

**Consequences of Teenage Parenthood:
Pathways which minimise the long term
negative impacts of teenage childbearing
Final Report - November 2005**

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1 April 2002 - 31 July 2004

Department of Health contract number 0370020



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1 ACKNOWLEDGEMENTS

This work was undertaken by The University of Southampton who received funding from the Department of Health. The views expressed in the publication are those of the authors and not necessarily those of the Department of Health. We thank Catherine Dennison from the Department of Health for her support and guidance during the project.

Data from the 1999/2000 General Household Survey (GHS) and the 1970 British Cohort Study (BCS70) were provided by the UK Data Archive.

Shayla Goldring carried out the analyses of the General Household Survey, under the supervision of Ann Berrington, as part of her MSc Social Statistics dissertation.

The BCS70 study is being conducted by the Centre for Longitudinal Studies at the Institute of Education, University of London.

Data from the Avon Longitudinal Study of Parents and Children was provided by the ALSPAC Study Team, Division of Child Health, Faculty of Medicine, University of Bristol. The authors thank Jon Heron, ALSPAC, University of Bristol, for providing prompt help and advice on the extraction of ALSPAC data.

The authors thank all of the participants in the three surveys; GHS, BCS70 and ALSPAC, without whom the analyses would not have been possible.

2 EXECUTIVE SUMMARY

2.1 Background

- 2.1.1 This project used data from two large longitudinal cohort surveys to explore aspects of teenage parenthood and its impact. The surveys are (a) Avon Longitudinal Study of Parents And Children (ALSPAC), which is following up all children born in 1991/92 in the Avon district (n = c10000), from which data were made available on mothers and their children up to 42 months old and (b) the 1970 British Birth Cohort Study (BCS70) which is following up all children born in one week in April 1970 (original n = c15000).
- 2.1.2 We define teenage mothers as those who had their first child aged 19 years or below, and young fathers as those who fathered their first child aged 22 years or below. Where possible, comparisons were made between these young parents and those who became parents within the two years following these bands, as well as those who became parents at older ages. Clearly, analyses are restricted by the issues raised on the questionnaires, and these were not designed specifically to explore the impact of young parenthood.
- 2.1.3 The conceptual approach adopted the following framework, whereby the impact of early parenthood on parent and child outcomes are assessed, taking into account that the antecedents of teenage parenthood (that is factors predisposing some individuals to become a teenage parent) may also be associated with the outcome. For example, childhood poverty is associated with both teenage parenthood and poorer adult health. We ask the question whether the relationship between early parenthood and poor adult health can be explained by the selection of individuals from underprivileged backgrounds into young parenthood. When a relationship between early parenthood and a later outcome remains, once the backgrounds of teen and older parents are taken account of, we examine the pathways through which this association arises. Mediators, for example partnership dissolution, or poor quality housing, are factors which are associated with both early parenthood and the outcome. Mediating pathways through which teenage parenthood may be associated with negative outcomes are the potential areas for policy intervention. The approach is novel in that it seeks to model the impact of teenage motherhood on outcomes for the mother and child simultaneously.

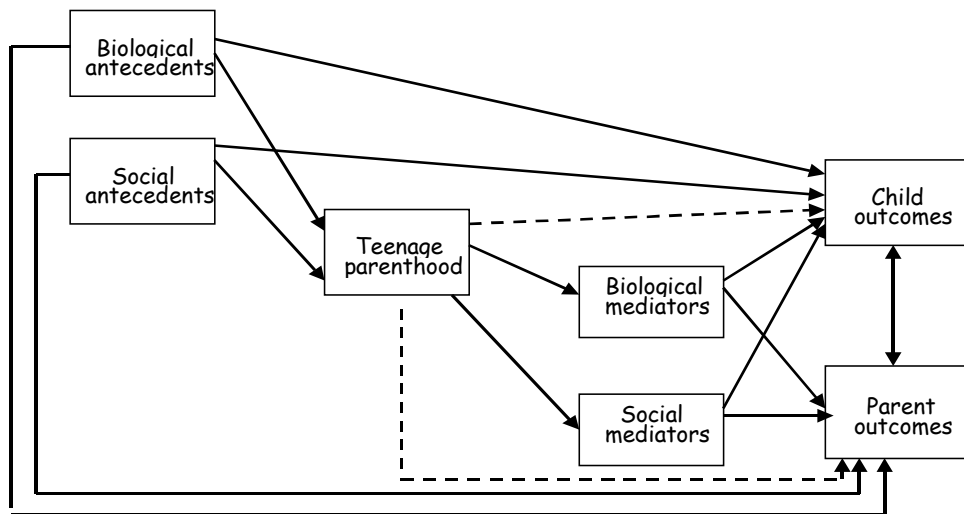


Figure 1. Conceptual Framework

2.2 Life course antecedents of early motherhood

2.2.1 From multivariate analyses, a number of factors predicted who was more likely to become a teenage mother. At age 10 years, these included having a conduct disorder, having poor reading ability, being in a family in receipt of benefits, being in social housing and having parents who had low aspirations. Additionally, the odds were higher for those young women whose own parents left school at 16, who lived in a lone parent family, whose father was in social classes IV and V, and whose own mother was a teenage mother. The highest five of these factors combined increased the odds of becoming a teenage mother by 31 percent.

2.2.2 A similar analysis amongst young men revealed generally similar factors, although these same factors had a reduced impact on the risk of young (under age 23) fatherhood.

2.2.3 We conclude that teenage parenthood continues to be a marker for general disadvantage.

2.3 Outcomes for young mothers

2.3.1 Bivariate cross-tabulations show that teenage mothers are more likely to suffer disadvantage in adulthood, including being more likely to be in social housing, receiving benefits, to be dissatisfied with their neighbourhoods, to have suffered from partnership dissolution, to be in families where neither partner is in paid work. They are also more likely to be in poor physical and psychological health.

- 2.3.2 These patterns result from a complex interplay of predisposing factors (that is, those that predicted their entry into teenage motherhood) in conjunction with the additional effects arising from being a teenage mother.
- 2.3.3 Longitudinal data from BCS70 show that a small amount of the health disadvantage suffered by teenage mothers is explained by their parental background and childhood characteristics. The majority of the differences in adult health however are explained by the fact that teenage motherhood is itself associated with a higher risk of partnership dissolution, living in a non-work family, being dissatisfied with the neighbourhood, being emotionally distant from their mother and not having a confiding relationship.
- 2.3.4 The breadth of topics covered in the two longitudinal surveys has revealed that teenage motherhood itself not only has negative material consequences, for example a greater risk of living in a workless family, but also negative consequences for emotional well being over and above these material consequences - in particular dissatisfaction with their neighbourhood, and the lower levels of social support from family and friends.

2.4 Outcomes for young fathers

- 2.4.1 Bivariate cross-tabulations show that men who became fathers in their teens and early twenties are twice as likely to live in social housing, to be unemployed and receive means-tested benefits. They are also significantly more likely to have lower educational qualifications, and to earn less.
- 2.4.2 Multivariate analyses show that some of these differences - for example, lower earnings at age 30 - are explained entirely by the selection into early fatherhood of men who come from poorer backgrounds, particularly those who had lower educational ability at age 10, and whose mothers had lower educational aspirations for them.
- 2.4.3 However, even after accounting for these predisposing factors, men who became fathers in their early twenties were twice as likely to be unemployed at age 30.

2.5 Contact and maintenance payments by early fathers

- 2.5.1 Age at fatherhood has a strong effect on the likelihood of the fathers living with their first children at age 30. More than one-fifth of teenage fathers have never lived with their child, compared with just 6 percent of older fathers.
- 2.5.2 Being a young father and whether they live with their child appear to have different aetiologies. The former is better predicted by socio-economic

background factors, whereas the latter is better predicted by behavioural and psychological characteristics, such as a history of conduct disorder and having an external locus of control.

