should be in place in case this call is not made.
- The local police should be aware that the interviewer is operating in the area.
- Risk control applies as above.

A10.2 Safety strategy

Lone interviewing

The interviewer will inform the local police that she is interviewing in the area. The interviewer will call the nominated buddy at the end of every interview (c. 30 mins for a single person interview, an hour for a joint interview).

If the interviewer does not call:

- 30 minutes after the designated call back time, call interviewer's mobile;
- If no answer, call the last known interviewee;
- If no answer and if appropriate, call next interviewee;
- If interviewer still missing after 1 hour, call local police – they will take over from here.

Lone door knocking

The interviewer will inform the local police that she is door knocking in the area. The interviewer will call the buddy every half an hour whilst she is lone door knocking. If the

call is 15 minutes late, the buddy should call the interviewer's mobile. If contact has not been made within 30 minutes, the buddy should call the local police.

Car accidents

If there is a car accident, the interviewer should:

- Call the buddy.
- Telephone police and ambulance, however minor the incident appears.

If there is a car accident, the buddy should:

- Cancel scheduled meetings on behalf of interviewee
- Notify House Services, who should notify car hire company and UWE insurance services.

Useful telephone numbers

Local police telephone numbers and work, home and mobile numbers for the interviewee, buddies and emergency contacts were listed here.

Appendix 11. Inception questionnaire

The inception questionnaire, administered during the inception interview, is given on the following pages. The questionnaire was slightly modified in Wave 2, to reflect the shorter duration of the survey. The questionnaire given here is for Wave 1.

INTERNET

Investigating New Technology's Evolving Role, Nature and Effects for Transport

Inception meeting topic guide

Name:	

- Thank for being part of the project.

- Why here:
  - More information on project, including training on how to use diary
  - They can ask questions
  - They can change their mind
  - Inception questionnaire, to find out a little bit about them, their travel and Internet use, to help classify their answers

Show booklet

- Verbal overview of the project
  - What INTERNET is about
  - What this phase is about
  - What they will have to do

- Check: still want to take part

- Talk through the booklet. In particular:
  - Point out further details about project in booklet and on web site
  - Diary details: show example of completed diary and instruct on how to complete it
  - Diary will arrive a week before the survey, with postage paid envelope
  - What we do with their information
  - Payment – when
  - Stress year-long commitment

- Do they have any questions

- Implement questionnaire

INTERNET

Investigating New Technology's Evolving Role, Nature and Effects for Transport

Thank you for agreeing to take part in the Internet project. I need to ask you a few questions about yourself, because we need to know a little bit about you so that we can understand and classify your answers later on in the study.

Questions in the questionnaire will touch on transport, communications and technology, plus some questions about you and your household. All of the answers that you give to me will be treated confidentially and will remain anonymous – and you can refuse to answer any question if you want to.

In this first section, I am going to ask you about travel

1. Do you have a valid driving license?	Yes / No	
2. Do you hold any of these? VISUAL AID 1		Did you pay for this? / Type?
	Bus pass giving discounted travel	
	Bus pass giving free travel	
	Train pass giving discounted travel	
	Train pass giving free travel	
3. Could you tell me how many _____ you have in your household?	Car	Number:
	Motorbike or similar	Number:
	Bicycle	Number:
SCREEN AS APPROPRIATE 4. Is a _____ **always** available for **your** use?	Car	Yes / No
	Motorbike or similar	Yes / No
	Bicycle	Yes / No

5. Please can you tell me how often you use... ? Please use this visual aid and please read out the number, rather than the sentence

VISUAL AID 2

	1	2	3	4	5	6	7	8
Car								
Motorbike								
Bicycle								
Bus								
Train								
Coach								

6. Please could you tell me how you usually travel to the following places, if at all? Please answer for yourself, not your household and answer not applicable if you do not make this journey. Please read out the numbers, not the sentence. You can say more than one number if you wish.

VISUAL AID 3

	1	2	3	4	5	6	7	8	9	10
Work										
Grocery shopping: main shop										
Grocery shopping: top up shop										
Other shopping										
Family and friends less than 1 mile away										
Family and friends 1 – 5 miles away										
Family and friends more than 5 miles away										
Place of education for children										
Place of education for you										
Cash point										
Banking – not just cash point										
Doctor's surgery										

In this section, I am going to ask you some questions about your use of the Internet and other communications technologies

7. Please tell me which of the following are available in your household?

Landline telephone	Yes / No
Mobile telephone	Yes / No
Fax machine	Yes / No
Televisions	Yes / No
Television with Teletext/Ceefax	Yes / No
Television with interactive capability	Yes / No
Television with Internet access	Yes / No
VCR or DVD player	Yes / No
Radio	Yes / No
PC	Yes / No
PC connected to the Internet	Yes / No
Laptop	Yes / No

8. And how often do you use _____?

SCREEN AS APPROPRIATE

VISUAL AID 4

Landline telephone	
Mobile telephone	
Fax machine	
Television	
Teletext/Ceefax	
Interactive capability on your TV	
Internet access via your TV	
VCR or DVD player	
Radio	
Non-Internet aspects of your home PC	
The Internet	
Laptop	

9. How long ago did you first use the Internet?	Years or months	Approx. year

10. And how long ago at your home?	Years or months	Approx. year

11. Can you tell me the name of your landline telephone provider?	
12. Do you know which billing option you use? E.g. BT Togeth...	
13. Who is your ISP? E.g., BT, Freeserve, AOL...	

14. Please look at this and tell me what kind of service they provide to you?

VISUAL AID 5

15. And how much does that cost?

Subs. type	Cost – fixed	Cost – calls
1)		
2)		
3)		
4)		

Further details:

16. Please look at this and tell me if you have ever accessed the Internet in any of these places?

VISUAL AID 6

17. And how often do you use the Internet in these places?

VISUAL AID 7

	Have ever used? Y / N	How often? Write code number
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		

18. Finally in this section, please look at this and tell me which of these activities you have done online in the past three months?

VISUAL AID 8

19. And which have you done in the past week?

	Past 3 months	Past week
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		
9)		
10)		
11)		
12)		
13)		

About you and your household:

In this section, I am going to ask you some questions about you and your household. If you would rather not answer a question, please just say and we will move on to the next one.

20. First of all, we would like to pay you by cheque. Is this convenient to you?	Yes / No
21. Gender	male / female
22. Date of birth	__ / __ / __
23. Are you currently in paid employment?	Yes / No **IF NO SKIP TO Q 33**
24. What do you do?	
25. Are you self employed?	Yes / No
26. What hours do you usually work – is it usually a 9-5, or shifts, or... ?	9 – 5 or similar Shifts: detail Other: detail
27. How flexible are your hours of work allowed to be? Are they...	Completely flexible (own hours of work) Somewhat flexible e.g. monitored flexitime within limits Not at all flexible
28. And how flexible are your hours in reality?	Completely flexible Somewhat flexible Not at all flexible
29. Where do you usually work...?	At the office At home Whilst travelling Other: detail
30. Are you **allowed** to work from home?	Yes / No **IF NO SKIP TO Q 33**

31. Are you able to work at home?	Yes / No **IF NO SKIP TO Q 33**
32. Can you choose when you work at home?	Yes / No
33. Are there any children in your household? 34. Ages of children in the household?	Yes / No 1) 2) 3) 4) 5)

35. Are there any other adults in your household? 36. How old are they? 37. What is their relationship to you?	Yes / No	
	Age:	Relationship:
	1)	
	2)	
	3)	
	4)	
	5)	

38. Would you class yourself as disabled?	Yes / No
	If yes, would you mind telling me the nature of your disability?:
39. Please could you look at this tell me your highest educational qualification? VISUAL AID 9	1) 2) 3) 4) 5) 6) 7) 8) 9)
40. Please look at this and tell me which of these do you feel best describes you? VISUAL AID 10	1) 2) 3) 4) 5) 6)

41. And finally, please could you look at this and tell me which band you think your household income falls into? VISUAL AID 11	1) 2) 3) 4) 5) 6) 7) 8) 9) 10) 11)

Can you think of anyone else who might be interested in participating in the study?

Name		
Contact details		
OK to give their name as contact		
How long online?		
Household composition?		
Age?		
Mode use?		
Relationship to participant?		

Name		
Contact details		
OK to give their name as contact		
How long online?		
Household composition?		
Age?		
Mode use?		
Relationship to participant?		

Appendix 12. Prevalence Tables.

The Tables given below present a rank ordering of all recorded activities, for the sample 'Those participating in all three waves' (n=69). The third and sixth columns give the total number of minutes per week, for the whole sample. Activities given in bold are the composite activity categories created for the analysis presented in this thesis, with the exception of 'paid work', which exists within the diary as a single category.

- Table A12.1. Rank order of primary activities, total minutes per week: wave 1. n=69.
- Table A12.2. Rank order of primary activities, total minutes per week: wave 2. n=69.
- Table A12.3. Rank order of primary activities, total minutes per week: wave 3. n=69.

Rank	Activity	Total duration (minutes)	Rank	Activity	Total duration (minutes)
1	Sleeping	238072	42	Escort activities	1080
2	**Paid work**	**107974**	43	Religious activity	930
3	Eating, drinking	50273	44	Errands	858
	All travel	**44266**	45	Personal activities	775
4	Watching TV, etc.	41225	46	Entertainment online – other	773
	All social networks	**35755**	47	Info. online – window shopping	765
5	Resting, relaxing	31945	48	Education online	635
6	Personal care	25546	49	Comms. online – other	587
7	Housework	25369	50	Comms. – letter	585
8	Travelling - driving the car	22683	51	Info. – other	550
9	Hobbies	13515	52	Info. online – travel	532
	All online	**12256**	53	Shop online – other	493
10	Childcare	11080	54	Info. – window shopping	485
11	Social	11060	55	Travelling – coach	435
	All shopping	**10796**	56	Travelling – taxi	340
	All education	**10405**	57	Comms. – other	322
12	Education	9785	58	Comms. – chat room	305
13	Reading	9429	59	Travelling – for pleasure	300
14	Comms. – face to face	9055		**All employment info. search**	290
15	Travelling – walking	8696	60	Banking	289
	All info. search	**8399**	61	Banking – online	268
16	Entertainment – other	6790	62	Travelling – motorbike	267
17	Travelling – car passenger	6245	63	Comms. – mobile phone	230
18	Voluntary work	4635	64	Travelling – bicycle	225
19	Comms. – email	4003	65	Travelling – aeroplane	210
20	Household – other	3714	66	Info. – employment	190
21	Computer games	3030	67	Shop online – groceries	180
22	Shop – other	2990	68	Shop – travel	180
23	Internet surfing	2643	69	Info. online – news	175
24	Other – not specified	2400	70	Other online – not specified	200
25	Comms. – telephone	2378	71	Info. online – trivia	145
26	Listening to music	2355	72	Shop online – music	145
27	Shop – top up grocery	2288	73	Shop online – clothing	125
28	Travelling – bus	2150	74	Formal online – other	120
29	Cinema, theatre, etc.	2020	75	Info. online – employment	110
30	Shop – main grocery	1900	76	Voluntary work – online	120
31	Play sports	1885	77	Info. online – medical	75
32	Travelling – train	1858	78	Info. – travel	65
33	Missing	1701	79	Comms. – text	60
34	Info. online – hobbies	1505	80	Civic	60
35	Info. – news	1475	81	Shop online – travel	60
36	Medical	1415	82	Travelling – other	50
37	Formal – other	1390	83	Info. – trivia	40
38	Shop – clothing	1305	84	Civic – online	35
39	Caring (not childcare)	1285	85	Shop online – top up grocery	35
40	Info. online – other	1235	86	Shop – music	25
41	Info. – hobbies	1082	87	Personal – online	15

Table A12.1. Rank order of primary activities, total minutes per week: wave 1. n=69

Rank	Activity	Total duration (minutes)	Rank	Activity	Total duration (minutes)
1	Sleeping	235250	41	Info. – news	1400
2	**Paid work**	**94218**	42	Escort activities	1225
3	Eating, drinking	47104	43	Travelling – train	1120
	All social networks	**43052**	44	Comms. – letter	1020
	All travel	**42017**	45	Medical	985
4	Watching TV, etc.	32171	46	Info. – other	897
5	Housework	31414	47	Errands	798
6	Resting, relaxing	30278	48	Info. – hobbies	704
7	Personal care	23147	49	Civic	685
8	Travelling - driving the car	22034		**All employment Info. search**	639
9	Childcare	18353	50	Info. online – employment	570
	All online	**16739**	51	Info. online – window shopping	565
10	Missing	16214	52	Travelling – coach	515
11	Travelling – walking	12485	53	Travelling – aeroplane	480
12	Social	11958	54	Banking	463
	All shopping	**11279**	55	Travelling – other	430
	All education	**11241**	56	Comms. – chat room	410
13	Education	10890	57	Voluntary work – online	400
14	Comms. – face to face	10846	58	Personal activities	400
15	Hobbies	9485	59	Info. online – trivia	397
	All Info. search	**8798**	60	Education online	396
16	Reading	6679	61	Shop online – other	395
17	Entertainment – other	6160	62	Travelling – taxi	354
18	Travelling – car passenger	5962	63	Travelling – bicycle	352
19	Comms. – email	4255	64	Travelling – for pleasure	310
20	Household – other	3845	65	Travelling – motorbike	285
21	Voluntary work	3490	66	Info. – travel	280
22	Shop – other	3322	67	Info. online – travel	260
23	Comms. – telephone	3147	68	Info. online – news	260
24	Play sports	3028	69	Personal – online	253
25	Shop – top up grocery	2687	70	Other online – not specified	180
26	Listening to music	2634	71	Info. – window shopping	165
27	Computer games	2445	72	Info. – employment	159
28	Travelling – bus	2427	73	Banking – online	150
29	Caring (not childcare)	2095	74	Comms. – other	135
30	Info. online – other	2035	75	Shop online – clothing	135
31	Shop – main grocery	2030	76	Comms. – mobile phone	134
32	Shop – clothing	1990	77	Shop online – groceries	110
33	Other – not specified	1890	78	Shop – music	95
34	Comms. online – other	1860	79	Entertainment online – other	90
35	Internet surfing	1680	80	Info. – medical	75
36	Formal online – other	1650	81	Info. online – medical	75
37	Formal – other	1615	82	Info. – trivia	70
38	Cinema, theatre, etc.	1585	83	Comms. – text	37
39	Info. online – hobbies	1473	84	Comms. – fax	30
40	Religious activity	1430	85	Shop – travel	10

Table A12.2. Rank order of primary activities, total minutes per week: wave 2. n=69

Rank	Activity	Total duration (minutes)	Rank	Activity	Total duration (minutes)
1	Sleeping	228015	41	Travelling – for pleasure	1245
2	**Paid work**	**92615**	42	Escort activities	1150
3	Eating, drinking	45365	43	Info. – hobbies	1065
	All travel	**44884**	44	Travelling – train	1024
4	Watching TV, etc.	41949	45	Info. online – trivia	820
	All social networks	**38635**	46	Errands	750
5	Resting, relaxing	31415	47	Info. online – window shopping	750
6	Personal care	27234	48	Education online	745
7	Housework	26641	49	Info. – news	735
8	Travelling - driving the car	21053	50	Entertainment online – other	590
9	Childcare	18075	51	Medical	555
	All online	**16162**	52	Banking	520
10	Missing	15755	53	Travelling – bicycle	501
	All education	**12970**	54	Personal activities	495
11	Education	12325	55	Info. – window shopping	455
12	Hobbies	11591	56	Comms. – letter	420
13	Travelling – walking	11378	57	Info. – other	415
14	Social	10746	58	Info. online – travel	355
	All shopping	**10342**	59	Shop online – other	295
15	Reading	9790	60	Travelling – motorbike	275
16	Comms. – face to face	9428	61	Travelling – taxi	273
	All info. search	**7602**	62	Info. online – news	230
17	Travelling – car passenger	6060	63	Comms. – other	230
18	Household – other	4905	64	Info. online – employment	225
19	Entertainment – other	4576		**All employment Info. search**	**215**
20	Cinema, theatre, etc.	3975	65	Banking – online	215
21	Info. online – hobbies	3732	66	Comms. – mobile phone	185
22	Formal – other	3710	67	Shop – music	185
23	Comms. – email	3675	68	Travelling – other	130
24	Other – not specified	3257	69	Civic	125
25	Shop – other	3002	70	Shop online – groceries	100
26	Comms. online – other	2920	71	Shop online – clothing	100
27	Internet surfing	2710	72	Voluntary work – online	85
28	Computer games	2630	73	Info. – trivia	80
29	Voluntary work	2465	74	Other online – not specified	75
30	Caring (not childcare)	2350	75	Info. – travel	55
31	Shop – main grocery	2315	76	Info. – medical	45
32	Comms. – telephone	1940	77	Personal – online	45
33	Info. online – other	1805	78	Shop online – music	40
34	Shop – clothing	1775	79	Shop online – travel	40
35	Travelling – bus	1765	80	Travelling – aeroplane	40
36	Listening to music	1760	81	Civic – online	30
37	Religious activity	1705	82	Shop – travel	20
38	Shop – top up grocery	1620	83	Comms. – text	10
39	Play sports	1500	84	Travelling – coach	5
40	Formal online – other	1305			

Table A12.3. Rank order of primary activities, total minutes per week: wave 3. n=69

Appendix 13. Supporting Tables and Figures: Chapter 10

- Table A13.1. Minutes spent participating in key activities per week, in each wave: descriptive statistics for the subgroup 'those participating in the activity'.
- Table A13.2. Percentage change in participation in key activities over time, by subgroups, with indication of statistical significance.
- Figure A13.1. Depicting the variation in individual behaviour: all online activities.
- Figure A13.2. Depicting the variation in individual behaviour: shopping activities.
- Figure A13.3. Depicting the variation in individual behaviour: social networks activities.
- Figure A13.4. Depicting the variation in individual behaviour: all travel activities.
- Table A13.3. Creating an aggregate database: correlations between different combinations of waves (n=69).
- Figure A13.5. Minutes spent in offline and online education activities, by nature of participation.
- Figure A13.6. Minutes spent in offline education activities, by nature of participation.
- Figure 13.7. Minutes spent in online education activities, by nature of participation.
- Figure 13.8. Minutes spent in offline and online shopping activities, by nature of participation.
- Figure A13.9. Minutes spent in offline shopping activities, by nature of participation.
- Figure A13.10. Minutes spent in online shopping activities, by nature of participation.
- Figure A13.11. Minutes spent in offline and online social networks, by nature of participation.
- Figure 13.12. Minutes spent in offline social networks, by nature of participation.
- Figure A13.13. Minutes spent in online social networks, by nature of participation.
- Table A13.4. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of total Internet use.
- Table A13.5. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of Internet experience.
- Table A13.6. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of type of access to the Internet.

- Table A13.7. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of car availability.
- Table A13.8. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of frequency of car use.
- Table A13.9. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of residential location.
- Table A13.10. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of gender.