- 2.5.3 Among both teenage and older non-resident fathers, the majority (around two-thirds) see their child at least once a month, and around two-thirds make some form of financial contribution towards their child's maintenance. Payment of maintenance is much more common amongst those who have more regular contact.
- 2.5.4 For teenage and older fathers contact is strongly affected by the length of time since the father last lived with the child, to a greater extent than whether the father ever lived with the child. Those who lived with their child less than two years ago are five times as likely to see that child compared to those who last co-resided more than six years ago.
- 2.5.5 Even when all these factors are controlled young fathers who themselves were not living with both biological parents at age 10 are much less likely to maintain weekly contact with their own child.
- 2.5.6 The level of contact is reduced when either the mother or the father forms a new co-residential partnership. In addition, a new partnership for the father and especially new biological children with this new partner reduce the likelihood of paying maintenance irrespective of age of entry into fatherhood.

2.6 Outcomes for children of teenage mothers

- 2.6.1 Teenage childbearing is increasingly taking place outside of any co-residential partnership - around half of the teenage births in the early 1990s were to lone parent teenagers. Around one third of children born to teenage mothers within ALSPAC spent the first three years of their life living with both of their biological parents compared to 88 percent of children born to women aged above 19 years.
- 2.6.2 In general the children born to teenage mothers within the ALSPAC study are doing well - they do not differ from the children of older mothers in their language development at 38 months, social development, gross or fine motor skills, or pro-social development at 42 months.
- 2.6.3 The children of teenage mothers were observed in bivariate analyses to fare worse in two areas; accidents and behaviour problems.
- 2.6.4 The observed higher rates of accidents (overall, bad falls and swallowing substances, but not burns/scalds) amongst the children (aged between 24 and 38 months) of teenage mothers are mediated by the mothers' mental state. In

other words, it is not the age at first motherhood *per se* that is important, but that teenage mothers are more likely to suffer from anxiety and depression. In turn the higher risk of maternal anxiety and depression is associated with the lack of a co-residential partner and poorer housing quality (as indicated by social housing, lack of amenities, overcrowding, and the presence of damp).

- 2.6.5 An unexpected result is that, amongst both teenage and older mothers, those with higher qualifications had children who were more likely to experience accidents. This warrants further exploration.
- 2.6.6 Bivariate cross-tabulations showed that the children of teenage mothers were at a higher risk of all three types of behavioural problems examined; conduct, emotional and hyperactivity. Although better parenting skills were found to be associated with fewer behavioural problems, within the ALSPAC study no significant differences were found in parenting skills between teenage and older mothers. Instead we find that the child's behavioural adjustment was affected by the mothers' mental state. As found in the multivariate analyses for accidents, lack of a co-residential partner and poor housing are factors which identify teenage mothers most at risk of depression and anxiety.
- 2.6.7 The effects described above for both accidents and behaviour were not moderated by child gender, parity, ethnicity or the quality of support experienced by the mothers.

2.7 Policy considerations

- 2.7.1 Despite the inevitable limitations of the survey instruments, some useful pointers to areas for policy considerations are highlighted.
- 2.7.2 It is clear that a life course perspective is required if we are to target those at risk of becoming a teen parent, since individual measures taken when the child was aged 10 years old (such as conduct disorder, parental aspirations, educational achievement) are found to be important predictors of subsequent entry into early parenthood, over and above the more general contextual aspects of poverty, family composition and the receipt of benefits. Early identification of those most vulnerable using these risk factors may be feasible. The association between parental aspirations for their daughters education and teenage motherhood suggests that preventative interventions targeted at parents may be appropriate.
- 2.7.3 Policies aimed at reducing inequalities in adult health also need to take a life-long perspective, tackling social disadvantages across the life course. Teenage motherhood is an important independent pathway through which poor socio-economic conditions in childhood translate into higher rates of both mental and

overall ill-health in adulthood. The poorer mental health of teenage mothers has implications for the subsequent generation and hence contributes to the intergenerational transmission of disadvantage.

- 2.7.4 The pattern of results suggests that an important potential area for action to prevent the adverse consequences of teenage motherhood for the child, are in relation to the mother's mental health.
- 2.7.5 The results suggest that policies to support young mothers' mental health need to be multi-faceted - addressing both the material deprivation suffered by teenage mothers and their lower levels of emotional support. The significance of neighbourhood satisfaction in predicting good health also points to the importance of the wider community.
- 2.7.6 Partnership dissolution and lone parenthood have appeared in both surveys as having important consequences for both teenage parents and their children. It is not immediately obvious whether the State would want, or indeed be able, to encourage couples to remain together, although some consideration could be given to whether current policies on, for example, housing for young mothers and/or the youth justice system, may threaten relationships amongst young people. Nevertheless, the data suggest that policies need to recognise the realities of family dissolution and reformation and need to be implemented to ameliorate their consequences.
- 2.7.7 For teenage fathers, policies need to recognise that by age 30 one half were not living with their child and that one fifth had never lived with their child. Nevertheless, two thirds of these non-resident fathers do have regular contact and do provide some sort of maintenance. Policies need to support such young fathers, recognising this contribution, and at the same time also recognising that young fathers will go on to have new partnerships, to have new biological children and hence will take on new family responsibilities.

3 OVERVIEW OF FINDINGS

3.1 Aims of project

Tackling teenage pregnancy is central to the Government's work to prevent health inequalities, child poverty and social exclusion. In 2002, the Teenage Pregnancy Unit and Department of Health funded nine research projects under a number of themes in order to inform the implementation and development of the Teenage Pregnancy Strategy in several key areas. This project was funded under the theme of *Long-term Consequences of Teenage Births for Parents and their Children*. This project looks at the outcomes of young parenthood for mothers, fathers and their children.

The research had two key aims:

- 1) to assess over the medium to long term, and for a range of outcomes, the consequences of teenage births for mothers, fathers and children using secondary datasets, and
- 2) to use the results of the above analyses to identify pathways by which the negative impacts of teenage childbearing could potentially be minimised.

3.2 Research design, data and methods

3.2.1 *The data sets used for secondary analysis*

The research involved the secondary analysis of a range of data sources (see Table 1). Insights gained from each of the datasets were used to inspire research based on the others. The research was set in the changing demographic context of teenage parenthood as explored using the 2000/01 round of the General Household Survey. Prospective data from two large-scale longitudinal studies are used to identify the pathways through which men and women become young parents, as well as the outcomes for these mothers, fathers and their children. The availability of prospective data means that we can identify the temporal ordering of events and build up a more realistic model of these pathways.

Table 1: Description of the data sets used for analysis

	<i>BCS70</i>	<i>ALSPAC</i>	<i>2000-01 GHS</i>
Type of survey	Multi-disciplinary longitudinal birth cohort study. This project uses data from birth, age 10 and age 30 sweeps.	Longitudinal study of children which aims to identify way in which the physical and social environment interact, over time, with genetic inheritance to affect children's health, behaviour and development.	Multipurpose, continuous cross-sectional household survey carried out by Office for National Statistics
Study design	Follow up from birth of all those living in Britain who were born between 5-11 April 1970	Follow up of children born to mothers resident in the part of the county of Avon which was also within the South West Regional Health Authority. The expected date of delivery had to lie between 1/04/91 and 31/12/92	Two-stage stratified cluster sample - 13,248 addresses drawn from postcode address file
Sample	7389 females and 8028 men born in Britain who took part in the birth survey. Out of these, 6249 females and 6623 males took part at age 10 and 4766 females and 4461 males were present in all three relevant sweeps.	9939 children who took part in the 42 month child questionnaire "My son's/daughter's health and behaviour". If the child was one of a twin, only one child was included in the analysis.	5,121 women aged 16-59 who consistently completed fertility and partnership history questions
Response rates	60% of the sample who were born in Britain and took part in the birth survey also took part at age 10 and age 30	72% of the children still alive at one year took part in the 42 month child questionnaire	67%
Weighting and imputation for non-response	We developed attrition weights for unit non-response and an imputation system for item non-response	We developed an imputation system for item non-response	Office for National Statistics provides non-response weights and an imputed dataset
Further information from:	http://www.cls.ioe.ac.uk/Cohort/Bcs/mainbcs.htm	http://www.alspac.bristol.ac.uk/	http://www.statistics.gov.uk/lib2001/index.html

Outcomes of teenage motherhood for children were investigated using data from the Avon Longitudinal Study of Parents and Children (ALSPAC). This study has followed up a sample of children born in Avon in the early 1990s. During and after pregnancy the mother was asked to complete a whole series of questionnaires about themselves and their child's development. The University of Bristol only allowed access to data up to when the children were aged 47 months.

Outcomes for mothers and fathers (measured at age 30) were investigated using the 1970 British Birth Cohort Study (BCS70), hence updating previous research (Kiernan, 1999) which was based on the 1958 cohort. The BCS70 cohort provides a very rich set of data but we should bear in mind that the participants in this cohort were teenagers in the late 1980s and hence their experience of teenage parenthood predates the implementation of many current policy strategies. Indeed, the historical nature of these longitudinal studies means that many of the questions that we would now include in the questionnaires - for example, about the pregnancy support that is available to young parents, or outcomes for the child growing up - were not thought of at the time. Furthermore, it must be pointed out that these surveys are generalist socio-medical surveys and not specifically designed to study outcomes of young parenthood. Often we have had to use variables which are proxy measures for the underlying phenomena which we believe to be really important.

Finally, like all longitudinal studies, there has been some loss to the BCS70 and ALSPAC study samples. Those most socio-economically disadvantaged (which includes a disproportionate number of teenage parents) are most likely to be lost. Where attrition is most severe, in the BCS70, we have calculated attrition weights to offset this selective loss to the study sample (see paper 4.4.1). Our assumption is that, within a weighting class, the experience of teenage parents who remain in the study is representative of those who are lost to follow-up.

3.2.2. Who is a young parent?

The Government's Teenage Pregnancy Strategy focuses on (a) efforts to reduce teenage conception rates among women aged less than 18 years, and (b) supporting teenage parents to minimise the risk of social exclusion.

In the following analyses, we define young motherhood as being below age 20 at first birth, and young fatherhood as being below age 23 at first birth, capturing one in ten men and one in ten women in the BCS70 sample. We recognise that the circumstances of very young parents, for example, those under age 18 are likely to be different from slightly older parents but there are insufficient numbers of such individuals in the survey to permit separate analyses. Previous authors have variously defined young fathers as those aged under 19 (Stouthamer-Loeber and Wei, 1998), under 20 (Dearden *et al.*, 1994), under 21 (Kiernan, 1999), under 22 (Jaffee *et al.*, 2001), under 23 (Kiernan, 1992), and under 24 (Quinton *et al.*, 2002). Evidence from vital registration

for England and Wales shows that, for teenage mothers who had a jointly registered birth, only one quarter of the fathers were themselves aged under age 20. In almost half the cases the father was aged 20-24 and, for one in six teenage births, the father was aged 25-29. For this reason we focus on men aged less than 23 when they became a parent, arguing that many of these men will be the partners of teenage mothers.

Further, it is arguable which comparison group should be used to compare later outcomes: for example, in the case of teenage mothers, should their experience be contrasted with women who had their first babies in their early twenties, later twenties, women who have not yet had children, etc.? Where possible, we have compared a number of different groups in the analyses, and this is specified where appropriate.

3.2.3 Methodological approach

Our aim is not to quantify precisely the impact of young parenthood on parents and children; this is difficult using observational data since there are likely to be unmeasured characteristics differentiating men and women who have an early conception from those who do not (including those who become pregnant but have a miscarriage or termination). Instead, our aim is to elucidate the *mechanisms* whereby young parenthood is associated with poor outcomes and hence identify areas for potential policy intervention.

Using path models (graphical chain modelling and structural equation modelling) and prospectively collected data, we are able to demonstrate more explicitly the complex ways in which the antecedents and consequences mediate and moderate the impact of teenage motherhood.

Path models depict the direct and indirect pathways through which parental background and childhood factors are associated with entry into young motherhood and how young parenthood is later associated with poorer outcomes.

Graphical chain modelling explicitly explores inter-dependencies between covariates, providing the potential opportunity to simulate, in a more appropriate way, the possible impact of a policy intervention to reduce health inequalities, assuming causality.

3.2.4 Conceptual approach

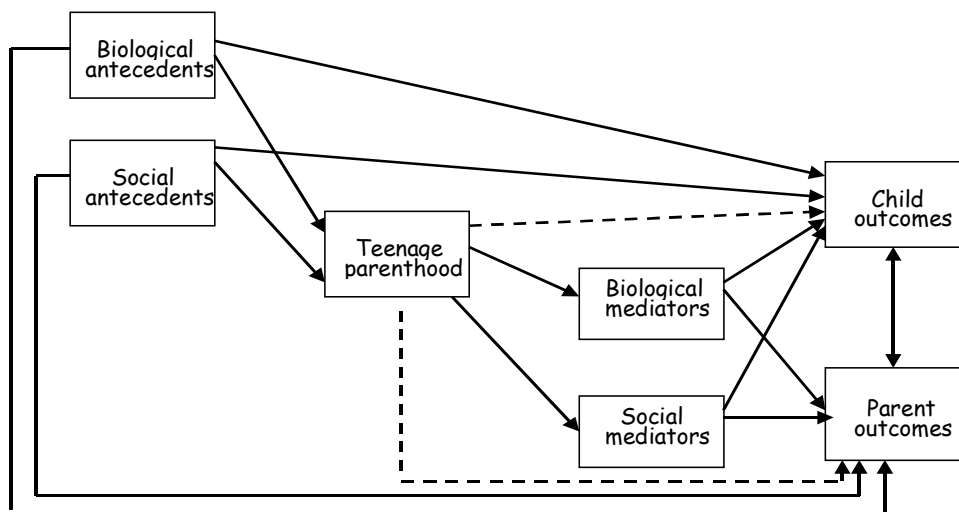
The research is grounded within a conceptual framework (Figure 1) which sees teenage childbearing as a result of a complex series of individual, family and societal factors. Consequences of early parenthood depend on these factors and on mediating factors following the birth; these may include relationships, the mother's mental health, levels of social support, financial circumstances, and so on.

The *biological antecedents* may include genetic differences between individuals that affect such characteristics as risk taking which are themselves related to the likelihood of teenage parenthood. Such factors for both the mother and the father may also be influencing the child. None of the data sets provides information on such genetic factors and their effects cannot be separated from environmentally transmitted risks in these studies. The *social antecedents* are such factors as the mother's own experience of having a teenage mother and the continuing effects this might have on attitudes and behaviour. Facets of social disadvantage also increase the risk of teenage parenthood. These social antecedents may both influence the likelihood of teenage parenthood and have additional effects on outcomes for parents and children.

The mediators are consequences of teenage parenthood that carry some of the effects on outcome. An example of a *biological mediator* would be prematurity, or the consequence of inadequate antenatal care. Both of these are more likely to be experienced by teenage parents and may have impacts on the child's subsequent development. The *social mediators* are that range of consequences for the social and family experiences of teenagers subsequent to parenthood. These will include poor housing, low income and partnership instability.

The *outcomes* for a parent and a child are varied. They include both aspects of physical and mental health and, for the child, aspects of development such as cognition, language and educational attainment. Of course, some outcomes can also be considered as mediators. For example, mother's poor mental health may also be a mechanism whereby teenage parenthood impinges on the child's outcome. In this sense, a mediator is only defined as such by its role within the model as a link between teenage parenthood and outcome. In other models it may be considered an outcome in its own right.