Activity	*Type*	*Wave*	*Mean*	*Median*	*Mode*	*Std. Dev.*	*Skew*	*Kurtosis*
Education	Total	w.1	416.20	105.00	0	684.46	1.80	1.92
		w.2	449.64	56.00	0	819.31	2.04	3.47
		w.3	518.80	0	0	881.97	1.56	.87
	Offline	w.1	391.40	105.00	0	658.48	1.89	2.30
		w.2	435.60	0	0	807.88	2.11	3.87
		w.3	493.00	0	0	855.66	1.55	.78
	Online	w.1	24.80	0	0	70.78	3.50	13.25
		w.2	14.04	0	0	35.61	2.99	9.20
		w.3	25.80	0	0	46.38	2.20	5.55
Employment information	Total	w.1	24.17	0	0	48.75	2.10	3.75
		w.2	53.25	0	0	119.69	2.53	6.20
		w.3	17.92	15.00	0	18.64	.39	-1.61
	Offline	w.1	15.83	0	0	31.10	1.94	3.13
		w.2	13.25	0	0	38.96	3.29	11.02
		w.3	0	0	0	0	-	-
	Online	w.1	8.33	0	0	27.33	3.45	11.91
		w.2	40.00	0	0	87.78	2.11	3.23
		w.3	17.92	15.00	0	18.64	.39	-1.61
Information search	Total	w.1	144.81	90.00	0	161.69	1.62	2.62
		w.2	151.69	52.50	0	225.00	2.54	7.86
		w.3	131.07	62.50	0	201.91	3.30	14.84
	Offline	w.1	67.02	20.00	0	105.65	2.10	4.04
		w.2	63.41	0	0	161.24	4.56	24.88
		w.3	48.19	0	0	93.19	2.68	8.00
	Online	w.1	77.79	37.50	0	118.96	2.82	10.00
		w.2	88.28	30.00	0	130.08	2.00	3.93
		w.3	82.88	27.50	0	141.87	2.81	9.31
Paid work	Total	w.1	1741.52	1717.50	0	106.60	.17	-.23
	Total	w.2	1519.65	1747.50	0	1065.05	.15	-.33
	Total	w.3	1493.79	1650.00	0	991.94	-0.6	-.93
Shopping	Total	w.1	156.46	145.00	0*	116.14	.89	.37
		w.2	163.46	165.00	0	106.13	.41	.14
		w.3	149.88	135	0	124.83	1.06	1.17
	Offline	w.1	132.94	115	0	102.95	1.08	1.25
		w.2	146.87	160	0	89.96	.03	-.55
		w.3	135.10	130	0	118.09	1.19	1.80
	Online	w.1	23.52	0	0	48.69	3.13	12.81
		w.2	16.59	0	0	42.96	3.60	15.81
		w.3	14.78	0	0	34.52	2.94	9.12
Social networks	Total	w.1	518.19	492	0	375.43	.92	.78
		w.2	623.94	560	180*	414.57	1.01	1.66
		w.3	559.93	480	0*	397.35	1.27	1.93
	Offline	w.1	446.74	405	0*	372.47	1.09	1.08
		w.2	532.86	435	180	391.67	1.31	3.05
		w.3	478.33	400	0	387.98	1.69	3.41
	Online	w.1	71.45	25	0	122.59	3.05	10.77
		w.2	91.09	20	0	142.96	1.76	2.02
		w.3	81.59	15	0	159.52	3.14	10.72
All online activities	Total	w.1	182.93	130	0	188.41	1.45	1.83
	Total	w.2	249.84	150	0	294.96	2.26	6.82
	Total	w.3	241.22	180	0	242.865	1.55	2.61
All travel activities	Total	w.1	641.54	625	215	349.69	.48	-.26
	Total	w.2	608.94	585	290	359.13	.86	.86
	Total	w.3	650.49	695	705	329.01	.15	.61

Table A13.1. Minutes spent participating in key activities per week, in each wave: descriptive statistics for the subgroup 'Those participating in the activity'

			Difference between the means (%)				
Activity	*Type*	*Waves*	*Whole sample*	*All who participated*	*Offline only*	*Online only*	*On and offline*
Education	Total	w.1 – w.2	8	8**	-37.1**	-	17.1
		w.2 – w.3	15.4	15.4****	142.5	-	1.7***
		w.1 – w.3	24.6	24.6**	52.6	-	19
	Offline	w.1 – w.2	11.4	11.4**	-30.1**	-	21.8
		w.2 – w.3	13.2	13.2****	141.7	-	1.3***
		w.1 – w.3	26	26**	52.1	-	20.2
	Online	w.1 – w.2	-43.4	-43.4*	-	-	-43.4
		w.2 – w.3	83.7	83.7	-	-	83.8
		w.1 – w.3	4	4	-	-	4
Employment information	Total	w.1 – w.2	120.4	120.4	-100	4365.1	176
		w.2 – w.3	-66.3	-66.3	0	-17.2	-94
		w.1 – w.3	-27.8	-25.8	-100	3669.8**	-83.3
	Offline	w.1 – w.2	-16.4	-16.4	-100	-	189.1
		w.2 – w.3	-100	-100	0	-	-100
		w.1 – w.3	-100	-100	-100	-	-100
	Online	w.1 – w.2	3.8	3.8	-	4365.1	168.4
		w.2 – w.3	-55.2	-55.2	-	-17.2	-920
		w.1 – w.3	115.2	115.1	-	3669.8*	-73.7
Information search	Total	w.1 – w.2	4.8	4.8**	-94.2	14.1***	16.3
		w.2 – w.3	-13.6	-13.6****	620.3*	-30.8	-15.2****
		w.1 – w.3	-9.5	-9.5	-58.1	-36.8	-1.4
	Offline	w.1 – w.2	-5.4	-5.4	-94.2	-	19.8
		w.2 – w.3	-24.0	-24.0****	620.3*	-	-39.4****
		w.1 – w.3	-28.1	-28.1	-58.1	-	-19.6
	Online	w.1 – w.2	13.5	-13.5****	-	14.1***	13.3***
		w.2 – w.3	-5.7	-5.7	-	-30.8	0.8
		w.1 – w.3	6.75	6.75	-	-36.8	14.2
Paid work	Total	w.1 – w.2	-12.7	-12.7*	-12.7*	-	-
		w.2 – w.3	-1.6	-1.7	-1.7	-	-
		w.1 – w.3	-14.2**	-14.2*	-14.2*	-	-
Shopping	Total	w.1 – w.2	4.5	4.5	-3.4	-	12.7
		w.2 – w.3	-8.3	-8.3	-0.3	-	-15.5
		w.1 – w.3	-4.2	-4.2	-3.7	-	-4.8
	Offline	w.1 – w.2	10.5	10.5	-3.4	-	31.4*
		w.2 – w.3	-8	-8	-0.3	-	-16.6
		w.1 – w.3	1.6	1.6	-3.7	-	9.6
	Online	w.1 – w.2	-29.5	-29.5	-	-	-29.5
		w.2 – w.3	-10.9	-10.9	-	-	-10.9
		w.1 – w.3	-37.2	-37.2	-	-	-37.2
Social networks	Total	w.1 – w.2	20.4**	20.4**	77.9	-	13.1
		w.2 – w.3	-10.3	-10.3	-19.7	-	-8.4
		w.1 – w.3	8	8	42.8	-	3.7
	Offline	w.1 – w.2	19.3*	19.3*	77.9	-	10.9
		w.2 – w.3	-10.2	-10.2	-19.7	-	-8
		w.1 – w.3	7.1	7.1	42.8	-	1.7
	Online	w.1 – w.2	27.5	27.5	-	-	27.5
		w.2 – w.3	-10.4	-10.4	-	-	-10.4
		w.1 – w.3	14.2	14.2	-	-	14.2

*p<.1. ** p<.05. *** p<.01. **** p<.001. Calculated as a percentage of the preceding wave. # = cannot calculate percentage change from zero. Total online and travel not included because of space constraints, because they are mode specific. Percentage changes are as follows. Online: 35.6; -3.4; 31.9. Travel: -5.1; 6.8; 1.4.

Table A13.2. Percentage change in participation in key activities over time, by subgroups, with indication of statistical significance

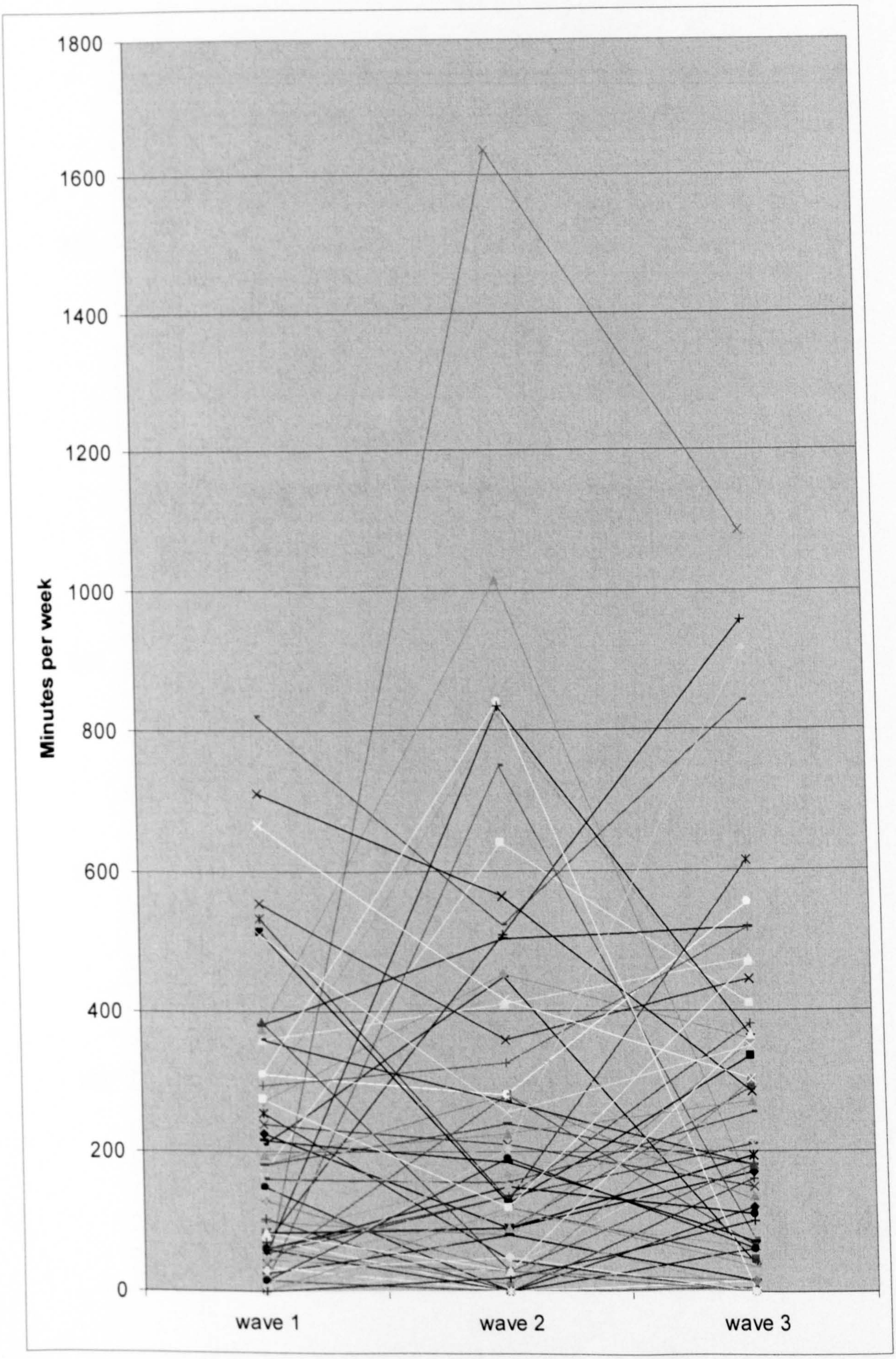


Figure A13.1. Depicting the variation in individual behaviour for all online activities, each line representing an individual

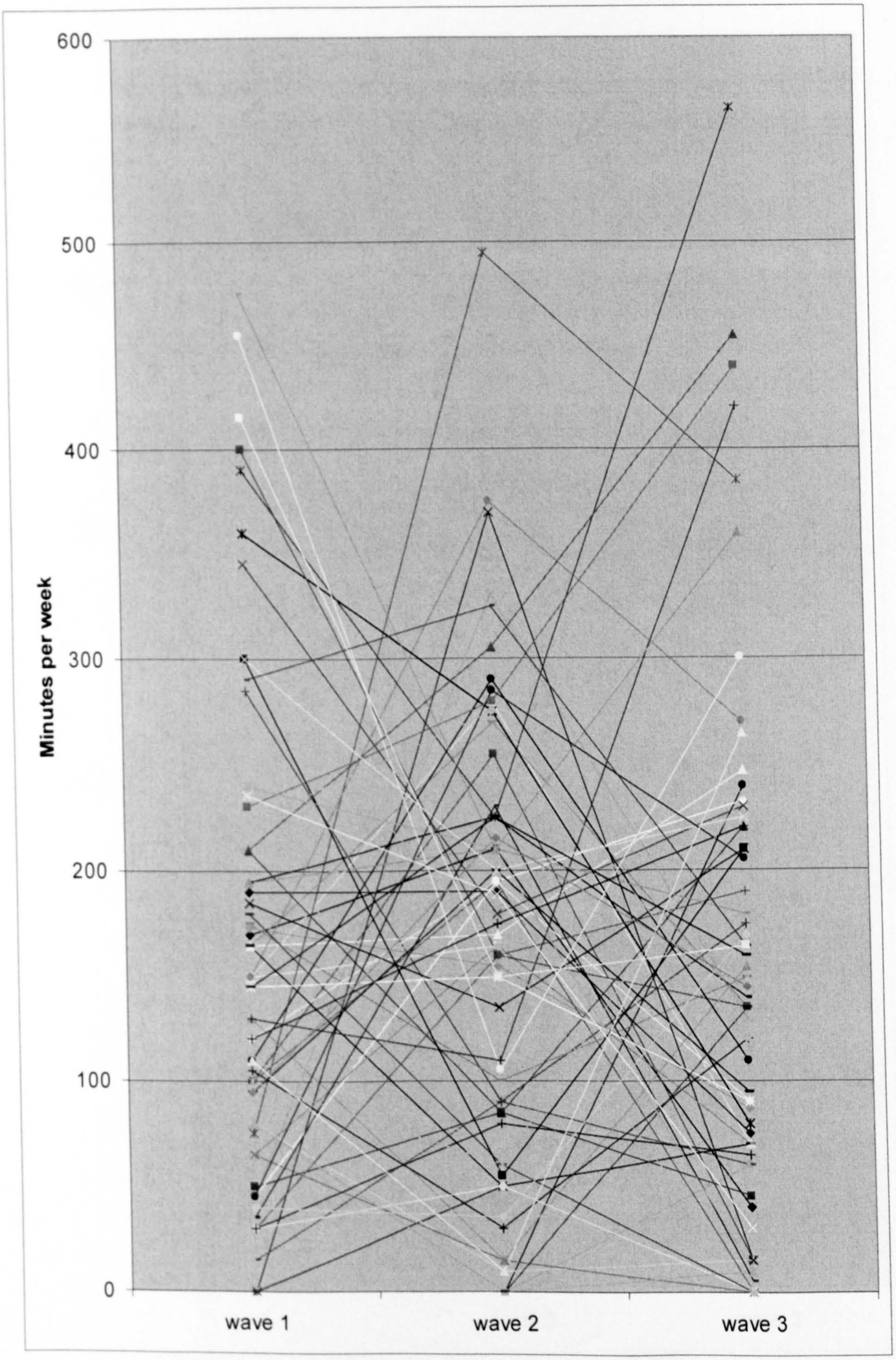


Figure A13.2. Depicting the variation in individual behaviour for shopping activities, each line representing an individual

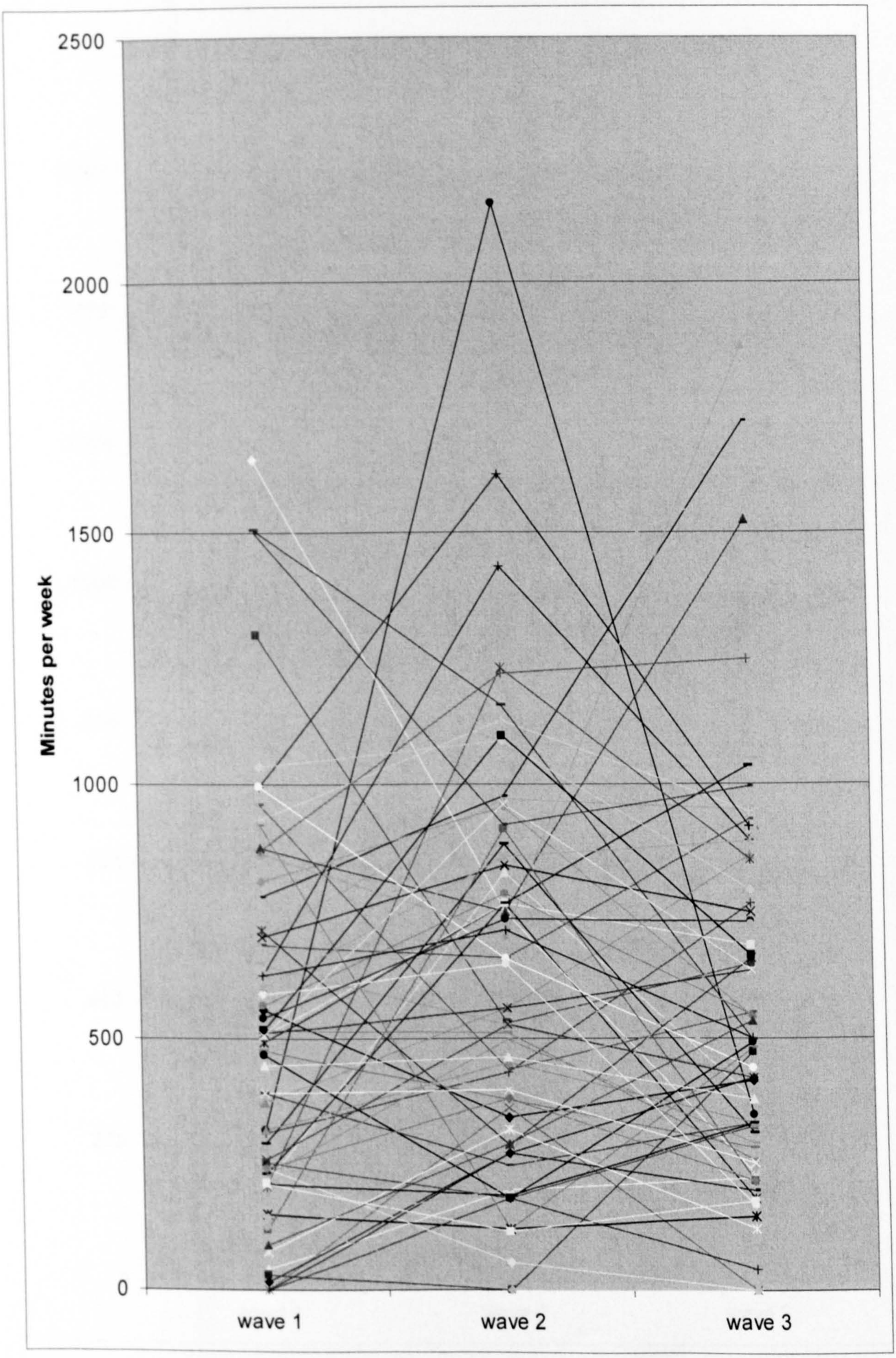


Figure A13.3. Depicting the variation in individual behaviour for social networks activities, each line representing an individual