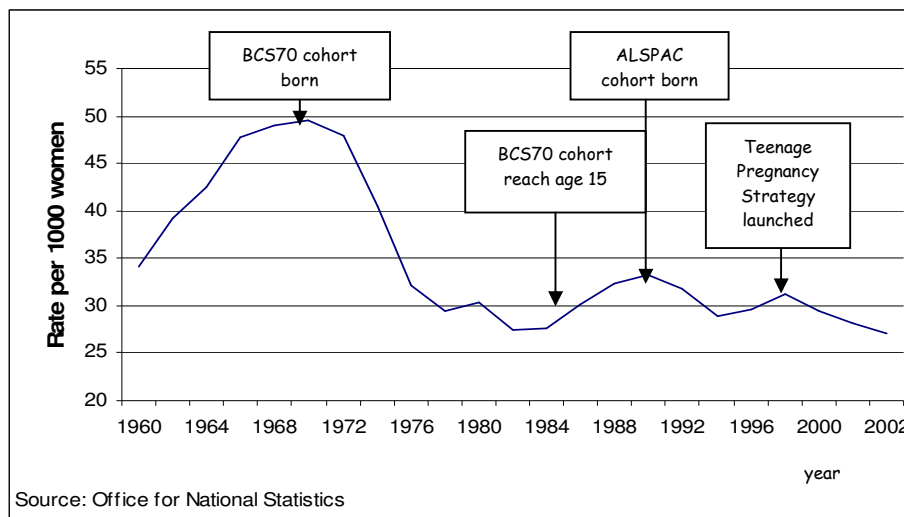
Figure 1: Conceptual framework



3.3 The changing demographic context of teenage parenthood

Ironically, the 1970 birth cohort was born at a time when teenage fertility rates peaked in England and Wales. During the 1970s, teenage fertility rates fell rapidly, reaching a low point just when the 1970 cohort reached their mid-teen years in the mid-1980s. Since then the rate has fluctuated at around 30 births per 1000 women, with some evidence of a fall since 1999, following the implementation of the Government's Teenage Pregnancy Strategy. Given that there has also been a sharp increase during the 1980s in the mean age at motherhood, we are witnessing an increased polarization of childbearing behaviour with one part of the population delaying childbearing to later ages and the other part not. Our findings discussed in sections 3.4 and 3.5 suggest that young motherhood is a key pathway through which inter-generational transmission of adult social exclusion and health inequalities among women are being reproduced.

Figure 2: Under 20 fertility rate (per 1000 women aged 15 to 19 years) England and Wales, 1960-2002



By combining event history data from the fertility and partnership histories of women interviewed in the 2000-01 General Household Survey, we demonstrate that the percentage of teenage first births which took place within marriage fell from 71 percent among women born in the 1950s to 41 percent of those born in the 1960s, and 17 percent of those born in the 1970s (see Table 2). Just over half of the increase in extra-marital teenage births is accounted for by increased births to cohabiting couples. Nevertheless, among the most recent cohorts, the most common partnership context of teenage childbearing is outside of any co-residential partnership (among the cohorts

born in the 1970s almost half of all teenage first births were outside of any co-residential partnership). Children of teenage mothers are significantly more likely to experience parenting changes in the first three years of their life. Only one third of children born to teenage mothers in the ALSPAC sample remained in a two-parent family during the first three years of the child's life, compared to 88 percent of children born to older mothers (Table 3).

Table 2: Partnership context of entry into teenage motherhood for British cohorts born in 1950s, 1960s and 1970s (in percentages)

<i>Partnership situation at time of birth</i>	<i>Birth cohort</i>		
	<i>1950s</i>	<i>1960s</i>	<i>1970s</i>
<i>Unpartnered</i>	23	35	47
<i>Cohabiting</i>	6	24	36
<i>Married</i>	71	41	17
<i>Total</i>	100	100	100

Source: 2000-01 General Household Survey

Table 3: Parenting situation of children from the antenatal period up to 33 months, according to age of mother (in percentages)

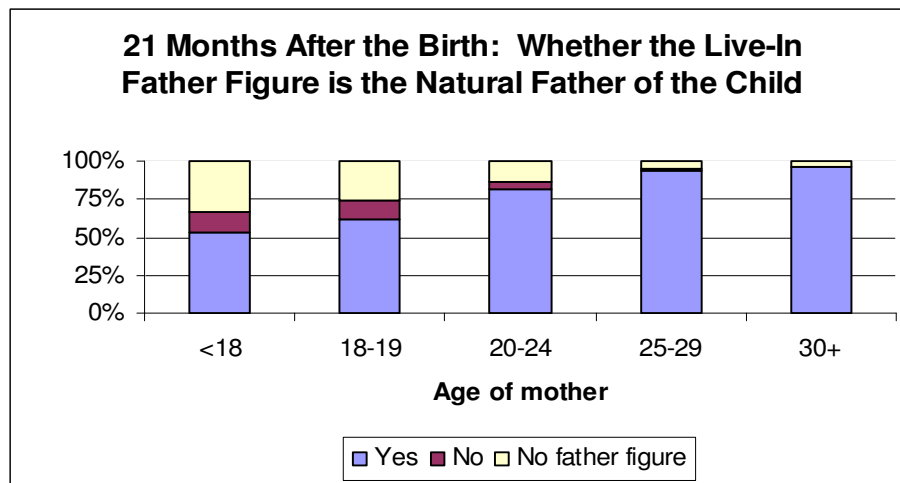
<i>Age of mother</i>	<i>Mother has live in partner throughout</i>	<i>Lone mother throughout</i>	<i>Lone mother at antenatal, later partnered</i>	<i>Mother has live in partner at antenatal, later dissolution</i>
<i>Teenage mothers</i>	33	18	33	16
<i>Older mothers</i>	88	3	3	7

Source: ALSPAC

The presence of a partner is a key factor affecting the relationship between young motherhood and behavioural difficulties in the child. The effect is mediated via the poorer mental health of women who do not have a stable partnership (section 3.7). ALSPAC children born to teenage mothers are significantly less likely to be living with their natural father (Figure 3). When we take the perspective of the father, we find that, among men born in Britain in 1970, teenage fathers are around four times more likely *not* to be co-resident with their child at the time of birth than men who entered fatherhood between ages 25 and 30. Section 3.6 reports our findings concerning the factors that affect the likelihood that teenage and young fathers are living with their

children and, among non-resident young fathers, the barriers to regular contact and financial support.

Figure 3: Percentage of children living with their natural father at 21 months according to age of the mother

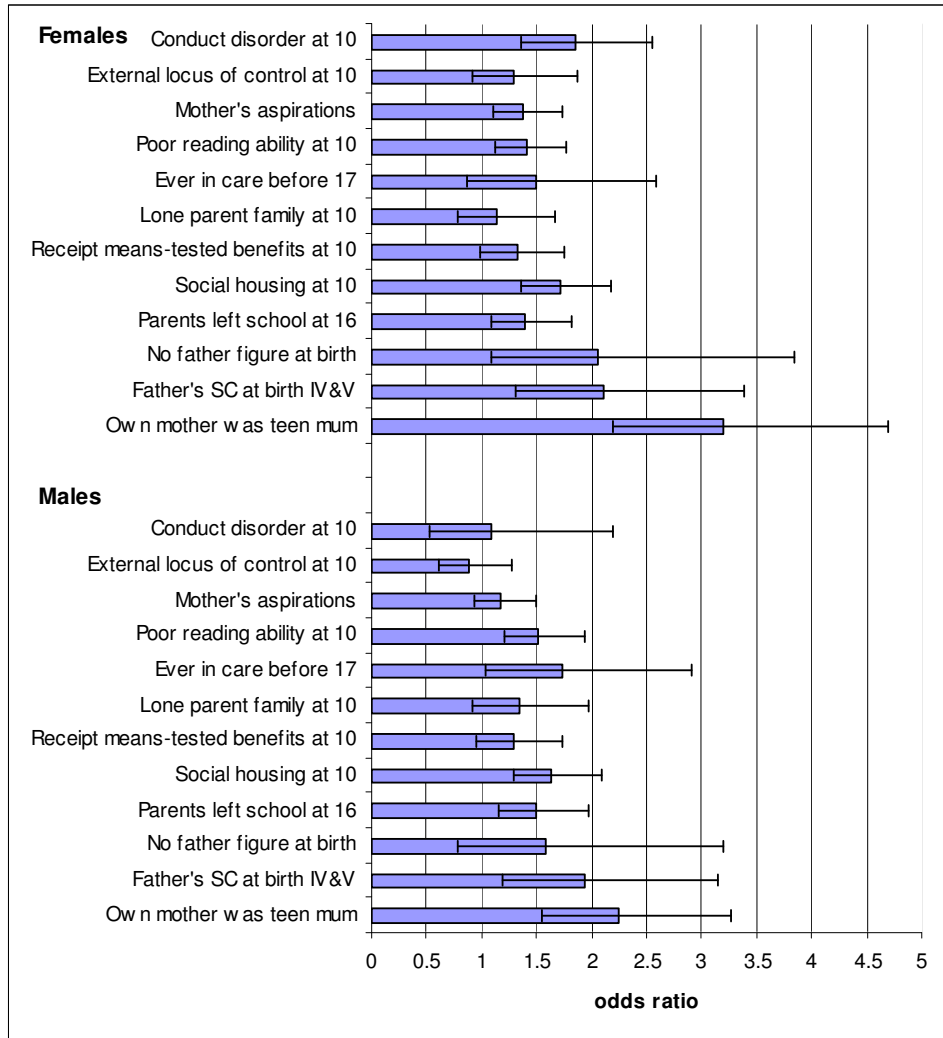


Source: ALSPAC

3.4 Life course antecedents of young parenthood

We need to take account of the selection into young parenthood of men and women from poorer socio-economic backgrounds if we are to compare outcomes for younger and older parents. The BCS70 dataset provides a rich array of background information which can be used to provide control variables. The importance of the various parental and childhood characteristics in predicting who becomes a teenage mother and a young father are summarized in Figure 4, which shows the results of a binary logistic regression where all the variables are entered simultaneously. Odds ratios of greater than 1 suggest a positive relationship with becoming a young parent. A confidence interval that does not overlap 1 indicates that the result is significant at the 5 percent level.

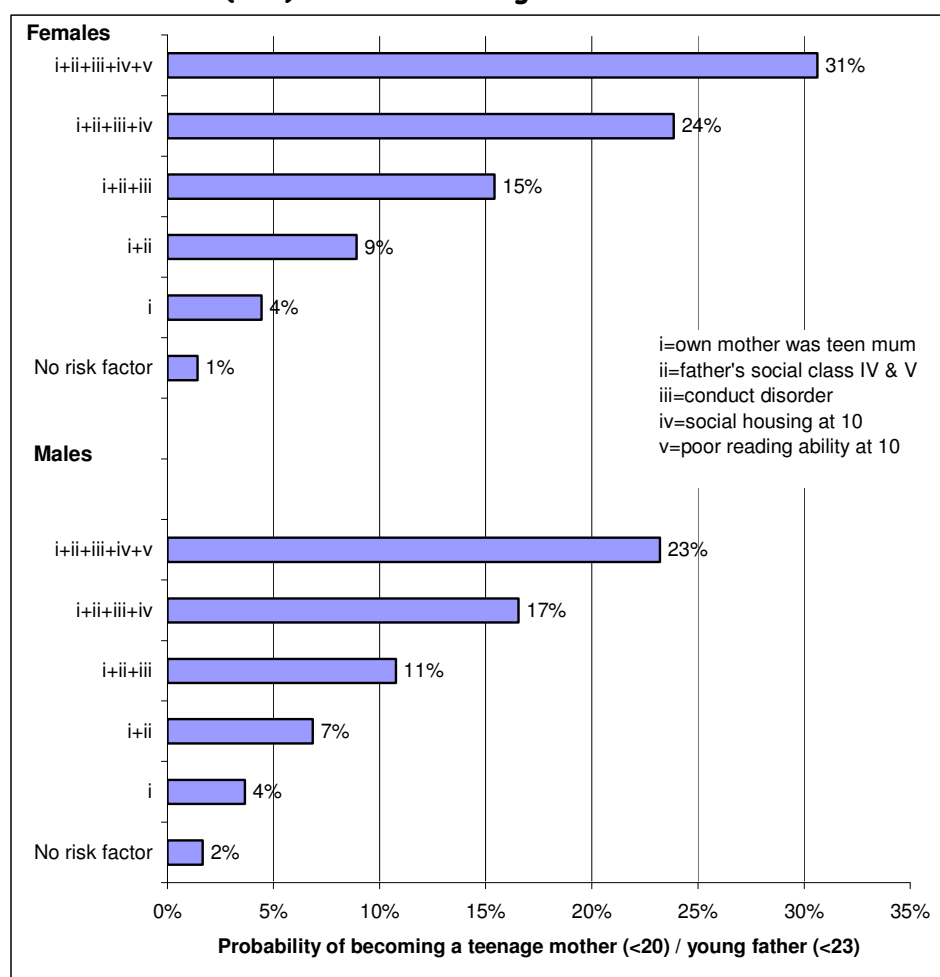
Figure 4: Odds ratios of becoming a teenage (<20) mother and young (<23) father



Source: BCS70

Figure 5 illustrates the predicted probabilities of becoming a teen mother or a young father based on the number of risk factors the cohort member was exposed to. We calculate the cumulative increased risk using five of the largest significant antecedents of teen motherhood, following Kiernan (1999). All the remaining covariates are assumed to be at their baseline. Thus, these probabilities refer to cohort members for whom both parents stayed in education past age 16, who did not receive means tested benefits at age 10, who were not in care, who lived with two biological parents at age 10, whose mother thought they would stay for further education, and who have an internal locus of control.

Figure 5: Predicted probabilities of becoming a teenage (<20) mother and young (<23) father according to risk factors



Source: BCS70

Our findings are largely consistent with earlier work based on the 1958 cohort by Kiernan (1999). Interestingly, we are more able to identify teenage motherhood than young fatherhood, although this may be because of our definition of young fathers. There are some experiences (for example, experience of statutory care) that are associated with young parenthood, but because of the small number of respondents who experience this life course event - around 2-3 percent of the sample - the result is not statistically significant; if we had a larger sample size these effects would almost certainly reach statistical significance. The fact that the age of the cohort member's (CM) mother at her first birth remains such an important predictor of the age at which the CM herself becomes a mother - even when controlling for socio-economic characteristics - suggests that attitudes (towards, for example, sexual behaviour, the right time to start a family, abortion) are important, in addition to socio-economic factors, in predicting young parenthood.

In addition to these structural and possible attitudinal factors predicting entry into early parenting, some further contextual and individual attributes were also found to be of importance. For example, parents' aspirations for whether their child would stay on in school past 16 - expressed when the child was just aged 10 - were associated with whether or not the child would become a teenage mother. Further, a history of conduct disorder, and having an external locus of control (that is to say a fatalist approach to life, perhaps reflecting a lack of empowerment) are associated with becoming a young parent, especially for women.