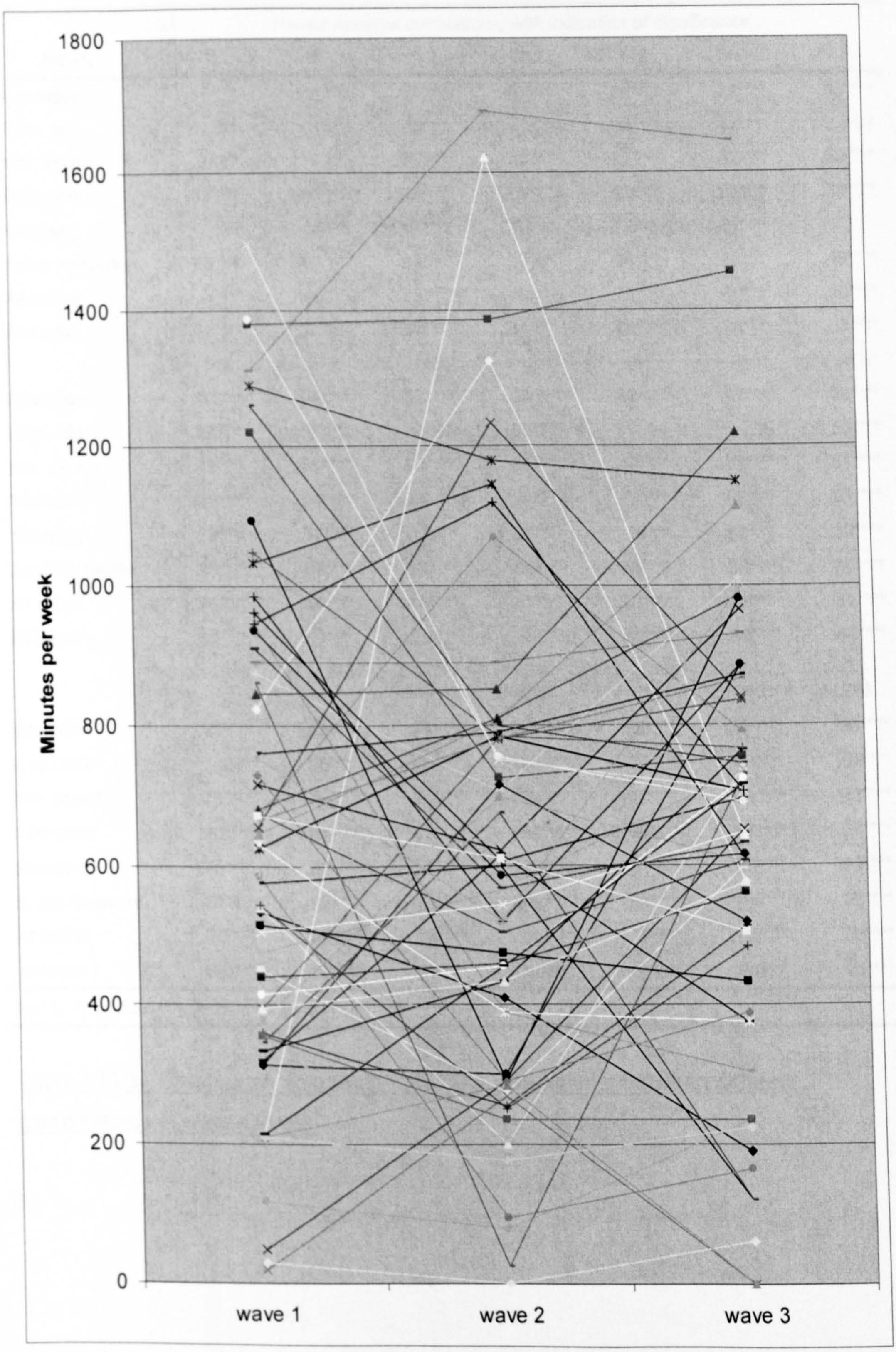


Figure A13.4. Depicting the variation in individual behaviour for all travel activities, each line representing an individual

	Paired samples correlations, with indication of significance						
Activity	*1 – 2*	*1 – 3*	*1 – 1+2*	*1 – 2+3*	*1 – 1+3*	*1 – 1+2+3*	*2 - 3*
Education	.57****	.58****	.87****	.60****	.86****	.79****	.86****
Emp. info.	.01	.2*	.39***	.05	.92****	.42****	-.04
Info. search	.37***	.17	.77****	.31**	.71****	.62****	.59****
Paid work	.68****	.68****	.91****	.73****	.92****	.88****	.76****
Shopping	.18	.30***	.792***	.31***	.79****	.71****	
Social networks	.43****	.43****	.83****	.50****	.84****	.76****	.49****
All online	.36***	.35***	.75****	.41***	.78****	.68****	.50****
All travel	.51****	.57****	.87****	.61****	.89****	.83****	.58****
	2 – 1+2	*2 – 2+3*	*2 – 1+3*	*2 – 1+2+3*	*3 – 1+2*	*3 – 2+3*	*3 – 1+3*
Education	.90****	.96****	.82****	.93****	.82****	.97****	.92****
Emp. info.	.92****	.98****	-.01	.90****	.04	.15	.56****
Info. search	.88****	.90****	.64****	.88****	.49****	.88****	.81****
Paid work	.92****	.94****	.78****	.91****	.79****	.93****	.91****
Shopping	.74****	.74****	.25**	.63****	.34***	.82****	.82****
Social networks	.86****	.87****	.55****	.81****	.56****	.86****	.86****
All online	.89****	.89****	.53****	.85****	.53****	.84****	.86****
All travel	.84****	.90****	.61****	.83****	.66****	.88****	.88****
	3 – 1+2+3	*1+2 – 2+3*	*1+2 – 1+3*	*1+2 – 1+2+3*	*2+3 – 1+3*	*2+3 – 1+2+3*	*1+3 – 1+2+3*
Education	.92****	.89****	.94****	.97****	.90****	.97****	.98****
Emp. info.	.22*	.92****	.35***	.96****	.10	.93****	.44****
Info. search	.79****	.78****	.80****	.92****	.81****	.94****	.93****
Paid work	.90****	.91****	.93****	.98****	.90****	.97****	.97****
Shopping	.75****	.67****	.69****	.88****	.71****	.89****	.91****
Social networks	.81****	.82****	.81****	.94****	.81****	.94****	.93****
All online	.80****	.84****	.76****	.93****	.78****	.95****	.90****
All travel	.85****	.87****	.87****	.96****	.83****	.95****	.95****

*p<.1. ** p<.05. *** p<.01. **** p<.001.

Table A13.3. Creating an aggregate database: correlations between different combinations of waves (n=69)

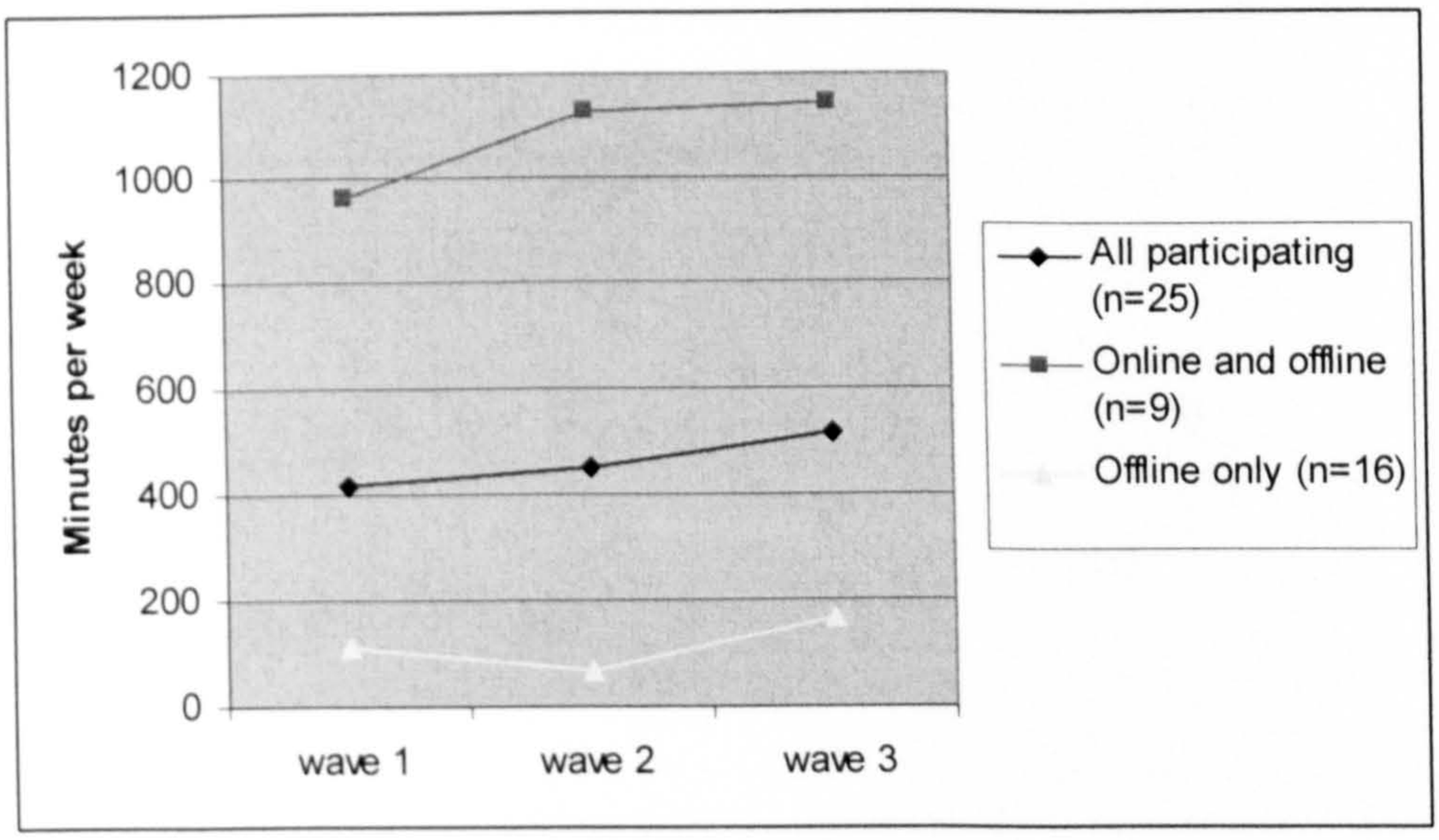


Figure A13.5. Minutes spent in offline and online education activities, by nature of participation

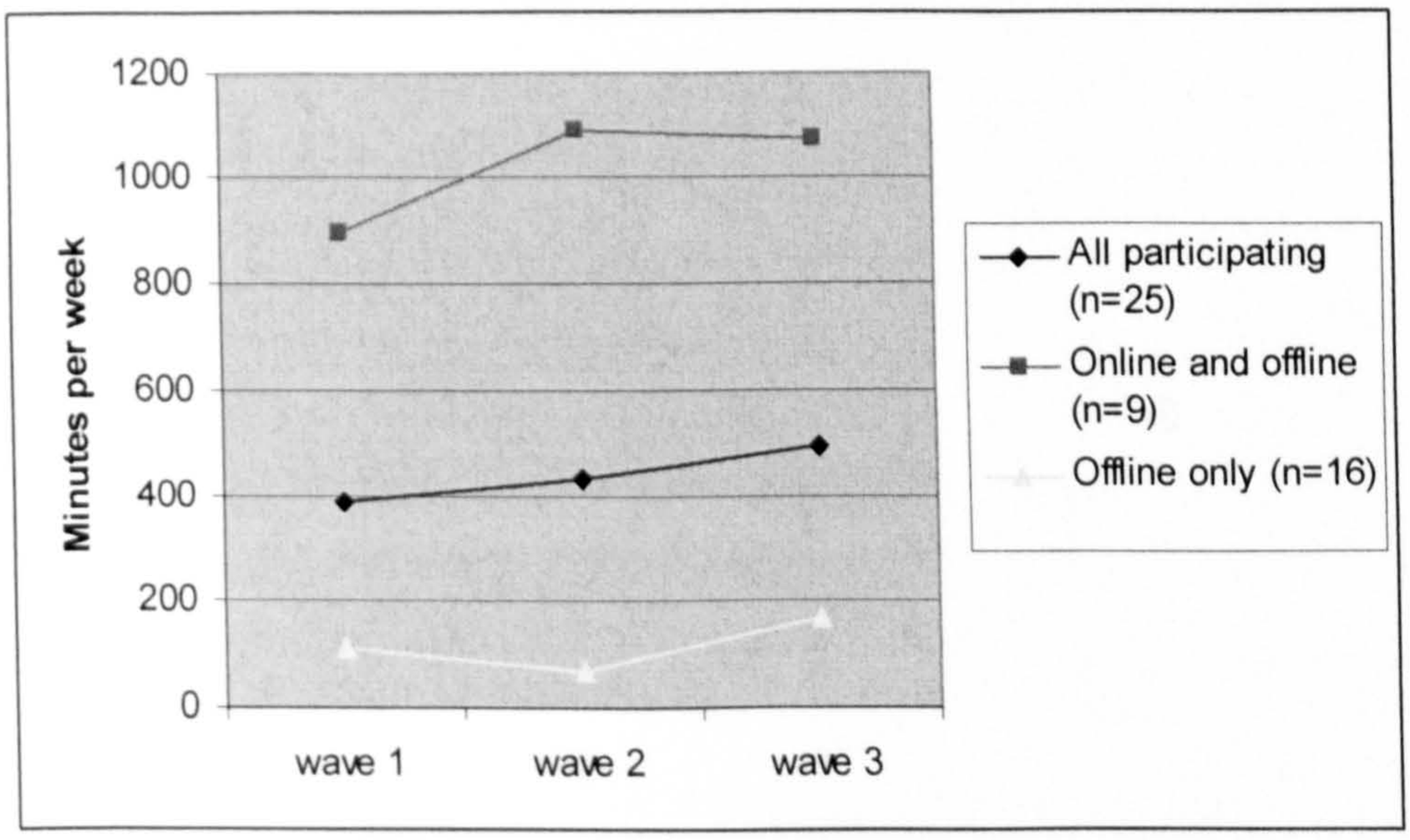


Figure A13.6. Minutes spent in offline education activities, by nature of participation

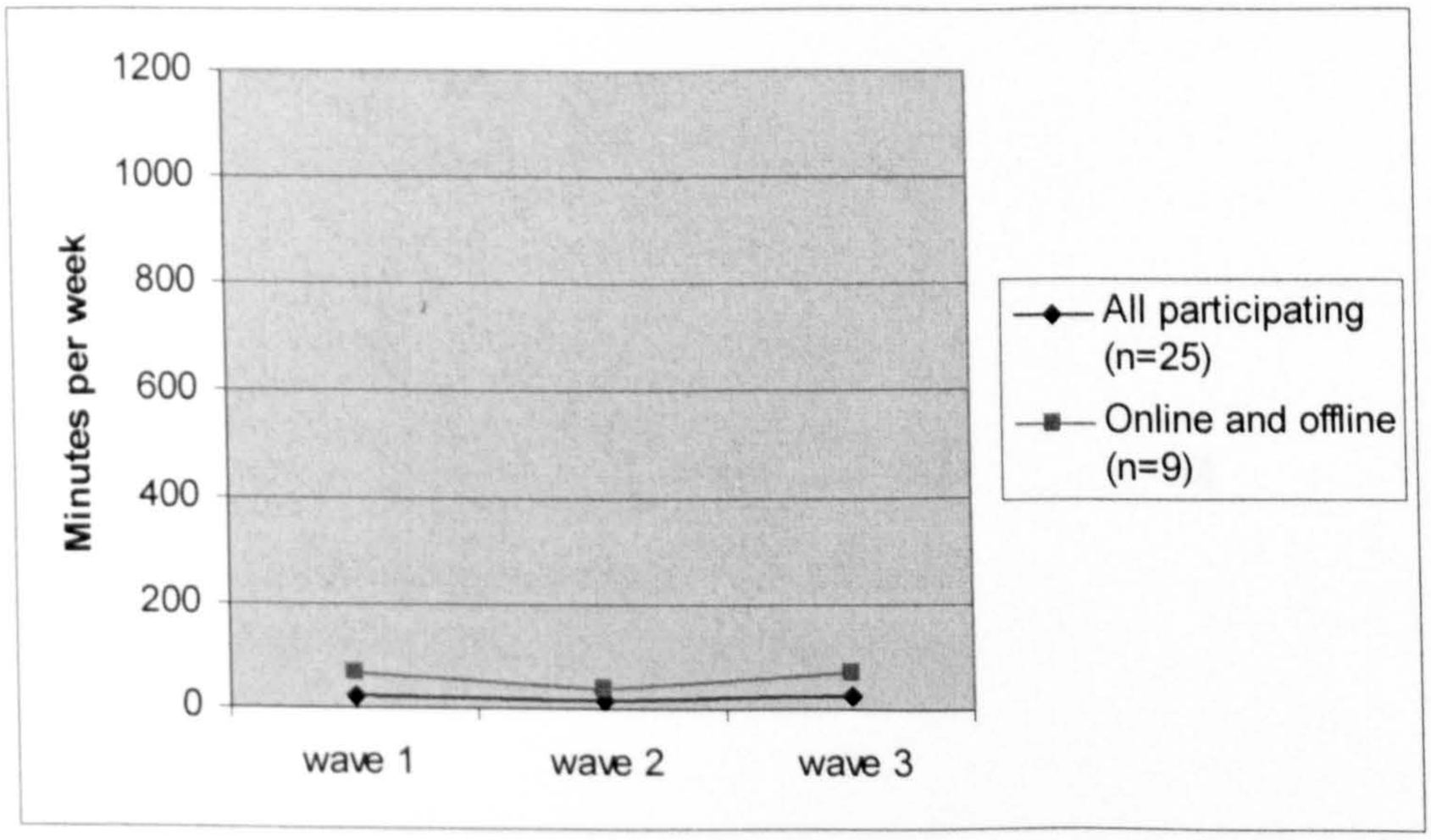


Figure A13.7. Minutes spent in online education activities, by nature of participation

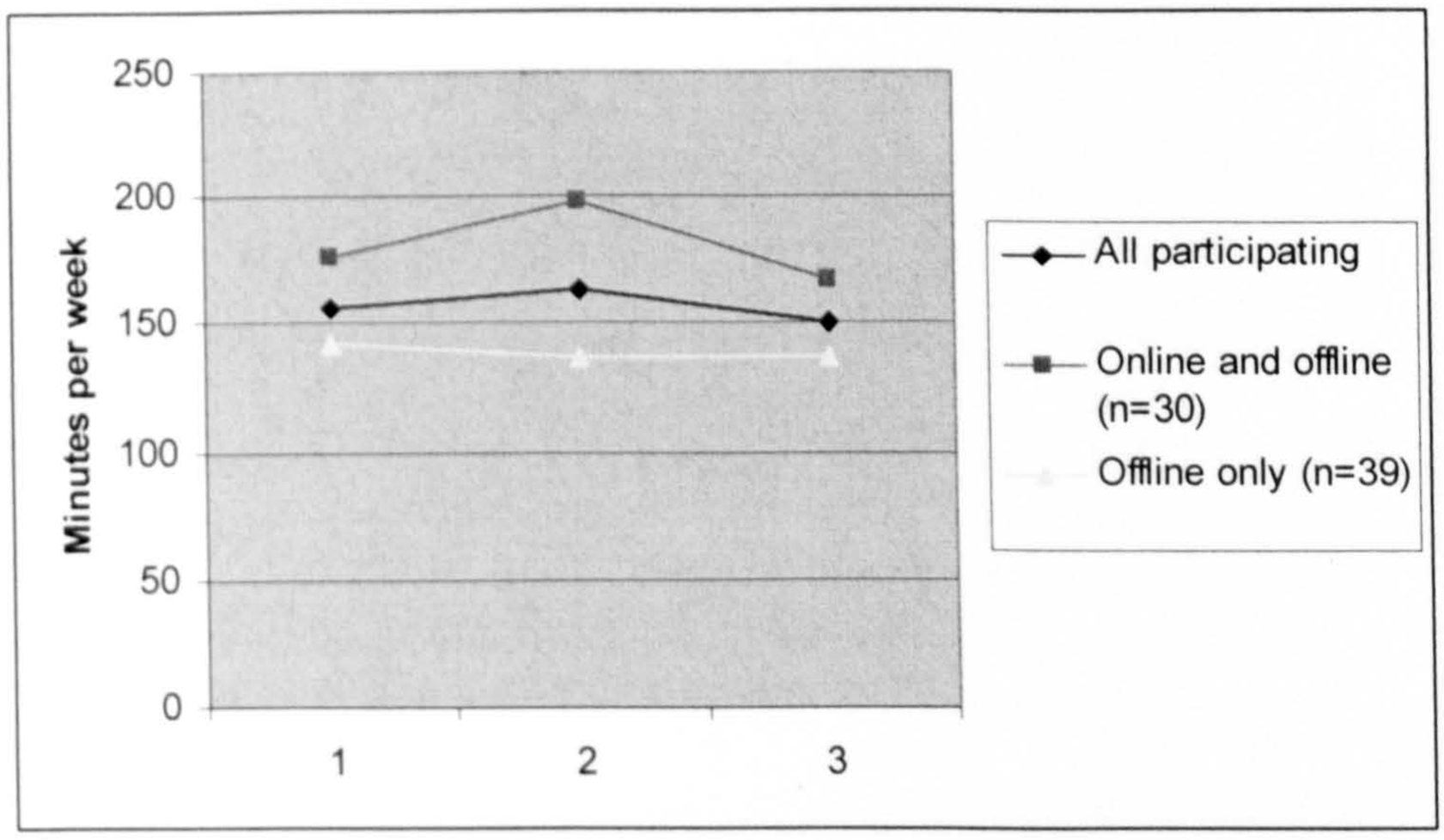


Figure A13.8. Minutes spent in offline and online shopping activities, by nature of participation

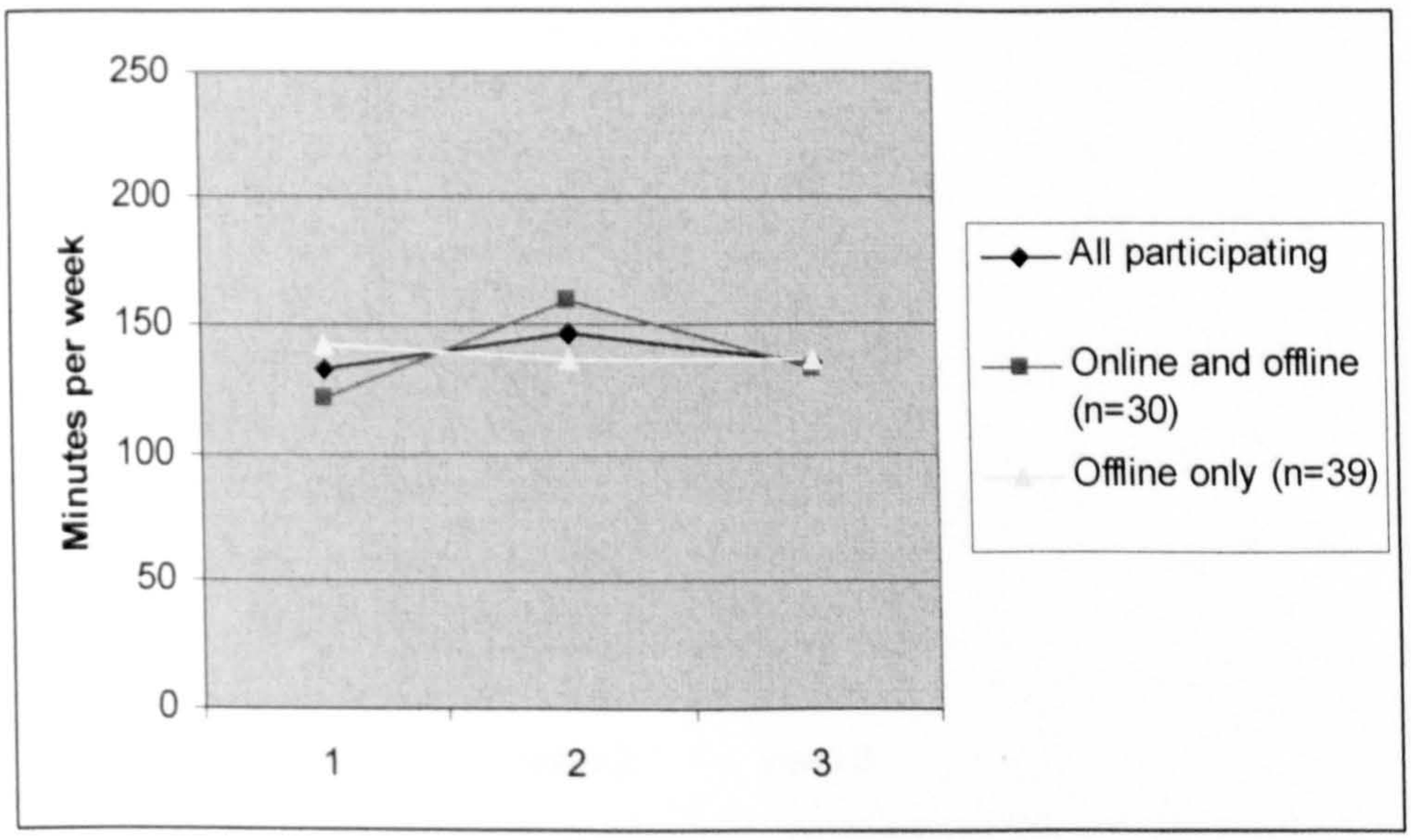


Figure A13.9. Minutes spent in offline shopping activities, by nature of participation

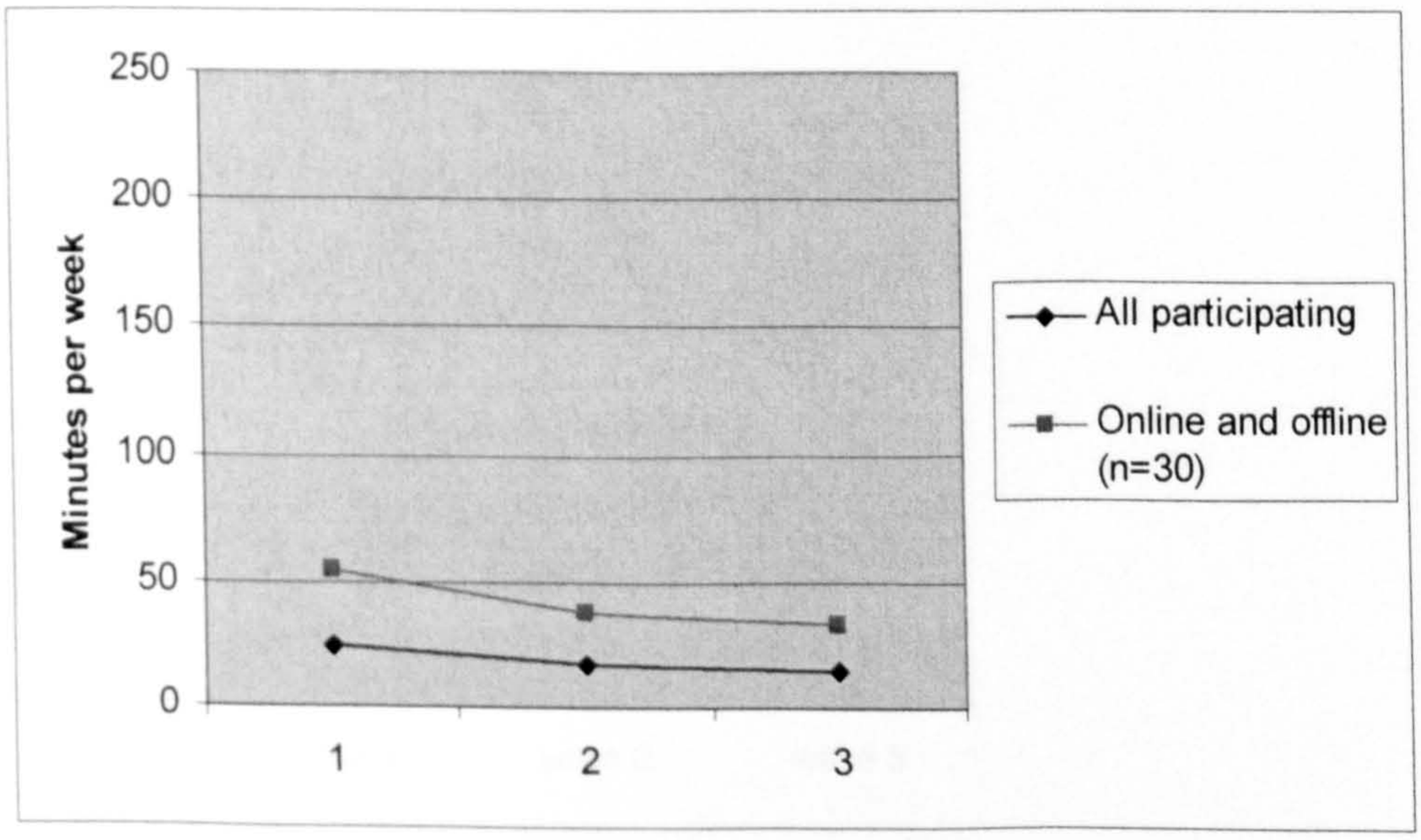


Figure A13.10. Minutes spent in online shopping activities, by nature of participation

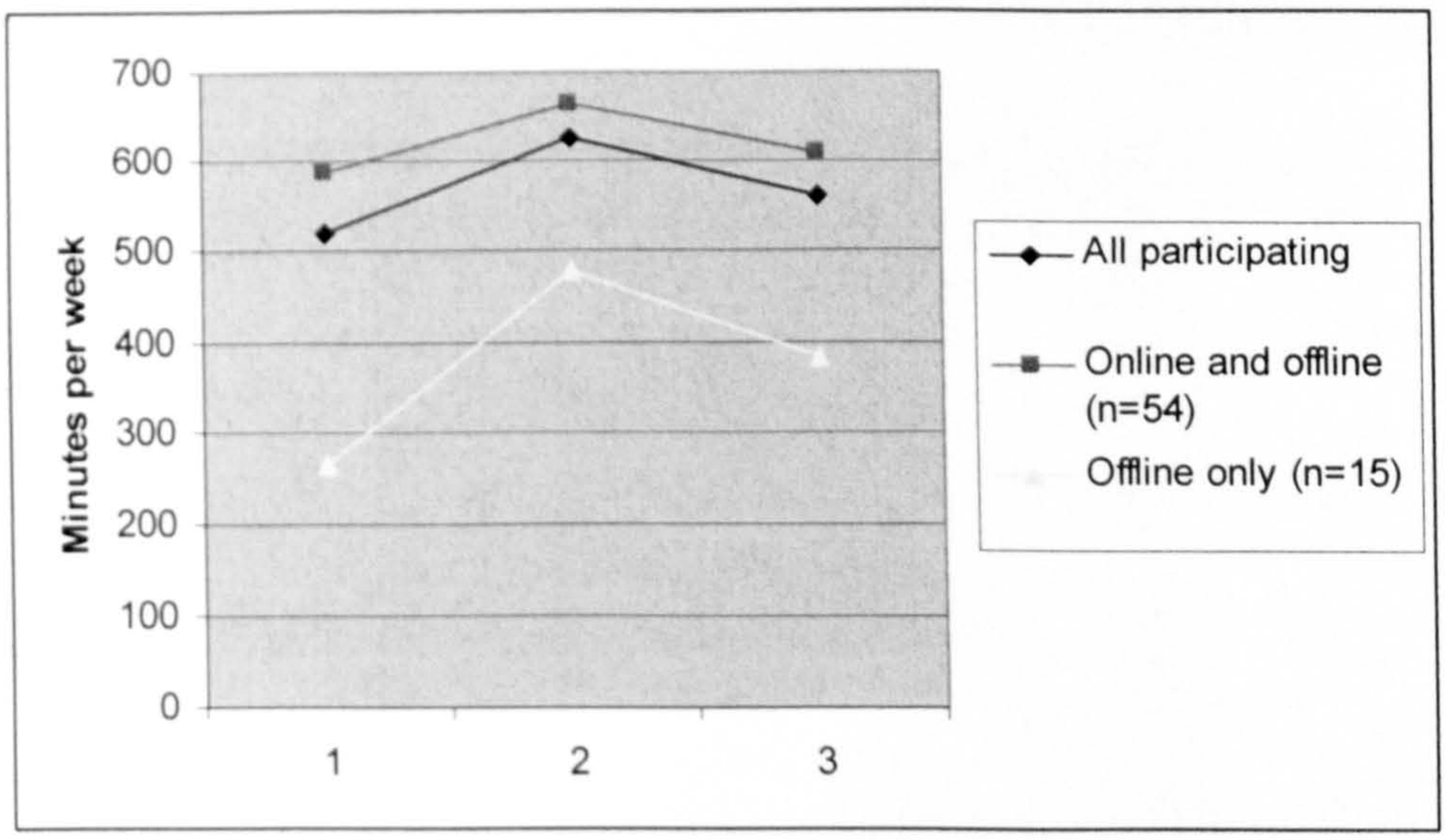


Figure A13.11. Minutes spent in offline and online social networks, by nature of participation

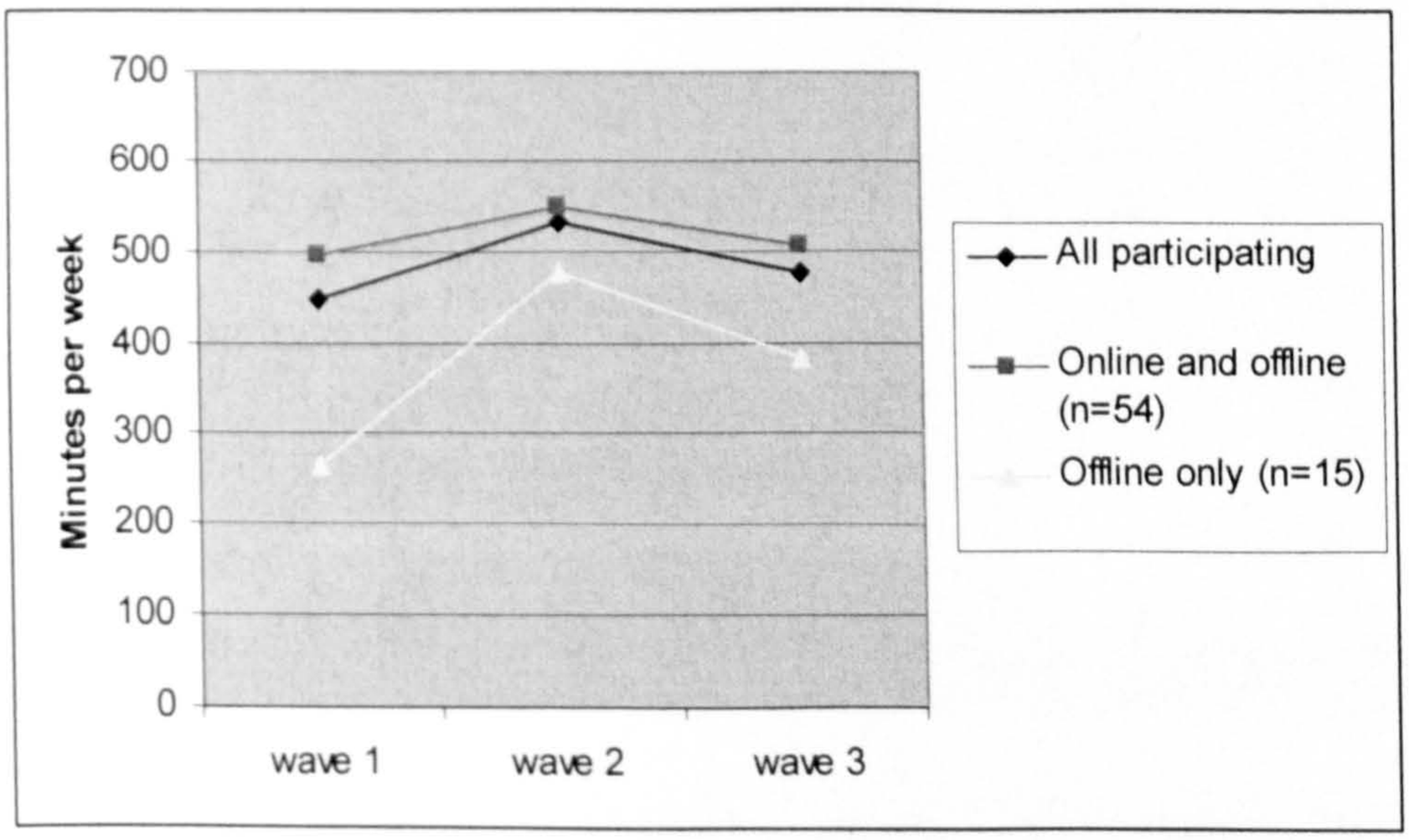


Figure A13.12. Minutes spent in offline social networks, by nature of participation