The BCS70 cohort was not found to be suitable for examining ethnic differentials in teenage parenthood and its consequences - the sample of non-white respondents who were included in the survey in 1970 and who remained in the study is too small. For female cohort members we did examine whether there were differences for white and non-white women and concluded that non-white women were more likely to become a teenage mother and that this effect was explained by the poorer circumstances that non-white women experienced during their childhood. Given that we had reservations about "lumping together" individuals of different ethnic origins into a single non-white category and the problems of interpretation that this leaves we did not attempt to incorporate ethnicity in our analyses for fathers.

3.5 Consequences of teenage parenthood for mothers¹

3.5.1 Aims

The aims of this element of the project were

- to compare the circumstances at age 30 for those who became young mothers with those who were older mothers;
- to investigate the extent to which young motherhood is associated with poorer health at age 30 by looking at a number of health measures;
- to investigate the extent to which this relationship is mediated via a greater risk of experiencing partnership breakdown among teen mothers; and
- to investigate the extent to which the poorer health of teenage mothers results from aspects of their socio-economic circumstances in adulthood.

3.5.2 Teenage motherhood and health at age 30

Teenage mothers are more likely to suffer disadvantages in adulthood; the raw data (i.e. unadjusted bivariate analyses) revealed that teenage mothers are nearly

¹ See Berrington et al. (2004) and Borgoni et al. (2004) for further details

- six times more likely to be in social housing than older mothers (above 24 years old);
- four times more likely to be in a family where neither themselves nor any partner are employed in paid work;
- more than three times as likely to be on benefits;
- about twice as likely to be unsatisfied with the neighbourhood in which they are living ..
- .. and to be twice as likely to experience partnership dissolution by age 30.

We also found that young motherhood is associated with poor adult health (teenage mothers were more than twice as likely than older mothers of having a high malaise score and being in poorer self-rated overall health).

However, we demonstrate that this association, rather than being a simple direct effect, is the result of a complex mechanism partially due to common antecedents (particularly poor material circumstances, conduct disorder, poor educational ability, experience of institutional care and low parental aspirations for their child's education) and partially mediated through the aforementioned disadvantages in adulthood. Graphical modelling shows the most important pathways through which teenage motherhood is associated with 3 health outcomes at age 30, after controlling for the selection into teenage motherhood.

Malaise

The malaise inventory comprises a series of 24 self completion questions relating to the presence of symptoms of anxiety and depression (such as feeling tired, worried miserable, scared) and somatic symptoms of emotional distress (such as suffering from indigestion, headaches, upset stomach). Our analyses showed that teenage motherhood is associated with a higher risk of malaise in part due to common antecedent factors, for example, coming from a poor background, having low educational ability, a history of conduct disorder and an external locus of control.

However, age at motherhood continues to be associated with malaise in adulthood even after controlling for these childhood antecedents. The graphical model tells us that part of this continuing association is explained by the later circumstances of teenage mothers including:

- the greater risk of partnership dissolution - teenage mothers were twice as likely to experience the breakdown of a co-residential partnership, an experience which is itself associated with an increased risk of malaise;
- the greater risk for teenage mothers to be living at age 30 in a non-work family which itself is associated with a doubling in the risk of malaise; and
- the greater risk for teenage mothers to be dissatisfied with their neighbourhood - associated with a 70 percent higher risk of malaise.

Lack of social support, in terms of not having a confiding relationship, or being less emotionally close to their own mother, was also an important pathway through which

teenage motherhood was associated with malaise. Whether or not the mother was currently living with another adult in the household was not important in this cohort.

General Health Questionnaire, 12 question version (GHQ12)

GHQ12 focuses on the respondent's feelings, asking about psychological and physical symptoms of depression and anxiety during the last few weeks, and whether they are more or less prevalent than usual. Hence GHQ12 reflects more immediate short-term psychological ill health...A significant relationship between age of the mother at first birth and scores on GHQ12 in adulthood was found, even after controlling for common antecedents. We found that this remaining association was entirely explained by the poorer living conditions and lack of social support experienced by teenage mothers. In fact, adult circumstances appear to be the strongest predictors of GHQ12 score. The risk (odds) of poor health among women living in a workless family were found to be 1.8 times higher than for women living in a family with an adult in paid employment. Social circumstances were also important; women who reported partnership dissolution, those who were not emotionally close to their mother, those who said they had no one in whom they could fully confide, and those who were dissatisfied with their neighbourhood, were all more likely to have a higher GHQ12 score. This score was independent of whether the woman lives with another adult once all the other variables were controlled for, suggesting again it is the *level* of social support, rather than living with another adult *per se*, that is important. Given that young motherhood is a key determinant of adult circumstances, age at motherhood is an important mediating variable through which inequalities in childhood social circumstances are translated into social inequalities in adult psychosocial health.

Ethnicity was the only parental or childhood variable that remained associated with a high GHQ12 score once circumstances in childhood and adulthood are controlled for. The risk of poor psychological health was 1.4 times higher for non-white women. All remaining parental and childhood characteristics are only indirectly associated with a high GHQ12 score through their relationship with ethnicity, age at motherhood, partnership dissolution, or adult socio-economic circumstances.

Self-rated overall health

At age 30, teenage mothers were only half as likely to describe their health as "excellent" or "good", being more likely to describe it as "fair" or "poor". Our analysis suggests that the observed bivariate association between young motherhood and poor adult health is partly due to common antecedent factors. Young mothers are more likely to come from poorer socio-economic backgrounds and hence are more likely to have childhood characteristics - such as conduct disorder, poor reading ability and experiences such as that of statutory care - which are themselves associated with poorer health in adulthood. However, once these common antecedent factors are controlled, young motherhood remains strongly associated with less than good overall health at age 30. In part, this relationship is mediated through the poorer socio-

economic circumstances in adulthood of younger mothers, and their greater risk of being emotionally distant from their own mothers. However, even when these factors are taken account of there remains a net relationship between teenage motherhood and poor overall health.

Adult overall health appears to be directly related to disadvantages not only in adulthood but earlier on in the life course. Only one variable amongst parental characteristics and birth circumstances - ethnicity - had a direct relationship with health in adulthood. Even when all other factors are controlled, ethnicity remained directly related to less than good health, with non white women being 60 percent more likely to report less than good health (numbers were too small to enable further disaggregation into ethnic groups). All of the other parental characteristics and birth circumstances were associated with less than good health at age 30 *indirectly* via their impact on childhood circumstances (particularly low reading ability, conduct disorder, parental expectations and experience of statutory care) and later life course experiences (particularly age at motherhood and poverty in adulthood). Childhood circumstances, such as reading ability and conduct disorder, had direct relationships to poor adult health. Further, parental expectations for the age at which their child will leave school and experience of institutional care were also directly related to overall health.

Our analyses show that experiencing economic disadvantage in childhood and in adulthood combine across the life course to create health inequalities. For example, low reading ability in childhood was associated with poorer overall health both directly and indirectly, through the relationship between reading ability with other age 10 circumstances, a greater risk of young motherhood, a greater risk of being in a non-work family and in socially rented accommodation in adulthood. Women who were living in a non-work family were more than twice as likely to be in poorer health, whilst those living in social rented housing were 1.3 times more likely to report less than good overall health.

Experience of a partnership dissolution was not found in itself to be related to poor overall health, but was indirectly associated via poorer living conditions in adulthood, and being less emotionally close to one's mother. Neither satisfaction with their neighbourhood, nor having someone to fully confide in were significant predictors of general health.

In summary, the graphical modelling visually demonstrated how differentials in adult health reflect the cumulative impact of social disadvantage experienced throughout the life course. Young motherhood plays an independent role as a mediating pathway through which socio-economic disadvantage in childhood is associated with poor health in adulthood. In other words the greater experience of young motherhood among women from poorer backgrounds contributes to the observed adults social inequalities in health. It is worth noting that women who delay childbearing to their early twenties do not seem to fare much better than teenage mothers in terms of all three health

outcomes. It is thus questionable as to whether a broader concept of young motherhood needs to be considered by policy makers rather than a focus on a specific age cut-off.