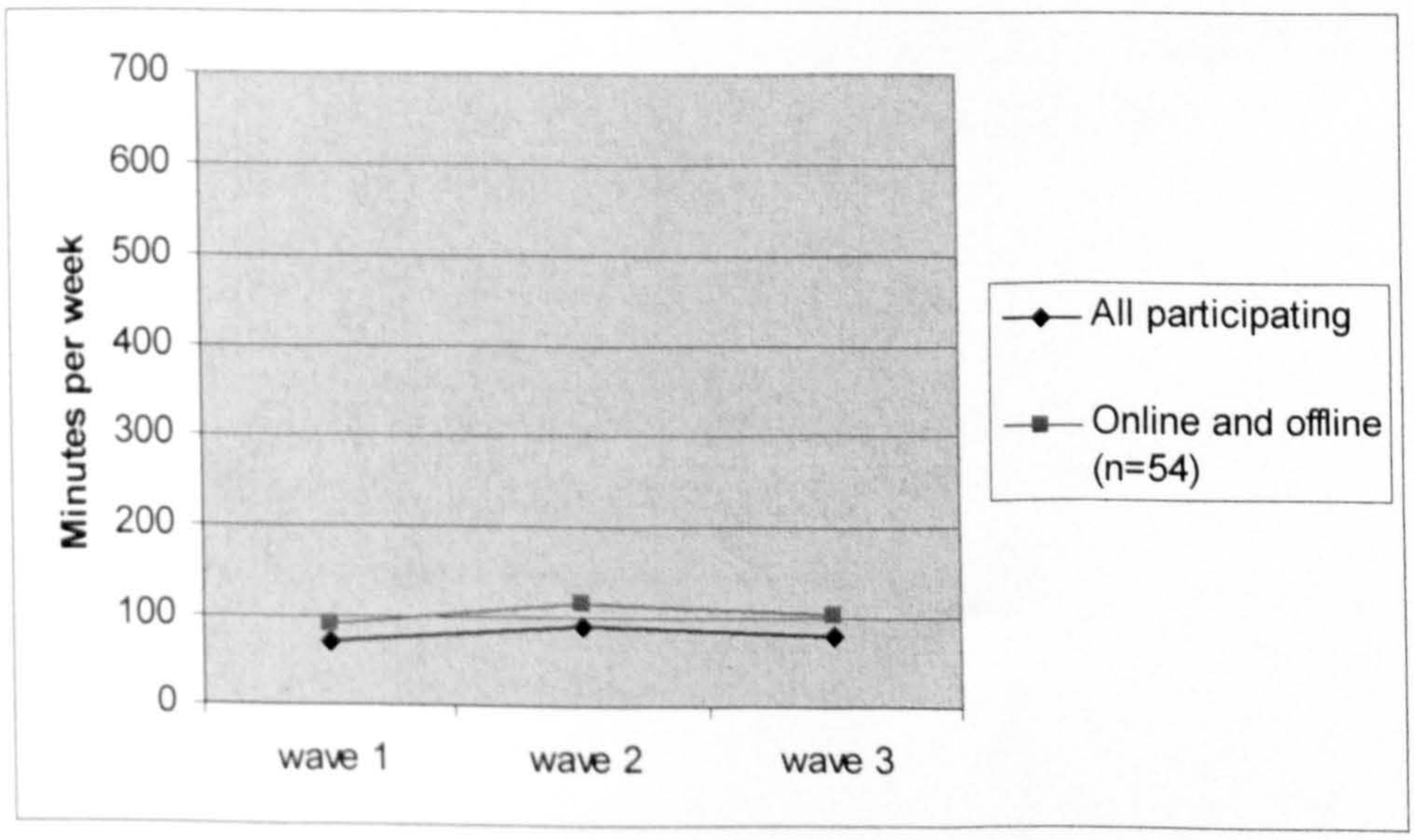


Figure A13.13. Minutes spent in online social networks, by nature of participation

Activity	*Status*	*Below and above average total Internet use (sample defined)*[1]					
		Below			*Above*		
		All[2]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	352.1	177.3	1225.8	531.4	39.2	978.8
	Offline	340.6	177.3	1156.7	505.5	39.2	929.4
	Online	11.5	0	69.2	25.9	0	49.4
	n =	*12*	*10*	*2*	*21*	*10*	*11*
Information search	Total	74.3	58.3	78.0	186.5	63.8	198.5
	Offline	36.9	58.3	32.0	73.7	63.8	74.6
	Online	37.4	0	46.0	112.9	0	12.9
	n =	*32*	*6*	*26*	*45*	*4*	*41*
Shopping	Total	149.2	136.8	189.8	161.5	123.9	190.6
	Offline	138.1	136.8	142.4	138.0	123.9	148.9
	Online	11.1	0	47.4	23.5	0	148.9
	n =	*47*	*36*	*11*	*48*	*21*	*27*
Social networks	Total	502.9	453.9	541.0	685.1	547.7	694.2
	Offline	480.3	453.9	500.7	556.0	547.7	556.6
	Online	22.7	0	40.3	129.0	0	137.6
	n =	*48*	*21*	*27*	*48*	*3*	*45*
All online activities	Total	87.0	-	-	354.9	-	-
	n =	*42*	-	-	*48*	-	-
All travel activities	Total	718.7	-	-	645.6	-	-
	n =	*48*	-	-	*48*	-	-

[1] Subgroup 1: below average total Internet use: below 176 minutes per week. Subgroup 2: above average total Internet use: 176 minutes and above.

[2] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.4. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of total Internet use

Activity	*Status*	*Years since first Internet use at home*					
		Less than 3 years			*3 years +*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	711.0	228.3	1193.7	326.3	56.8	865.2
	Offline	678.3	228.3	1128.2	312.5	56.8	823.9
	Online	32.7	0	65.5	13.8	0	41.3
	n =	*12*	*6*	*6*	*21*	*14*	*7*
Information search	Total	130.6	87.3	140.0	145.2	33.7	157.9
	Offline	61.3	87.3	55.6	56.8	33.7	59.4
	Online	69.4	0	84.4	88.4	0	98.5
	n =	*28*	*5*	*23*	*49*	*5*	*44*
Shopping	Total	138.9	120.8	176.6	164.6	139.6	196.0
	Offline	128.1	120.8	143.3	143.6	139.6	148.5
	Online	10.8	0	33.3	21.0	0	47.5
	n =	*34*	*23*	*11*	*61*	*34*	*27*
Social networks	Total	562.9	481.3	595.5	611.8	454.4	658.7
	Offline	485.2	481.3	486.8	537.0	454.4	561.6
	Online	77.7	0	108.7	74.8	0	97.1
	n =	*35*	*10*	*25*	*61*	*14*	*47*
All online activities	Total	208.8	-	-	241.4	-	-
	n =	*32*	-	-	*58*	-	-
All travel activities	Total	672.3	-	-	687.8	-	-
	n =	*35*	-	-	*61*	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.5. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of Internet experience

Activity	*Status*	*Type of access to the Internet*					
		Broadband			*Dial up*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	729.6	66.1	978.4	366.2	127.7	1558.9
	Offline	697.7	66.1	934.6	357.6	127.7	1507.2
	Online	31.9	0	43.8	8.6	0	51.7
	n =	*11*	*3*	*8*	*18*	*15*	*3*
Information search	Total	140.5	95.0	149.2	120.5	37.5	135.6
	Offline	59.2	95.0	52.4	54.9	37.5	58.1
	Online	81.3	0	96.8	65.6	0	77.6
	n =	*25*	*4*	*21*	*39*	*6*	*33*
Shopping	Total	152.5	118.4	193.8	162.7	145.6	188.9
	Offline	129.8	118.4	143.7	148.5	145.6	152.9
	Online	22.7	0	50.2	14.3	0	36.0
	n =	*31*	*17*	*14*	*48*	*29*	*19*
Social networks	Total	663.0	501.8	708.1	520.7	440.3	553.8
	Offline	568.3	501.8	586.9	461.2	440.3	469.7
	Online	94.7	0	121.2	59.6	0	84.1
	n =	*32*	*7*	*25*	*48*	*14*	*34*
All online activities	Total	293.0	-	-	164.5	-	-
	n =	*31*	-	-	*44*	-	-
All travel activities	Total	727.8	-	-	621.5	-	-
	n =	*32*	-	-	*48*	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.6. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of type of access to the Internet

Activity	*Status*	*Is a car always available for your use?*					
		No			*Yes*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	539.7	84.1	1125.5	397.0	128.0	890.1
	Offline	513.4	84.1	1065.4	381.6	128.0	846.5
	Online	26.3	0	60.1	15.4	0	43.6
	n =	*16*	*9*	*7*	*17*	*11*	*6*
Information search	Total	166.7	52.8	181.5	126.2	63.8	136.2
	Offline	81.8	52.8	85.6	46.5	63.8	43.7
	Online	84.9	0	95.9	79.8	0	92.5
	n =	*26*	*3*	*23*	*51*	*7*	*44*
Shopping	Total	143.2	103.0	197.7	161.9	146.5	186.1
	Offline	126.1	103.0	157.5	144.4	146.5	140.9
	Online	17.1	0	40.2	17.5	0	45.2
	n =	*33*	*19*	*14*	*62*	*38*	*24*
Social networks	Total	546.4	425.9	577.6	620.1	482.0	672.3
	Offline	467.5	425.9	478.3	545.9	482.0	570.0
	Online	78.8	0	99.3	74.2	0	102.3
	n =	*34*	*7*	*27*	*62*	*17*	*45*
All online activities	Total	221.3	-	-	234.6	-	-
	n =	*32*	-	-	*58*	-	-
All travel activities	Total	697.7	-	-	673.6	-	-
	n =	*34*	-	-	*62*	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.7. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of car availability

Activity	*Status*	*Frequency of car use*								
		Daily			*Weekly*			*Less than weekly*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*	*All*	*Off*	*On*
Education	Total	451.5	233.3	713.3	51.5	51.5	0	832.6	68.3	1214.7
	Offline	421.7	233.3	647.7	51.5	51.5	0	801.9	68.3	1168.8
	Online	29.8	0	65.6	0	0	0	30.7	0	46.0
	n =	*11*	*6*	*5*	*10*	*10*	*0*	*9*	*3*	*6*
Information search	Total	130.1	188.9	117.0	17.8	0	20.0	470.4	1705.0	358.2
	Offline	122.4	188.9	107.6	0	0	20.0	450.8	1608.3	345.5
	Online	7.7	0	9.4	17.8	0	0	19.7	96.7	12.7
	n =	*33*	*6*	*27*	*27*	*3*	*24*	*12*	*1*	*11*
Shopping	Total	161.7	147.4	190.3	142.6	130.7	163.5	170.4	93.3	216.6
	Offline	148.0	147.4	149.2	126.2	130.7	118.4	146.2	93.3	177.8
	Online	13.7	0	41.1	16.4	0	45.1	24.2	0	38.8
	n =	*39*	*26*	*13*	*33*	*21*	*12*	*16*	*6*	*10*
Social networks	Total	601.6	534.2	635.3	590.4	257.6	676.7	553.8	606.8	536.1
	Offline	529.5	534.2	527.1	507.9	257.6	572.8	488.6	606.8	449.2
	Online	72.1	0	108.2	82.5	0	103.9	65.2	0	86.9
	n =	*39*	*13*	*26*	*34*	*7*	*27*	*16*	*4*	*12*
All online activities	Total	208.7	-	-	246.7	-	-	227.2	-	-
	n =	*35*	-	-	*33*	-	-	*15*	-	-
All travel activities	Total	714.4	-	-	692.8	-	-	636.1	-	-
	n =	*39*	-	-	*34*	-	-	*16*	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.8. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of frequency of car use

Activity	*Status*	*Residential location*								
		Small village, large village			*Market town, large town*			*City suburbs, inner city*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*	*All*	*Off*	*On*
Education	Total	232.6	48.5	1705.0	474.4	82.0	1128.3	593.5	195.2	903.2
	Offline	221.9	48.5	1608.3	444.8	82.0	1049.4	571.7	195.2	864.2
	Online	10.7	0	96.7	29.6	0	78.9	21.8	0	38.8
	n =	*9*	*8*	*1*	*8*	*5*	*3*	*16*	*7*	*9*
Information search	Total	115.0	59.6	126.7	152.4	71.7	164.5	149.1	50.6	159.7
	Offline	51.2	59.6	49.4	59.0	71.7	57.0	63.3	50.6	64.7
	Online	63.8	0	77.2	93.4	0	107.4	85.8	0	95.0
	n =	*23*	*4*	*19*	*23*	*3*	*20*	*31*	*3*	*28*
Shopping	Total	121.4	86.3	184.5	162.6	163.0	161.8	175.6	141.6	209.6
	Offline	102.3	86.3	130.9	152.9	163.0	131.8	153.0	141.6	164.4
	Online	19.1	0	53.6	9.7	0	30.0	22.6	0	45.1
	n =	*28*	*18*	*10*	*31*	*21*	*10*	*36*	*18*	*18*
Social networks	Total	694.8	643.3	719.2	477.1	233.0	577.0	615.6	548.1	628.6
	Offline	601.8	643.3	582.1	408.7	233.0	480.6	546.5	548.1	546.2
	Online	93.0	0	137.1	68.4	0	96.4	69.1	0	82.4
	n =	*28*	*9*	*19*	*31*	*9*	*22*	*37*	*6*	*31*
All online activities	Total	255.0	-	-	204.5	-	-	233.0	-	-
	n =	*26*	-	-	*30*	-	-	*34*	-	-
All travel activities	Total	704.6	-	-	586.4	-	-	745.4	-	-
	n =	*28*	-	-	*31*	-	-	*37*	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.9. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of residential location

Activity	*Status*	*Gender*					
		Male			*Female*		
		All [1]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	320.5	110.8	1159.3	529.5	106.5	990.9
	Offline	315.2	110.8	1132.5	502.2	106.5	933.8
	Online	5.4	0	26.8	27.3	0	57.1
	n =	*10*	*8*	*2*	*23*	*12*	*11*
Information search	Total	161.2	67.2	170.9	124.7	57.6	137.1
	Offline	64.3	67.2	64.0	54.2	57.6	53.5
	Online	96.9	0	106.9	70.6	0	83.6
	n =	*32*	*3*	*29*	*45*	*7*	*38*
Shopping	Total	142.3	113.2	194.3	164.5	146.7	188.1
	Offline	124.4	113.2	144.4	147.5	146.7	148.5
	Online	17.9	0	49.9	17.0	0	39.5
	n =	*39*	*25*	*14*	*56*	*32*	*24*
Social networks	Total	640.4	546.8	675.9	560.8	397.0	610.4
	Offline	549.6	546.8	550.6	495.7	397.0	525.5
	Online	90.8	0	125.3	65.2	0	84.9
	n =	*40*	*11*	*29*	*56*	*13*	*43*
All online activities	Total	296.7	-	-	183.2	-	-
	n =	*37*	-	-	*53*	-	-
All travel activities	Total	699.3	-	-	669.9	-	-
	n =	*40*	-	-	56	-	-

[1] All = all participating; Off = those participating offline only; On = those participating online.

Table A13.10. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of gender

Appendix 14. Supporting text for Section 10.3.3. Considering the influence of key variables upon the results presented in Section 10.3.1.

A14.1 Introduction

Section 10.3.3 summarises the results of analysis to analyse the results presented in Section 10.3.1 by key variables, which are hypothesised to influence activity participation, personal travel and Internet use: income, Internet experience, mode use and residential location. The longitudinal analysis was repeated, for the total, offline and online duration of participation in the eight key activities and inter-wave differences were examined for wave 1-2, wave 2-3 and wave 1-3.

A14.2 Income

The sample was disaggregated into two groups, above and below average annual household income. Paired samples t-tests fail to suggest that there is an inter-wave difference for these subgroups and the descriptive statistics suggest the same. This holds for all key activities. The analysis was repeated for the sample divided into quintiles and the findings again suggest that there is no inter-wave effect.

A14.3 Internet experience

The sample was disaggregated into two groups, those who first used the Internet two years ago or less and those who first used the Internet three or more years ago. No statistically significant inter-wave differences were found for either subgroup, for any key activity. Tests were repeated for those who first used the Internet at home two years ago or less and for those who first used the Internet at home three or more years ago. Again, no statistically significant inter-wave effect was found.

It was not possible to analyse longitudinal behaviour by broadband/dial-up access for participants who changed their grouping over time. Thus, initial analysis only included

those who retained the same subscription for all three waves (n=53). No statistically significant longitudinal effect was found for either broadband or dial-up users, for any key activity. Additional tests considered the subgroup of those who had changed their subscription, to assess whether or not there is a longitudinal effect for this subgroup. 16 people changed from dial-up to broadband during the timeframe of the study. There was no statistically significant longitudinal effect for those who changed from dial-up to broadband, for any key activity. This suggests that changing from dial up to broadband does not significantly affect online activity participation, for this sample and for this unit of measurement.

It was intended to assess longitudinal change for subgroups according to the amount of time spent online, by population-defined quartile. However, it emerged that there is considerable variation between waves, with almost three-quarters of the sample changing subgroups between the waves. This further confirms the variability of online activity participation, highlighted in Section 10.3.1.2, supporting the contention that online activities have yet to become an established part of daily life, for the majority of participants. Rather, the place, or role, of Internet activities in daily life is still to be determined. This further supports the suggestion that Internet activities are at present supplementary. This said, the observed variability in Internet use may merely reflect the natural variability observed in all activities, which is highlighted in the discussion of 'typical weeks' in Section 10.3.1.2.

In light of this variability, it was not possible to run statistical tests to assess inter-wave change for this variable. That the amount of time that participants' spent online in each wave was observed to vary, relative to others in the sample, suggests that there may be a degree of inter-wave change that is not reflected in the statistics. However, paired samples t-tests were conducted on the subgroup 'those who have changed quartiles during the study' and no statistically significant change between waves was found, for any key activity.

A14.4 Mode use

The sample was disaggregated into three groups, according to the number of cars in the household (0, 1, 2+). No statistically significant longitudinal change was found for any group, for any key activity. Four participants changed the number of cars in the household during the study and, as such, were analysed separately. Statistical tests were conducted, despite the small sample size and no longitudinal effect was

observed. Next, the sample was assessed by car availability and no statistically significant longitudinal effect was found[1]. Finally, the sample was divided into three groups, daily, weekly and less than weekly car use. The statistics suggest that longitudinal change is not significant, for all groups and activities. Five participants changed their car use during the study and, as such, were analysed separately. Longitudinal change for this group was also not significant.

A14.5 Residential location

Finally, considering longitudinal trends, disaggregation of the sample by household location revealed different behaviour between subgroups, but no clear longitudinal effect. Thus, analysis suggests that there are possible subgroups by household location, but that they are not hiding a longitudinal effect. This holds true for all key activities.

A14.6 Summary

Whilst this analysis indicates that there may be evidence to suggest that the subgroups are behaving differently, there is no evidence to support the hypothesis that these subgroups are hiding a longitudinal effect that is cancelled out at the whole sample level. The findings therefore support those in Section 10.3.1: that there is no longitudinal effect, for this sample, for this time frame, for the activities under consideration.

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[1] No participants experienced a change in car availability across the waves.

Appendix 15. Supporting text for Section 10.4.4. Considering the influence of key variables upon the results presented in Section 10.4.3.

A15.1 Introduction

Section 10.4.4 presents a summary of the analysis to investigate the possibility that factors other than extent of time spent online may be influencing the results. This appendix presents the results of this analysis in full.

A15.2 Analysis

Table A15.1 suggests that the quartiles do not differ greatly in their composition, relative to the key variables. Whilst at first glance, there appears to be a difference based on income, this is likely to be due to the missing data for this variable. Considering the Internet variables, those in quartile 1 appear to have been online at home for less time than those in quartile 4. However, there is not a consistent trend across the quartiles, which suggests that this is unlikely to be an important factor in influencing the extent of Internet use. This is supported by the observation that the quartiles do not differ substantially in terms of first ever use of the Internet.

Differences in type of access to the Internet may be expected to influence the extent of Internet use. The data in Table A15.1 suggest that access via broadband may be correlated with extent of Internet use, as the number of participants with broadband access increases with each quartile and the number of participants with dial up access correspondingly declines. This said, this may be influenced by the missing data. Furthermore, direction of causality is not clear. That is, it is equally probable that high levels of Internet use would lead to broadband access. Thus, it is suggested that mode of access to the Internet is unlikely to be a significant confounding factor. As such, it is unlikely to have unduly influenced the above results.

The quartiles differ in composition regarding the extent of car use. However, this observation may be influenced by the missing data. In addition, there is a lack of a

consistent trend across the variables. Thus, it is suggested that this variable is unlikely to have influenced the findings detailed in Section 10.4.3. Finally, the composition of the quartiles was assessed with regard to age and gender. Findings suggest that neither is likely to be a significant confounding factor.

In summary, the analysis of the composition of the subgroups used in Section 10.4.3 suggests that, for the variables considered, there are no substantial or consistent differences between the subgroups. Therefore, it is judged unlikely that the results have been influenced by other measured variables.

Variable[1]	*Subgroups*	*Extent of Internet use: sample quartile*			
		1	*2*	*3*	*4*
Income: average household income	Below average	8	8	8	12
	Above average	16	12	11	8
Income: sample quintiles	1st and 2nd	2	2	2	1
	3rd	6	6	6	11
	4th	9	8	7	3
	5th	7	4	4	5
Internet: first ever use	< 3 years	5	4	3	4
	3 years +	19	20	21	20
Internet: first home use	< 3 years	11	9	9	6
	3 years +	13	15	15	18
Internet: type of access	Broadband	5	5	10	12
	Dial up	15	18	8	7
Mode use: no. cars in household	0	1	2	3	2
	1	10	11	9	13
	2+	13	11	9	8
Mode use: car availability	0	7	8	12	7
	1+	17	16	12	17
Mode use: extent of car use	Daily	12	12	7	8
	Weekly	10	5	8	11
	< Weekly	2	4	7	3
Residential location	Small village	3	4	2	3
	Large village	4	3	3	6
	Market town	2	5	2	4
	Large town	7	3	5	3
	City suburbs	5	3	5	4
	Inner city	3	6	7	4

Table A15.1. Composition of Internet use quartiles by key variables: number of participants

[1] Some quartiles for the Internet use and mode use variables do not sum to 24, because those changing Internet access or mode use during the study are not shown here, for reasons of clarity and space. Similarly, income-related variables may not sum to 24, because missing data is not shown in this table.

Appendix 16. Supporting text for Section 10.4.6. Considering the influence of key variables upon the results presented in Section 10.4.5.

A16.1 Introduction

Analysis presented in Section 10.4.5 suggests that those who participate online exhibit different patterns of behaviour to those participating offline only. From this, we have concluded that online participation is associated with increased total activity participation – that, in the main, online activities are supplementary to offline activities. For some activities, however, most notably information search and shopping, online activities can substitute for their offline counterparts. This section reports the findings of analysis which sought to assess whether or not these findings hold true for the subgroups identified in Chapter 9. The analysis presented in Section 10.4.6 is reported in full below.

The analysis sought to achieve a number of associated aims. *Firstly*, to explore the possibility that factors other than Internet use, including personal characteristics, are intervening to influence the above results. As discussed in Section 10.4.4 in relation to the findings presented in Section 10.4.3, it is possible that the differences in participation observed in Section 10.4.5 may not be entirely due to differences in mode of participation (offline/online), but to other variables. Should this be the case, conclusions regarding the impacts of Internet use for activity participation may be flawed. *Secondly*, the analysis aimed to explore the hypothesis given in Chapter 9 that certain characteristics are likely to influence the attractiveness and use of virtual mobility. Should this be the case, it may be concluded that different groups may benefit from virtual mobility to different extents. *Finally*, through analysis by Internet experience, the analysis aimed to further explore the observations made above regarding the likeliness of substitution and generation occurring prior to this study.

The analyses presented below represent a modest effort to assess the impact of individual characteristics upon the whole sample findings. They are, in the main, descriptive, rather than statistical, with analysis limited to the identification of trends and substantial differences in behaviour between the subgroups. This reflects the

nature of the dataset. Given the number of participants, particularly when subdivided for those participating and, within this, for online/offline participation, statistical analyses are unlikely to be meaningful. This applies to multivariate analysis, which can be used to assess alternative explanations of observed differences and relationships, as discussed in Section 10.4.4. However, for this analysis, it also applies to bivariate analysis. Tables A16.1 and A13.4 – A13.10 highlight the small numbers within each subgroup, when the subgroup 'those participating' is subdivided into those participating online and those participating offline only, then further divided to consider key variables. This also shows that there are uneven numbers of participants in the subgroups. Small and uneven populations can affect the validity of statistical tests, even more so when both combine (Bryman and Cramer, 2003). Therefore, statistical tests are only undertaken for substantially and evenly populated subgroups. In the main, analysis is restricted to key variables with two subgroups, because of the sample size.

The following subsections consider each of the key variables in turn. The analysis considers six activities: education; information search; shopping; social networks; all online activity; and all travel. Because of the low numbers undertaking employment information search, analysis within subgroups and by offline/online status was not meaningful and as such is not presented here. As in Section 10.4.5, paid work is excluded from this analysis because its offline/online status was not recorded in this study.

Section 10.4.7.1 presents detailed analysis for income as a key variable, to illustrate the process undertaken. Subsequent sections summarise the analysis for each key variable. For clarity, the following terminology is used to refer to the different subgroups. Those determined by the key variable are termed collectively 'income subgroups', 'Internet subgroups', etc. Those determined by participation either offline only or online are termed collectively 'participation subgroups'.

A16.1.1 Income

Table A16.1 shows the influence of income upon mean duration of total, offline and online activity participation, considering those participating in the activity, those participating offline only and those participating online. Table A16.1 suggests that both income groups reflect the whole sample results. Some differences in activity participation between the income subgroups are noted. However, examination of the

descriptive statistics suggests that these are likely to be due to the small sample size, with outliers unduly influencing the results, rather than to genuine differences in activity participation according to income.

Activity	*Status*	*Below and above national average household income*[1]					
		Below			*Above*		
		All[2]	*Off*	*On*	*All*	*Off*	*On*
Education	Total	369.4	54.0	1210.7	340.4	154.9	748.7
	Offline	353.6	54.0	1152.8	326.8	154.9	705.1
	Online	15.8	0	57.9	13.7	0	43.7
	n =	*11*	*8*	*3*	*16*	*11*	*5*
Information search	Total	182.2	65.7	206.5	105.6	54.2	112.1
	Offline	93.9	65.7	99.8	28.6	54.2	25.4
	Online	88.3	0	106.7	77.0	0	86.6
	n =	*29*	*5*	*24*	*36*	*4*	*32*
Shopping	Total	144.9	125.7	183.1	161.2	141.3	195.1
	Offline	132.2	125.7	145.1	143.9	141.3	148.4
	Online	12.7	0	38.0	17.3	0	46.7
	n =	*36*	*24*	*12*	*46*	*29*	*17*
Social networks	Total	602.4	337.2	690.8	536.5	510.1	547.8
	Offline	490.9	337.2	542.2	491.7	510.1	483.9
	Online	111.5	0	148.7	44.8	0	63.8
	n =	*36*	*9*	*27*	*47*	*14*	*33*
All online activities	Total	258.7	-	-	193.1	-	-
	n =	35	-	-	42	-	-
All travel activities	Total	653.7	-	-	722.8	-	-
	n =	36	-	-	47	-	-

[1] Subgroup 1: below national average household income: below £27k. Subgroup 2: above national average household income: £27k and above.

[2] All = all participating; Off = those participating offline only; On = those participating online.

Table A16.1. Mean duration of activity participation in minutes per week, by nature of participation. Assessing the influence of income

A16.1.1.1 Online and travel activities

Those below average household income are observed to spend substantially more time in online activities than those above average household income, yet less time travelling. That those on a lower income spend more time online, in combination with their lower travel time, may support the hypothesis that virtual mobility is being used to overcome financial constraints upon access using physical mobility. This may suggest that those on a lower income are likely to gain greater benefit from virtual mobility. Whilst independent samples t-tests reveal that these differences are not statistically significant, the possibility that this is due to the nature of the sample (as outlined in

10.4.7) cannot be ruled out. Further quantitative research with a larger sample, or more in depth qualitative research, could usefully explore this further.

Finally, it is notable that similar *proportions* of each income subgroup participate offline only and online[1]. This is true for all activities considered in Table A16.1. Therefore, income does not appear to influence *propensity* to use the Internet for the activities considered.

A16.1.1.2 Education activities

Table A16.1 confirms the whole sample findings. In both income subgroups, those participating online do more of the activity than those participating offline only, considering both total and offline education.

Considering differences between the income subgroups, the differences between the participation subgroups are more marked for those below than those above average household income, despite the similarity in minutes spent participating in total, offline and online education between the subgroups, for all participating in the activity. Thus, those in subgroup 1 are observed to spend a greater proportion of their education time online than those in subgroup 2. This may suggest that those on lower incomes are finding greater accessibility benefit than those on higher incomes, which may be correlated with access to physical mobility. However, this cannot be statistically verified with this sample and may be the result of small sample size.

A16.1.1.3 Information search activities

For both income subgroups, as in the whole sample, those participating online do more of this activity in total than those participating only offline, confirming the whole sample results. However, there are differences in extent of participation between the income subgroups, with those below average income undertaking substantially more offline information search than those above. Online participation is comparable. This contributes to the observed differences between the income subgroups with regard to offline participation. For those below, online participation is linked with greater offline participation; for those above, the reverse is the case. Reasons for this difference in offline information search, based on income, are unclear.

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[1] Considering education, for example, 73 percent of those in subgroup 1 participate offline only; 69 percent of those in subgroup 2 participate offline only. Considering shopping, these figures are 67 and 63 percent, respectively.

A16.1.1.4 Shopping activities

Those participating in shopping online spend more time shopping in total than those participating only offline, for both income subgroups; and similar amounts of time shopping offline. This reflects the whole sample results. It is notable that income appears to have little influence upon the amount of time spent shopping, considering total, offline and online shopping.

A16.1.1.5 Social networks activities

As with the whole sample results, those participating online are observed to spend more time in total social networks activities than those participating offline only. Whilst there is little difference between the participation subgroups for those above average income, there is a notable difference for those below, where those participating offline only spend less time in offline social networks than those participating online. The reasons for such a difference, based on income, are unclear. As such, further research with a larger sample may be expected to refute this.

Considering the extent to which different income groups may be expected to gain differential benefit from virtual mobility, Table A16.1 shows that those below average income spend more time in online social networks than those above, but same amount offline. As with education activities, this may suggest that those on lower incomes are finding greater accessibility benefit from virtual mobility than those on higher incomes, which may be correlated with income-related access to physical mobility. Again, however, this cannot be statistically verified.

A16.1.1.6 Summary

In the main, both income groups reflect the trends identified in the whole sample analysis. Therefore, income is unlikely to be influencing the findings discussed in Section 10.4.5. This said, some behavioural differences between the income subgroups are noted. With regard to education and social networks activities, these differences may suggest that those on lower incomes are finding greater accessibility benefit from virtual mobility than those on higher incomes, which may be correlated with the financial accessibility of physical mobility.

A16.1.2 Internet variables

Sections 10.4.3 and 10.4.4 concluded that the amount of time spent online *in total* does not influence activity participation, in total, offline or online activities. Analysis was undertaken to assess the influence of total Internet use upon the whole sample findings. In light of the sample size, extent of Internet use was explored not by quartiles as before, but by dividing the sample in half. The analysis revealed that total online time does not affect the whole sample findings, regarding the increased total and, for some activities, offline participation by those participating in the activity online. This further supports the findings in Sections 10.4.3 and 10.4.4.

Analysis by *type of access to the Internet* (broadband/dial up) similarly supported the whole sample findings. In the main, both subgroups mirror the whole sample trends. Considering the influence of type of Internet access upon the use of virtual mobility, there is a statistically significant difference in total Internet use between the subgroups, with those with broadband using the Internet almost twice as much as those with dial up access ($p<.001$). Thus, it is likely that type of access influences take up of virtual mobility. However, similar *proportions* of each subgroup participate offline only and online, indicating that mode of access does not affect *propensity* to engage in the online activities considered here. In addition, for the majority of activities, there is no substantial difference in total, offline or online participation, when we consider all those participating in the activity, by access subgroup. An exception is social networks activities. Broadband users spend substantially more time in total, offline and online social networks[2]. Given that this is the case for all participating, those participating online *and* those participating *offline only*, this may not be due to type of access to the Internet. However, further research with a larger sample could usefully explore the influence of type of access to the Internet upon extent of Internet use, in particular in social networks activities.

The third Internet-related variable considered the influence of *Internet experience* upon the whole sample findings. Table 10.7 revealed that few (17 percent) first used the Internet less than three years ago. Thus, analysis was for first *home* use (36 percent less than three years online at home).

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[2] Given the numbers participating in total and online, independent samples t-tests were conducted for total, offline and online participation. However, differences are not statistically significant at $p.<.05$.

The analysis supports the whole sample findings. Internet experience does not influence the difference between those participating offline only and those participating online, in any of the activities considered. As above, similar proportions of each subgroup participate offline only and online, suggesting that Internet experience, measured as +/- 3 years experience, does not influence the propensity to participate in online activities. This finding suggests that 'virtual mobility readiness', highlighted in the timeline of Internet activity in Chapter 6, occurs within three years of Internet use.

Section 10.4.5 suggested that analysis of the whole sample findings by Internet experience might enable conclusions to be drawn regarding the likeliness of substitution and generation occurring prior to this study. However, no substantial differences in participation between the subgroups were revealed by this analysis. In consequence, no such conclusions can be drawn.

A16.1.3 Mode use variables

Analysis by *car availability* supported the whole sample findings with regard to differences in participation between offline only and online participants. However, analysis failed to reveal substantial differences between the mode use subgroups, for the majority of activities. Perhaps surprisingly, this includes travel activities. The absence of substantial or significant difference in time spent travelling between the subgroups suggests that, for this sample, lack of access to a car does not affect travel *time*. However, this analysis cannot consider the number of *trips*, thus it remains possible that, whilst car availability does not affect total travel time, the *number* and *types* of activities in which each subgroup can participate may differ. This macro-level analysis does not allow consideration of these factors. However, offline participation in the selected activities does not differ. Therefore, at the aggregate activity level, there is no evidence of difference in activity participation by car availability. Furthermore, the time spent in total online activities does not differ substantially between the subgroups; nor does activity-specific online time. Therefore, there is no evidence to suggest that extent of virtual mobility, in terms of time use, is influenced by car availability. Further research, with a larger sample, could usefully consider a greater number of mode use variables, to further explore this issue.

Considering *extent of car use* and *number of cars in the household*, the sample was divided into three subgroups – daily, weekly and less than weekly car use and 0, 1 and 2+ cars, respectively. Analysis, in the main, supports the trends identified for the whole

sample. Considering the influence of these variables upon activity participation, in the main, time spent in each activity does not vary substantially by extent of car use or the number of cars in the household. In addition, similar proportions of each subgroup participated in activities offline only and online, suggesting that extent of car use and car ownership have little influence upon propensity to use virtual mobility, for this sample. This may be influenced by the numbers in each subgroup: few of the sample were without a car in the household or using a car less than weekly. Finally, the construct of the subgroup 'weekly car use', whilst necessary given the sample size (as discussed in Chapter 9), embraces a wide range of users, which is also likely to have influenced these findings. Therefore, it cannot be assumed, from this analysis, that car availability and use do not influence access to activity participation. Rather, this highlights the importance of effective sampling in research to examine social exclusion issues.

A16.1.4 Location variable

The whole sample findings were considered in relation to location. Whilst the numbers in each subgroup were sufficient for the longitudinal analysis that was originally planned, use of all six locations in this analysis would not produce meaningful results (as discussed above). Therefore, the six locations were combined into three (small/large village; market/large town; outer/inner city).

Analysis supports the whole sample trends. Whilst differences in total travel and total online activities are observed, with those living in a town participating in less of each compared to those in a village and those in the city, these differences are not statistically significant[3]. Considering participation in other activities, in the main, differences in participation are not substantial, with the following exceptions: those living in a village are observed to do less shopping than others; those in a town, to participate less in social networks. Each is for total, offline and online participation. However, the lack of a consistent trend in reduced activity participation between the location variables, alongside the fact that reduced participation is for total, offline *and* online, prevents conclusions regarding the influence of location upon participation or propensity to use virtual mobility. The aggregation of the location variables may act to mask differences and further research with a larger sample is essential if differences in

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[3] Given the group sizes for these activities, Independent samples t-tests were conducted.

accessibility and thus the attractiveness and use of virtual mobility according to location is to be understood.

A16.1.5 Demographic variables

Analysis by gender supports the whole sample trends, in all activities. Furthermore, there are no substantial differences in activity participation, either in total, offline or online, between men and women – with one exception. Considering total online participation, women spend just over 100 minutes per week less online than men (significant at $p<.05$). However, this difference is not observed on an activity-specific level for the activities considered in this thesis. Finally, analysis by age was not possible. The nature of the sample would require considerable aggregation of age variables, which would disguise age-related difference and so render this variable meaningless.

Appendix 17. Questionnaire to probe the impacts of Internet use upon participation in five key activities

The following questionnaire was distributed by email in November 2005 to all those participating in wave 3 of the diary study and to those who did not participate wave 3, but had indicated willingness to be consulted further (n=81).

Hello again

I hope that you are well and enjoying not having to complete another diary! It would really help me if you could read this email. If you reply, you could win £25.

The analysis of the diaries is progressing and we are uncovering some very interesting findings, but something is puzzling us. We thought that you might be able to help us to solve this puzzle.

We have found that people who do things *on*line (using the Internet) behave differently to those who don't. In particular, if people do an activity online, they tend to do more of that activity in total. For example, if people communicate with their friends and family (at least in part) online, they tend to spend more time communicating with friends and family than those who communicate only *off*line (not using the Internet).

We have thought of a number of explanations for this - can you tell us which you think sounds most likely to explain this, *for you*, for each of the activities below?

It should only take you a few minutes to comment and everyone who replies to this email will be entered into a prize draw to win £25 - very handy with Christmas just around the corner!

Just reply to this email and type your responses into the spaces provided.

I hope to hear from you.

Take care,

Susan

PS The prize draw will take place on 9th Dec, so don't forget to reply asap.

If you don't do the activity online, please just skip past it and move on to the next one. Please write 'YES' next to the statement that best applies to you, for each activity, then write the answers to the following questions.