3.5.3 Results from simulations²

Part of the Government's Teenage Pregnancy Strategy is to provide support for young parents. The graphical modelling approach provides the opportunity to simulate the possible impact of a policy intervention to reduce health inequalities for young mothers accounting for both direct and indirect effects in an appropriate way. In other words, we evaluate the *potential* effect of a policy intervention on health in adulthood accounting for the effect that the intervening variable may have on other individual characteristics that, in turn, may affect such an outcome. We make the assumptions that the observed associations e.g. between partnership dissolution and poor psychosocial health are causal and that they are not the result of their joint association with an unmeasured variable.

In what follows, we provide a few examples of this sort of simulation selecting variables for intervention from the socio-economic circumstances in adulthood. We focus on the theoretical impact of making these interventions for our population of interest - a teenage mother with average characteristics (i.e. the most common profile of characteristics seen within our sample of teenage mothers), (see section 5.2). Because of the way in which the graphical model is constructed, for practical reasons, we simulate the effect of the intervention for teenage mothers who have and have not experienced a partnership dissolution - we can of course combine these effects to provide the total potential impact for all teenage mothers.

Neighbourhood Satisfaction

Among teenage mothers the proportion satisfied with the area in which they lived was about 83 percent (81 for those who experienced partnership dissolution and 85 for those who did not). Let us assume that through cross-cutting policy interventions such as might be implemented via the Government's Neighbourhood Renewal Strategy it is possible to increase neighbourhood satisfaction to 95 percent. If this were achieved, the percentage of teenage mothers suffering malaise would, according to the model, decrease by 5 and 7 percent respectively for those who have not experienced partnership dissolution and those who have. The percentage of people suffering poor mental health (GHQ12) would decrease by 4 and 5 percent for these two groups respectively, whilst the percentage of those in poorer overall health would decrease by a smaller amount (3 percent for both groups).

² A technical note on the method used is provided as section 5.2 of this report.

Our simulation also demonstrates that it is important to preserve current neighbourhood quality. Had the percentage satisfied dropped to just 60 percent for instance, this would raise the overall percentage of teenage mothers suffering malaise by 11 percent, the percentage with poor mental health (GHQ12) by 9 percent and the percentage with poorer overall health by 6 percent.

Partnership breakdown

Increased rates of partnership dissolution would exacerbate these effects. Policy interventions to support marriage are difficult to implement. Let us make the assumption that the current trend of increased partnership dissolution continues and that the percentage of teenage mothers who experience separation increases from the observed 41 per cent to around 50 percent. This, together with the previously described fall in neighbourhood satisfaction, would increase the percentage suffering malaise by 14 percent, the percentage suffering poor mental health (GHQ12) by 12 percent, and the percentage suffering poorer self-rated health by 7 percent.

Emotional support

The BCS70 respondents were asked to describe the emotional support they received from family and friends. We identify those who felt they had only limited emotional support available from a family member or friend separately from those who said that they could discuss anything within this supportive friendship. Only around 68 percent of teenage mothers reported good support. Assuming that it would be possible to increase this figure to 90 percent, the percentage of people suffering malaise would decrease by around 9 percent, whilst the percentage suffering poor mental health (GHQ12) would decrease by around 6 per cent. Since emotional support is not a significant variable for explaining self-rated health (i.e. no direct effect was found in the data), the change due to the considered intervention acts only indirectly via the relationship between emotional support and other circumstances in adulthood. Even these indirect relationships are weak such that improving emotional support would only improve self-rated overall health by less than half of one percent.

Our simulation also suggests that it is important to encourage inter-personal supportive relationships. Had the percentage of those who feel themselves to be emotionally unsupported risen to 50 percent for instance, this would raise the percentage suffering malaise by around 8 percent and the percentage suffering poor psychosocial health as measured by GHQ12 by around 5 percent. If the level of partnership dissolution also increased to 50 percent this, combined with the assumed drop in the level of emotional support, would increase the percentage of those suffering malaise by 10 percent and the percentage of those suffering poor mental health by 8 percent.

In conclusion different interventions have different theoretical impacts on the three health outcomes. Whilst policies to improve neighbourhood quality may have an impact

on both psychosocial and overall health, improving the emotional support available to young women could have most impact on psychosocial health and may have little impact on general health. We acknowledge that improving neighbourhood quality is likely to be associated with improvements in a range of adult circumstances e.g. lower unemployment, greater social support. To the extent to which these other circumstances have also been measured at age 30, this has been taken account of in the graphical model. The interdependencies between improvements in different areas; access to employment and home ownership for example are modelled explicitly and are one reason for the larger impact on health outcomes of improvements in neighbourhood satisfaction.

3.6 Consequences of teenage parenthood for fathers³

3.6.1 Aims

The aims of this element of the project were

- to examine the outcomes of young fatherhood at age 30; in particular, whether teenage (aged under 20 at the birth) and young (aged 20-22 at the birth) fathers have lower earnings and higher levels of unemployment;
- to quantify the extent to which younger fathers are more likely to be non-resident and, if so, the extent to which this is due to a greater chance of never having lived with their child and/or a higher propensity of younger fathers to separate from the mother and child; and
- to explore, for younger fathers, the factors associated with differential levels of contact and payment of maintenance.

3.6.2 Young fatherhood and socio-economic outcomes at age 30

From the raw data (i.e. unadjusted bivariate analyses), we observe that men who became a father in their teens and early twenties are twice as likely, at age 30, to live in social housing, to receive means tested benefits and to be unemployed. Moreover they are significantly more likely to have lower educational qualifications and lower earnings.

Multivariate analyses, however, show that the difference in earnings at age 30 among those younger and older at age of fatherhood is largely explained by selection into early fatherhood of men who come from poorer socio-economic backgrounds, in particular, those men who had lower educational ability and whose mothers did not expect them to continue in education post age 16.

³ Further details are provided in Berrington et al. (2005)

Men who became fathers in their early twenties continue to be at twice the risk of unemployment in adulthood, compared to older fathers even when their parental background, childhood circumstances and highest educational qualification are taken account of. This suggests that, for this group, there may be other factors - for example, psycho-social pathways not captured by the questionnaires and statistical model - which mediate the association. For example we find that, controlling for all the other factors, men with a history of conduct disorder at age 10 were twice as likely to be unemployed in adulthood.

3.6.3 Young fathers and non-residential fatherhood

One half of men who had had their first birth in their teens were *not* living with their first child at age 30, compared to 40 percent of those who became a father in their early twenties, and 15 percent of older fathers. Particularly striking is the fact that more than one fifth of teenage fathers, and 15 percent of those who became a father in their early twenties reported that they had *never* been co-resident with their first child compared to just six percent of older fathers. This age at fatherhood effect persists once the socio-economic backgrounds of young fathers is taken account of and probably reflects the type of partnership within which the child was conceived. Teen and young fathers are more likely to be in a casual relationship, or to be in a steady girlfriend-boyfriend relationship, whilst older fathers are more likely to become a parent within a co-residential union. Young fatherhood and non co-residential fatherhood do not share the same aetiology. Our multivariate analyses suggest that young fatherhood is more strongly predicted by socio-economic background factors, whilst non co-residence is more strongly predicted by behavioural and psychological characteristics, particularly a history of conduct disorder and having an external locus of control.

For fathers who were initially coresident, once the additional exposure of younger fathers to the risk of separation is controlled for, differences between teen, young and older fathers in the likelihood that they are not living with their child are much smaller than initially observed. Around one in seven men who became a resident father under age 20 or at age 20-22 separated from the child within five years, compared with one in 10 of the older fathers. We conclude that teenage fatherhood is more strongly associated with non co-residence from birth than with the risk of later separation among those men who do become a father within a co-residential partnership.