SHOPPING:

(1) What effect has using the Internet for shopping had upon how much *time* you spend shopping offline?

I think that doing shopping online has...
- made me spend *more time* doing offline shopping;
- made me spend *less time* doing offline shopping;
- had *no effect* on the time that I spend in offline shopping.

(2) Has your online shopping been *in addition to* or *instead of* your offline shopping?

(3) Do you have any further comments on this? If so, write them here...

COMMUNICATING WITH FAMILY AND FRIENDS:

(1) What effect has using the Internet for communicating with your family and friends had upon how much *time* you spend communicating with your family and friends offline?

I think that communicating with my family and friends online has...
- made me spend *more time* communicating with them offline;
- made me spend *less time* communicating with them offline;
- had *no effect* on the time that I spend communicating with them offline.

(2) Have your online communications with family and friends been *in addition to* or *instead of* your offline communications with family and friends?

(3) Do you have any further comments on this? If so, write them here...

EDUCATION:

(1) What effect has using the Internet for education had upon how much *time* you spend in education offline?

I think that doing education online has...
- made me spend *more time* doing offline education;
- made me spend *less time* doing offline education;
- had *no effect* on the time that I spend in offline education.

(2) Has your online education been *in addition to* or *instead of* your offline education?

(3) Do you have any further comments on this? If so, write them here...

EMPLOYMENT INFORMATION:

(1) What effect has using the Internet for employment information had upon how much time you spend looking for employment information offline?

I think that looking for employment information online has...
- made me spend *more time* doing offline employment information search;
- made me spend *less time* doing offline employment information search;
- had *no effect* on the time that I spend in offline employment information search.

(2) Has your online employment information search been *in addition to* or *instead of* your offline employment information search?

(3) Do you have any further comments on this? If so, write them here...

INFORMATION SEARCH – ALL KINDS OF INFORMATION

(1) What effect has using the Internet for information search had upon how much *time* you spend doing information search offline?

I think that doing information search online has...

- made me spend *more time* doing offline information search;
- made me spend *less time* doing offline information search;
- had *no effect* on the time that I spend in offline information search.

(2) Has your online information search been *in addition to* or *instead of* your offline information search?

(3) Do you have any further comments on this? If so, write them here...

THANK YOU.

Now just hit the 'send' button and we will enter you into the prize draw.

Appendix 18. Supporting Figures: Chapter 11

- Figure A18.1. Total minutes spent in education activities per week (n=69)
- Figure A18.2. Total minutes spent in employment information search per week (n=69)
- Figure A18.3. Total minutes spent in information search activities per week (n=69)
- Figure A18.4. Total minutes spent in paid work activities per week (n=69)
- Figure A18.5. Total minutes spent in shopping activities per week (n=69)
- Figure A18.6. Total minutes spent in social networks activities per week (n=69)
- Figure A18.7. Total minutes spent in online and travel activities per week (n=69)

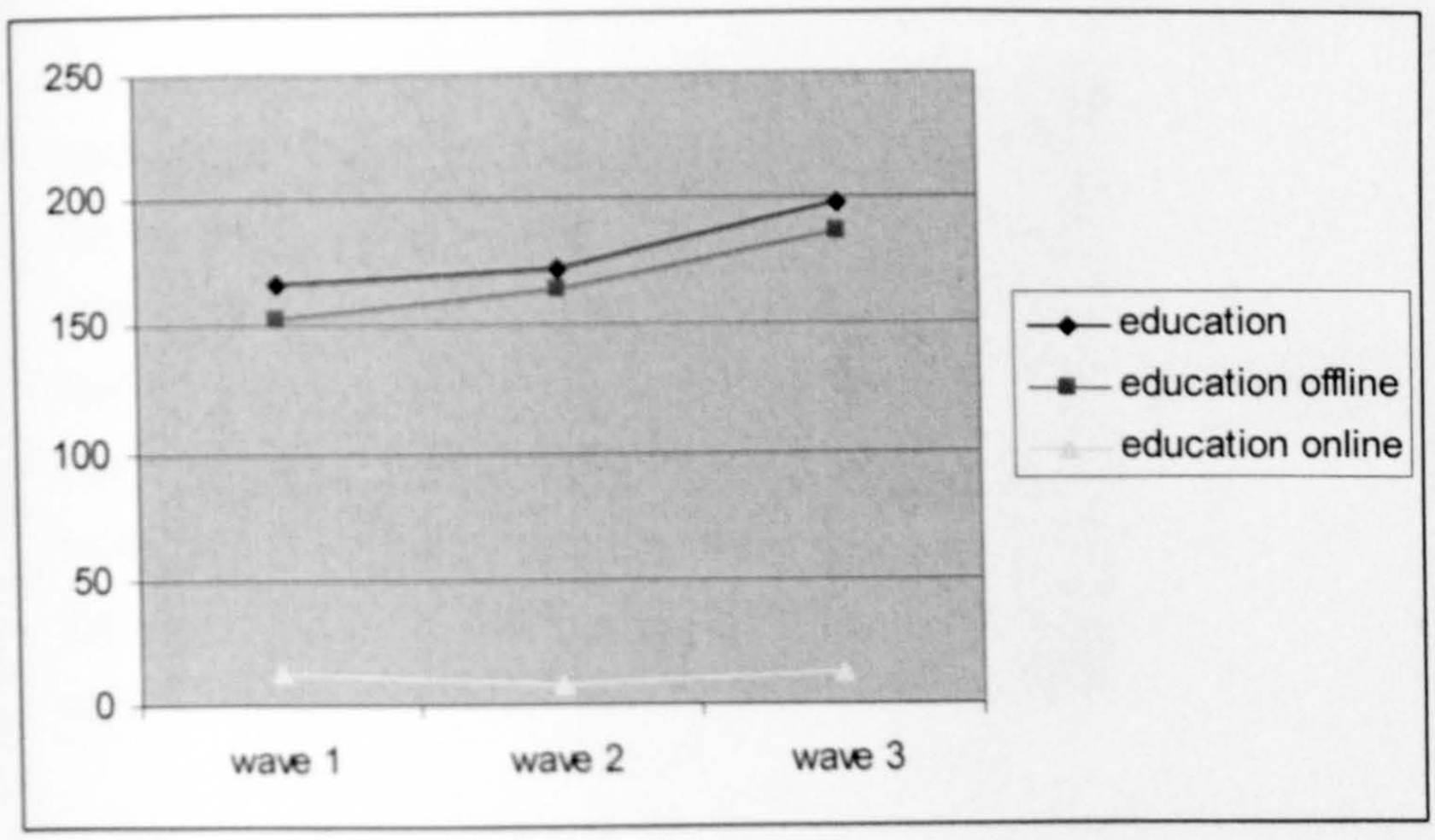


Figure A18.1. Total minutes spent in education activities per week (n=69)

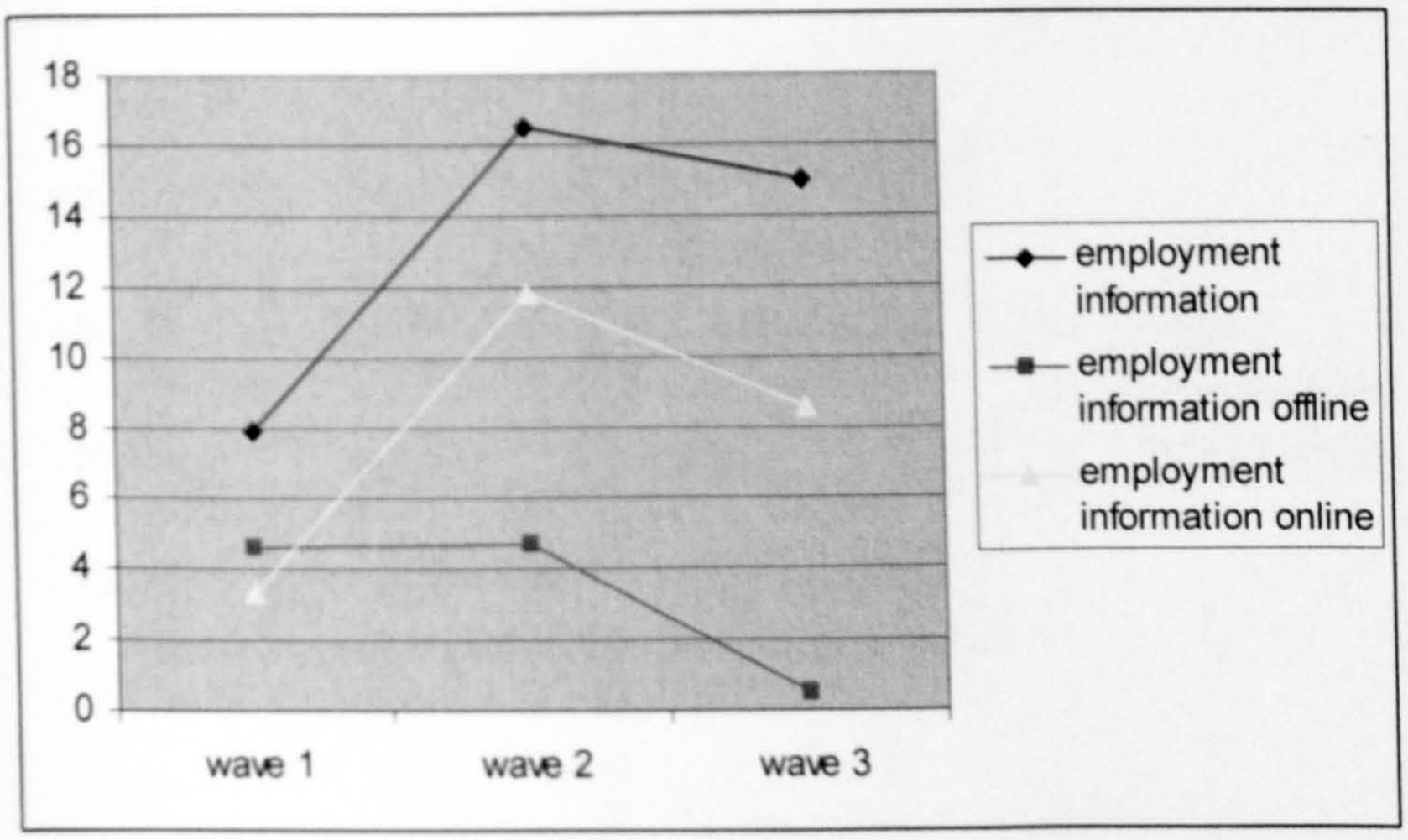


Figure A18.2. Total minutes spent in employment information search per week (n=69)

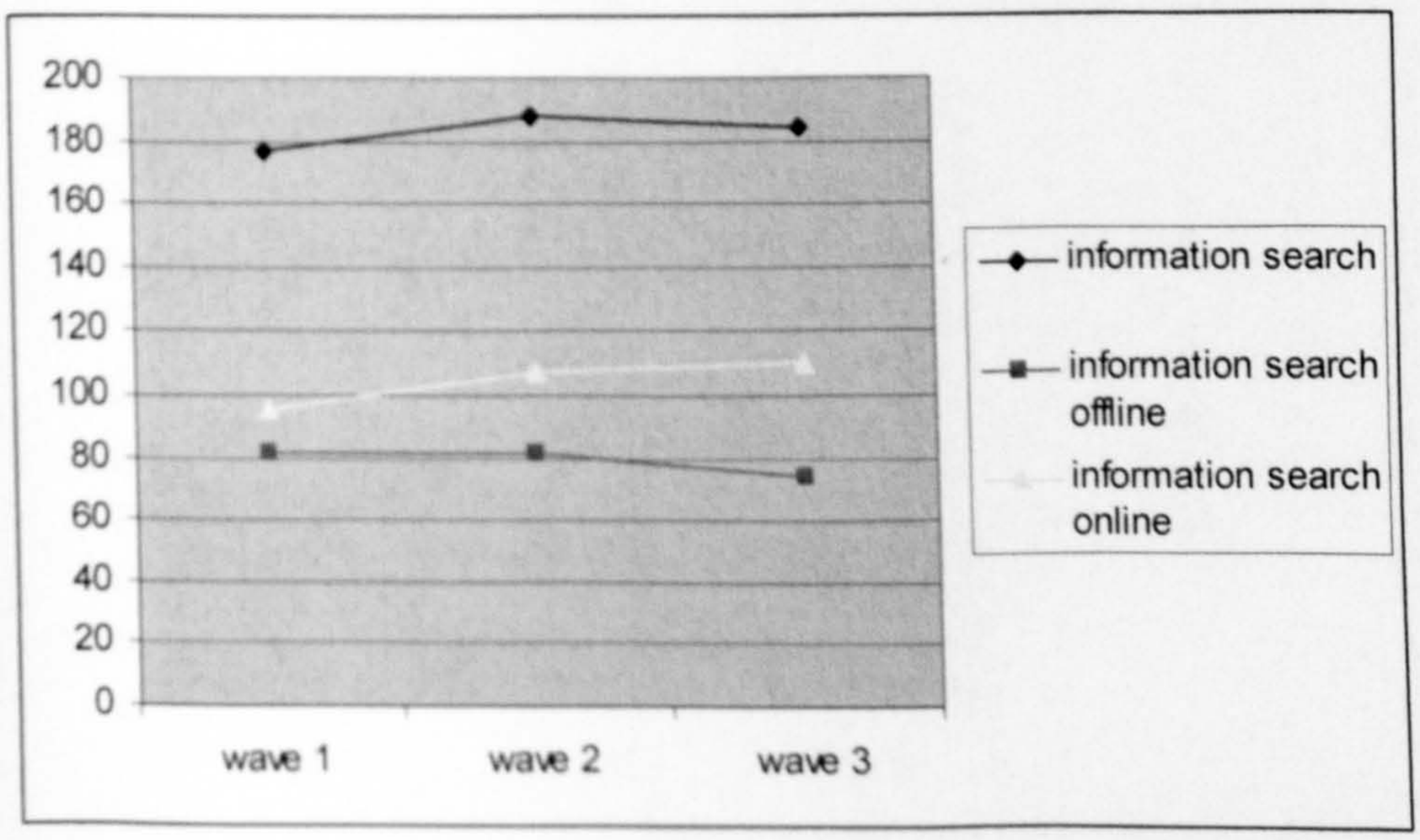


Figure A18.3. Total minutes spent in information search activities per week (n=69)

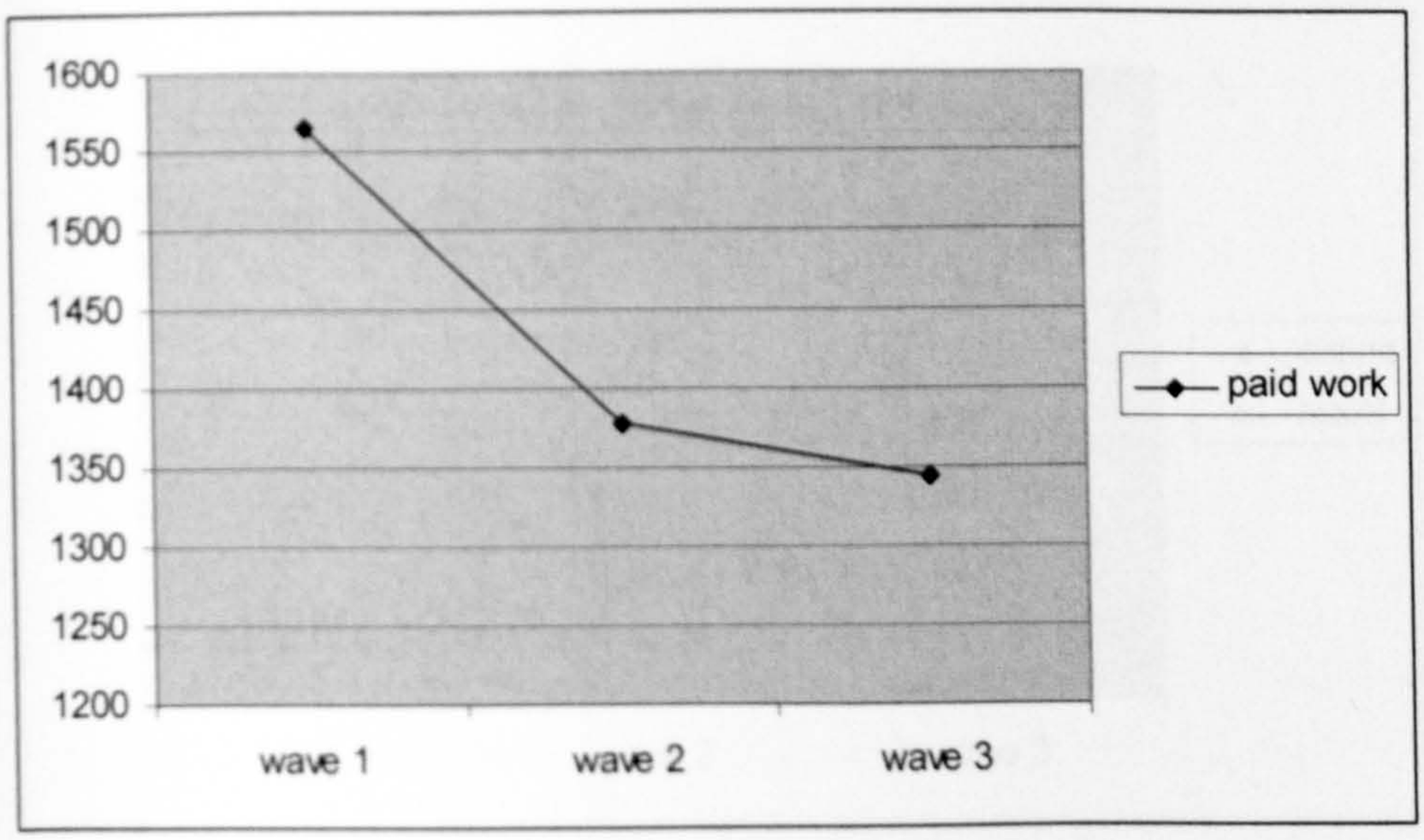


Figure A18.4. Total minutes spent in paid work activities per week (n=69)

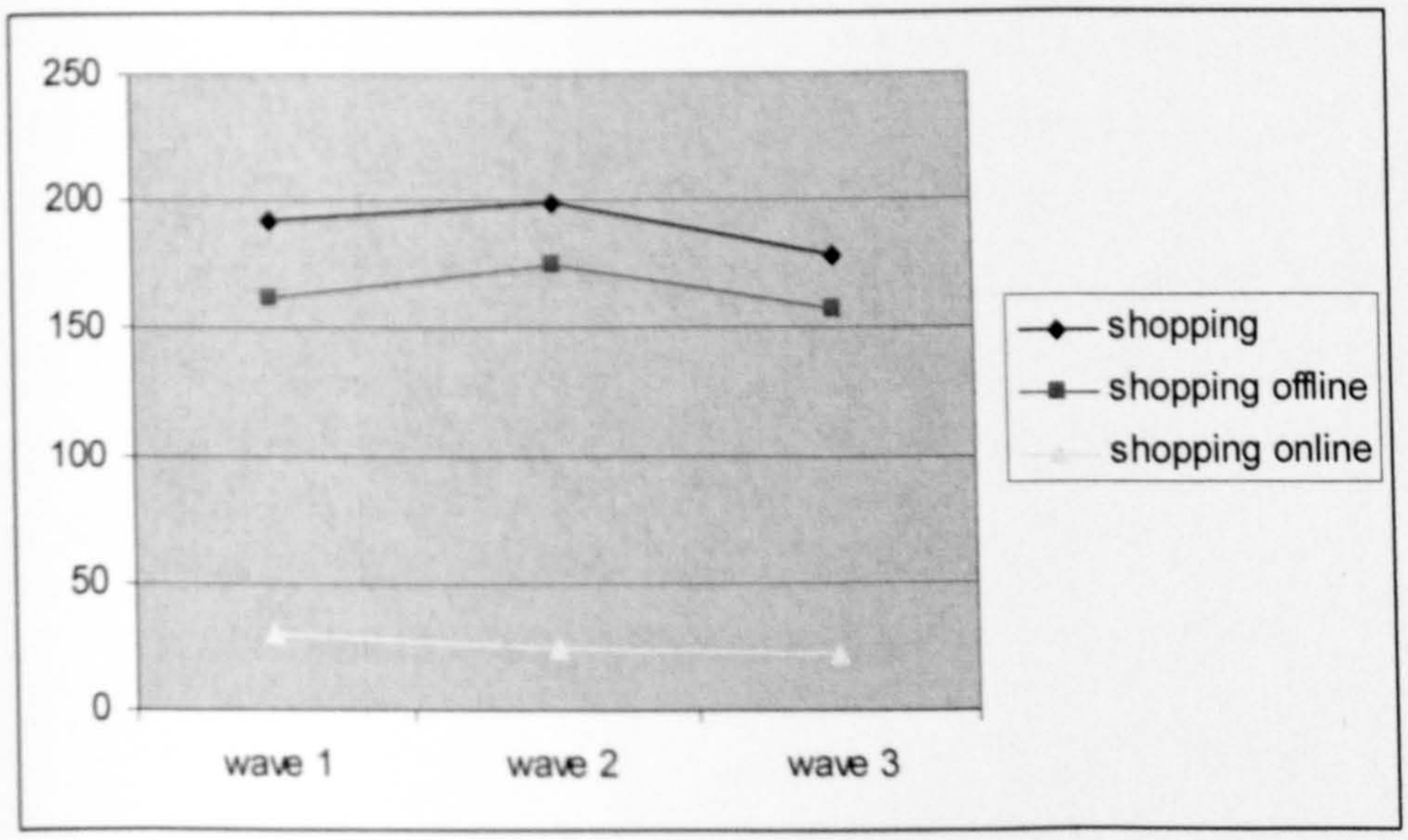


Figure A18.5. Total minutes spent in shopping activities per week (n=69)

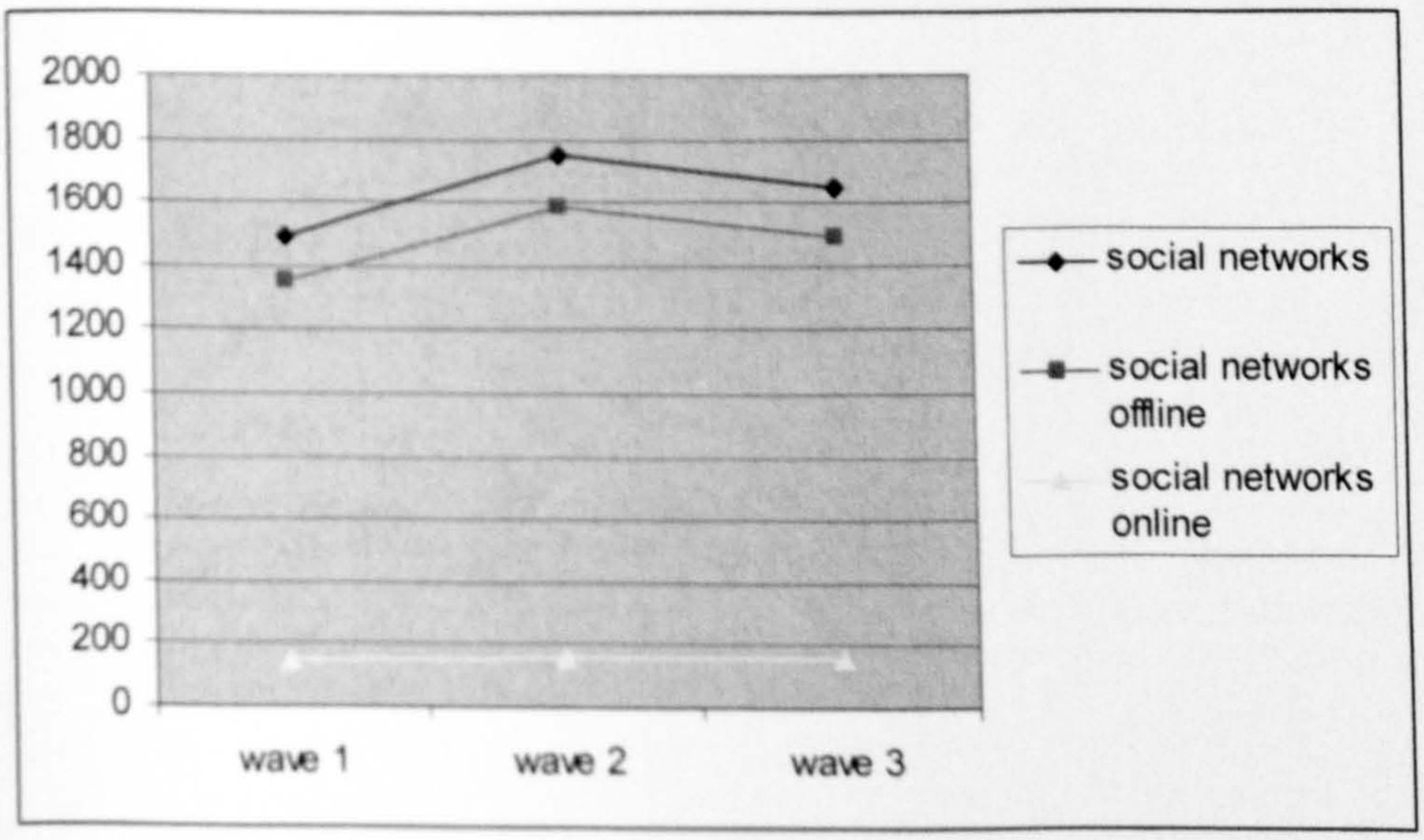


Figure A18.6. Total minutes spent in social networks activities per week (n=69)

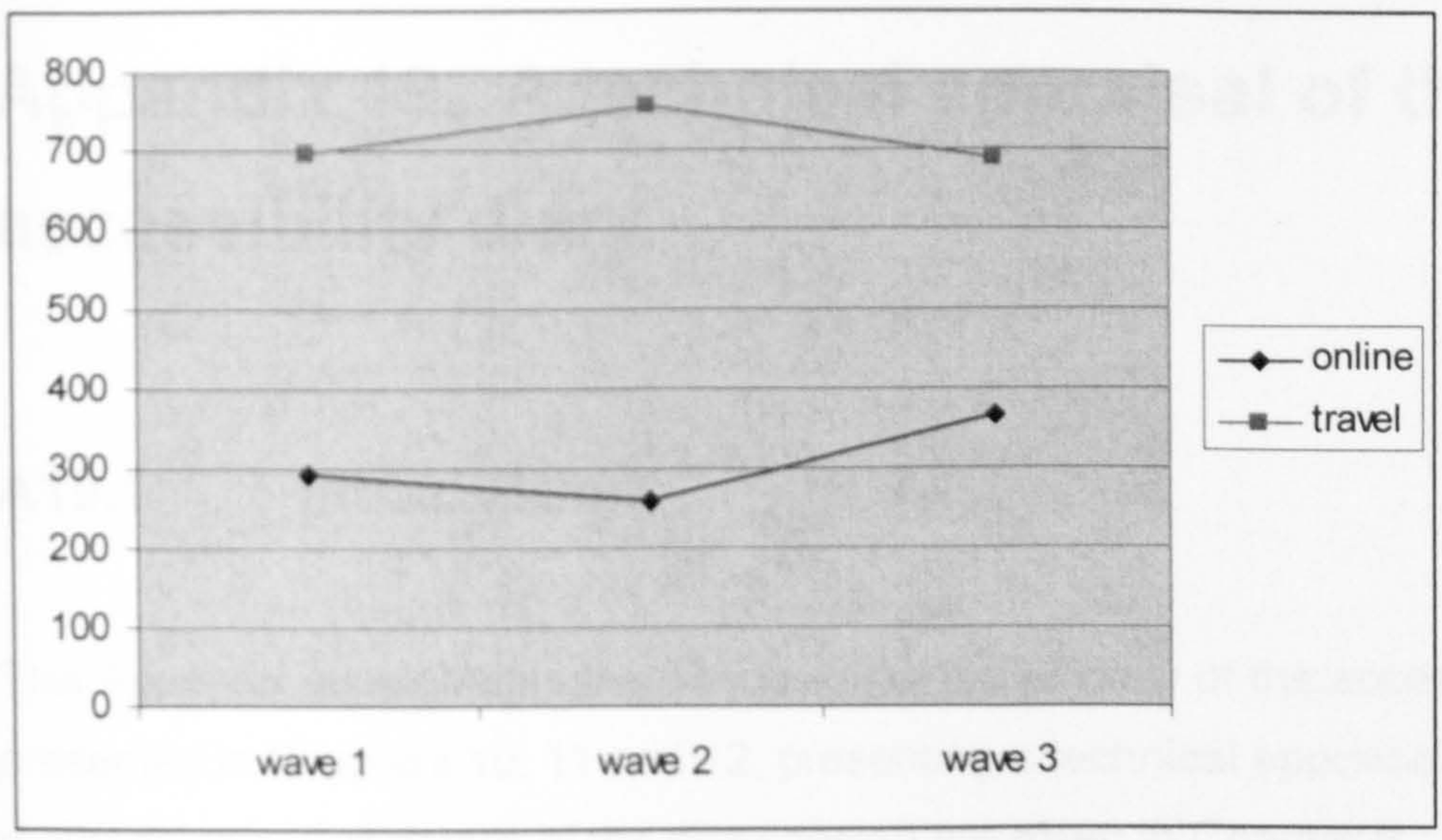


Figure A18.7. Total minutes spent in online and travel activities per week (n=69)

Appendix 19. A technical appraisal of the accessibility diary.

A19.1 Introduction

This Appendix supplements the discussion of the efficacy of the accessibility diary, presented in Chapters 10, 11 and 12, presenting a technical appraisal of the methodology. Full details of the diary design are given in Chapter 8.

Three methods were used to assess the usability of the accessibility diary: telephone interviews during the diary week[1]; two questions within a short post-diary questionnaire[2]; and two focus groups conducted with participants[3]. Its utility for the study of the impacts of Internet use has been assessed through the analysis. The following sections discuss the what was learned from the usability studies and the analysis and, where appropriate, what should be done differently, were the study to be repeated[4].

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[1] Attempts were made to contact every participant during the diary week, in each wave. Participants were informed that the call was a courtesy call and were asked if they had any questions or comments, or had any difficulties. In addition, participants could call a 24-hour help line for advice, of which a small number made use.

[2] 'Did you have any difficulties completing the diary?' and 'If you used the 'other' category, please could you tell me what kinds of activities this covered?' 15 per cent of the sample reported one or more difficulties; 50 per cent reported using the 'other' codes.

[3] Groups were held in two of the study locations, Taunton (Somerset) and Inner Bristol, with 6 and 7 participants, respectively. Participants were of mixed age, gender, household structure and reported diary difficulties. The groups aimed to uncover participants' general thoughts about the diary study, before discussing ease of completion, including detailed discussion of the diary structure and the usability and usefulness of activity codes. Participants also discussed the effects of the diary on their short and long term activity and travel behaviour.

[4] Very few changes were made to the diary for this study, because of concerns regarding losing comparability across waves. Changes that were made were to enhance clarity of existing instructions. Kimberly Fisher has examined this issue in relation to British Household Panel Survey data. See for example Fisher, 2003, 2004.

A19.2 Technical appraisal of the accessibility diary

A19.2.1 What did you do: what was learned?

Focus group participants suggested that the overall look of the diary was simple and usable. More specifically, participants confirmed that the structuring of the diary by activity both fitted their perception of the day and assisted recall. As the following participant states, participants more naturally see their day as structured by activities, not by time:

> You don't think, it's 10 o'clock I'll do the ironing, you think, I'm doing the ironing, oh, it's 10 o'clock.
> Taunton focus group.

A19.2.2 Activity codes: what was learned?

Focus group discussions confirmed the usability of the activity codes, in terms of visual presentation, the location of the codes on every facing page, the grouping into categories and the use of 'I' to indicate Internet use. The location of the codes on every facing page was seen to have increased use of the coding sheet and therefore to increase accuracy of reporting. Participants confirmed the learnability of the codes, aided by the category grouping. Category grouping was also seen to make finding the appropriate code both quicker and easier. Participants felt that the number of codes was manageable, but were keen that the number of codes should not be increased.

This said, results from the three consultations suggest a small degree of confusion regarding the codification of certain activities. Whilst each of the following activities comfortably fits within an existing code, the provision of guidance for these activities, which were most commonly mentioned in the telephone interviews, may be useful: visiting a friend's house (E6); walking the dog (H0); attending parent-teacher association meetings (F5); gardening and DIY (H4); waiting to collect children from school (H8); waiting for public transport (incorporated into the relevant travel code); and self-employed formal work, which is not strictly 'paid work' (F1). Whilst the inclusion of 'other' categories is a positive option, designed to encompass activities that are not essential to this study, the consultation did reveal two important oversights, namely the lack of codes for travelling by tube/metro/other lightrail and a code for completing the

diary itself. In addition, the questionnaire revealed that many of the activities described as 'other' should have been described using existing, more detailed codes. Whilst analysis revealed that the category letter used was correct in the majority of instances, thus that use of the 'other' code will not negatively affect analysis at the aggregate level, more accurate reporting is desirable. Finally, consultation revealed debate regarding the recording of childcare, currently a single code (H5), yet encompassing many activities, with different levels of active attention, dependent upon the age of the child. As such, it emerged that this study may underestimate the complexity of the childcare activity, thus a number of caveats must be drawn regarding the childcare data.

Activity-specific guidance at the interview stage and/or clarification within the instructions can overcome many of the issues above. Specifically, concern regarding inappropriate use of the 'other' codes can be surmounted by asking participants to write the activity in long hand, alongside the code, in all cases in which the 'other' codes are used. The activities can then, where appropriate, be post-coded. Indeed, this amendment was made in the second and third wave diaries. The issue of accurately recording childcare activities, however, is not as easy to resolve. Many time use studies have grappled with the difficulty of recording the complexity of childcare, specifically the issues of active/passive care and of the range of activities that are undertaken in childcare (for example, Ironmonger, 2003). For the purposes of this study, a single code for childcare activities continues to be seen as appropriate, because of the additional respondent burden associated with disaggregating childcare and increasing the number of activity codes. However, it is recognised that this may act to distort the activity profiles of primary carers and the limitations of this approach will be recognised in the analysis. Studies aiming to understand the complexities of childcare should disaggregate this activity. However, in consequence, the number of other categories may need to be reduced. Further research in this area is essential if an accurate picture of childcare behaviour and any change therein is to emerge.

A19.2.3 Start time, end time: what was learned?

Participants were instructed to round activities to the nearest five minutes, to alleviate respondent burden and to reduce the recording of activities that are unimportant in this study, for example making a cup of tea. However, this may have reduced reporting of important activities, including walking to the public transport interchange, sending short emails, or short telephone calls. If so, rounding to the nearest five minutes may

conceal subtle changes in behaviour. In consequence, in future studies, the five-minute rule should be reconsidered, replaced perhaps with guidance regarding which activities should always be reported, regardless of duration. However, such amendments and any perceived benefits must be balanced with the increase in respondent burden.

A19.2.4 Where did you do it: what was learned?

Analysis revealed a varying level of detail recorded, largely a result of lack of guidance within the diary itself. Thus, it is unlikely that this study will be able to assess the influence of Internet use upon activity location to any great degree, beyond changes in the balance of activities conducted at work, home and whilst travelling. Future studies aiming to assess spatial accessibility to a greater degree would be advised to amend this aspect of the diary, perhaps by gathering postcode information, or by using pre-coded distance categories, for example home, local, middle distance and long distance, with defined mileage for each. However, as above, the gains from such a strategy must be balanced against the possible negative impacts of an increase in respondent burden and against participant knowledge. Where participants do not know the more detailed (postcode or distance) information, it is likely that they will leave this field blank. It may be less useful to request detailed information, where there is a high likelihood that the data will be missing because of limitations to participant knowledge, than to collect basic data, as in this study, where there is less likelihood that data will be missing.

A19.2.5 Did anyone do this with you / was anyone else around at the time: what was learned?

On a number of occasions, participants reported difficulties deciding if anyone was conducting an activity with them, or if they were around at the time, specifically: when driving a car, if passengers were involved in the activity (no, but they are around at the time), or whether other road users were judged to be 'around at the time' (no); and if passengers unconnected to the participant should be considered to be doing the activity with them (no) or should be recorded as being around at the time (yes) (with similar concerns raised regarding walking alone on a busy street, or shopping alone in a busy supermarket). Clearer guidance in the instructions, perhaps using these examples, should overcome these issues.

A19.2.6 What else were you doing: what was learned?

Focus group participants described their low awareness of multitasking prior to using the diary instrument, suggesting that, without the diary prompt, they would have substantially underreported their participation in secondary activities. This highlights the importance of methodology in prompting accurate recall and thus in collecting comprehensive information – and the success of the accessibility diary in this regard. This said, there are a number of important observations from the consultation and analysis. Firstly, participants used different strategies to decide which activities were primary and which secondary, with some presenting the primary activity as that which took the most active attention, others, that which took the most time. Participants were instructed to decide which activity was primary themselves and instructions were not provided, to allow the diary to reflect respondent experiences of the activities that they were undertaking. However, this may have contributed towards the wide variation between participants in terms of the number of recorded secondary activity minutes. Future studies may wish to impose a clearer structure upon the recording of multitasking. In addition, where the primary activity was particularly lengthy, for example, the working day, participants wished to record more than three secondary activities. Whilst more columns cannot be added, instructions to continue onto lines below can enable this. Finally, this diary instrument does not allow conclusions to be drawn with regard to the scheduling of secondary activities. Thus, if a primary activity lasts 20 minutes and is accompanied by two secondary activities, each lasting ten minutes, it cannot be known when, in this 20 minute period, the secondary activities took place – if (a), all activities took place at once, (b), if the secondary activities took place sequentially, or (c), if the participant divided their time in secondary activities into separate (perhaps) five minute slots. However, redesign to include this information is likely to increase the complexity of the survey instrument and to increase respondent burden, with attendant issues for attrition.

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