At age 30, almost two thirds of teenage non-residential fathers report that they are living with a new partner, as compared with 45 percent of men who became fathers in their early twenties, and 40 percent of men who became fathers in their mid to late twenties. Almost three quarters of under 23 non-resident fathers are not living with any children at age 30, and 18 percent are living with subsequent biological children. Around one quarter of the teen and young fathers' children, and 11 percent of the children of older fathers, were now living in a reconstituted family where their mother has re-partnered.

3.6.4 Contact and maintenance amongst young non co-resident fathers

Irrespective of age at fatherhood, the majority - around two thirds - of non-resident fathers see their child at least once per month and, a similar proportion report that they make some kind of financial contribution toward their child's maintenance. Both of these outcomes decline with increasing time since the father lived with the child and his or her mother.

Over and above this, factors that decrease the frequency of contact are whether the mother is in a new relationship (where the likelihood of weekly contact is halved) and whether the father is in a new relationship and has further biological children (which reduces the likelihood of weekly contact by two-thirds). Having controlled for all these factors, fathers who were themselves not living with two biological parents at age 10 continue to be only half as likely to maintain weekly contact with their own children.

Younger (under 23) fathers are more likely to be unemployed, to have lower earnings and lower educational qualifications. Once these characteristics and time since separation are controlled for in a simultaneous model, younger fathers are, in general, no less likely to maintain contact, and, among the BCS70 cohort at least, are actually twice as likely to make payments.

The multivariate analyses suggest that the factors that influence payment of maintenance are similar for younger and older fathers, and include the frequency of contact with the child, the presence of new biological and/or step-children, and educational qualifications (those with no or below O-level qualifications are around half as likely to make payments). However, unlike the finding for contact, the mother's current relationship status does not affect the probability of maintenance payments.

3.7 Outcomes for children of teenage mothers⁴

The impact of teenage motherhood on children was investigated in a secondary analysis of data from the ALSPAC Study (Golding, Pembrey, Jones and the ALSPAC Study Team, 2001). Data were available on the family and the child up to 42 months after birth in a sample of 9910 families. On many developmental outcomes e.g. vocabulary, gross and fine motor development (discussed in Appendix 5.1), the children of teenage mothers were not reported to be doing any worse than the children of older mothers. However, as found in the BCS70 study, teenage motherhood was seen to play a role in the transmission of social disadvantage. Furthermore, there were adverse outcomes both for the mother and for the child in terms of their mental health and behavioural

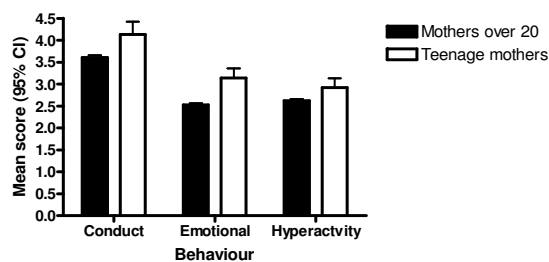
⁴ Further details are provided in Stevenson et al. (2004a, 2004b)

adjustment respectively. The mechanisms whereby these adverse outcomes arise need to be considered as a whole since they include factors that relate to family backgrounds of the mother themselves, the adverse social circumstances experienced after the birth and factors that might relate more directly to care provided by teenage mothers. For these reasons the analysis of the outcome for the child must be considered alongside outcome for the mother.

3.7.1 Behaviour problems and mothers' mental state

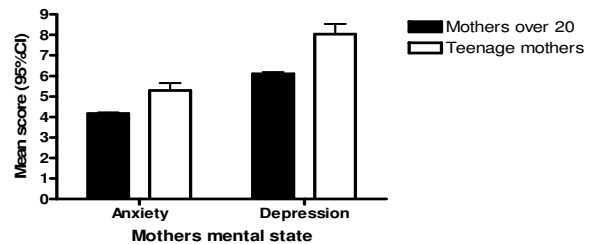
The level of behaviour problems in children born to teenage mothers is higher than in children born to older mothers (see Figure 6). Although better parenting skills were found to be associated with fewer behavioural problems, within the ALSPAC study no significant differences were found in parenting skills between teenage and older mothers. Instead we find that the adverse outcome for the children of teenage mothers is strongly affected by the mothers' mental state. As was shown for the BCS70 cohort (see Section 3.5.2), teenage motherhood in the ALSPAC data is related to an increase in mental health difficulties (see Figure 7). The most recent results published on teenage mothers in the UK are those from the e-Risk Study (Moffitt *et al.*, 2002). The comparison of the present ALSPAC results and those from the e-Risk study are shown in Figure 8 for externalising (conduct) and internalising (emotional) behaviour problems, and for maternal depression. Across the studies and across the measures, teenage mothers and their children have mental health scores some one third of a standard deviation higher than older mothers and their children. Another way of expressing this effect size is that the mean for teenage mothers is at a level reached by 38 percent of the population of older mothers.

Fig. 6 Comparison of children of teenage and older mothers on Rutter Scale at 42 months



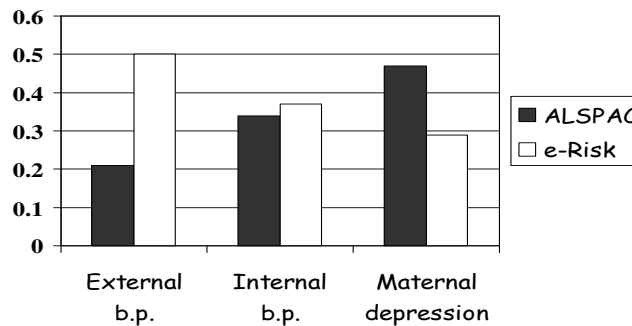
all sig. at $p < .001$

Fig.7 Comparison of Teenage and Older mothers on Mental State up to 33 months



all sig. at $p < .001$

Figure 8: Comparison of effect sizes of ALSPAC and e-Risk* studies
(effect size is difference between teenage and older mothers)

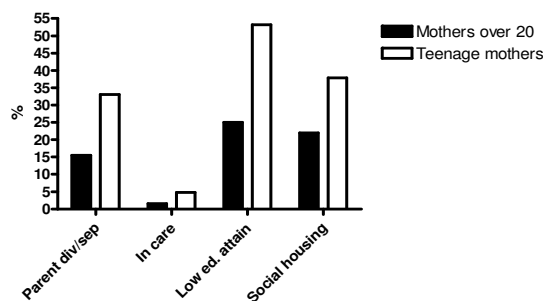


* see Moffitt (2002)

This poor mental health in teenage mothers was related, in part, to the social disadvantage present in their families of origin. The indicators of adverse social antecedents used are shown in Figure 9, each of which shows a significant association with teenage motherhood.

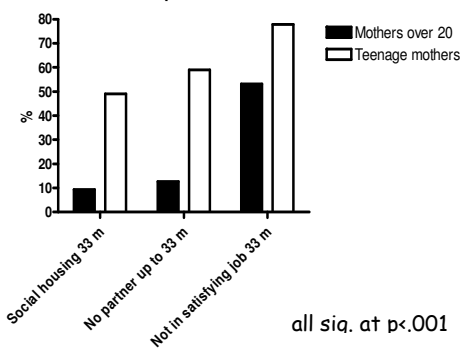
The development of anxiety and depression in mothers is related to a number of social factors that mediate the impact of teenage motherhood on mental state. Of the potential mediators included in the analyses, presence of a co-residential partner, attitudes to pregnancy, housing quality, job satisfaction (but not employment per se), unemployment in the family during pregnancy and parenting were all related to mothers' mental state. The relationship between some of these mediators and teenage motherhood is shown in Figure 10.

Fig. 9 Comparison of Teenage and Older Mothers on Antecedents



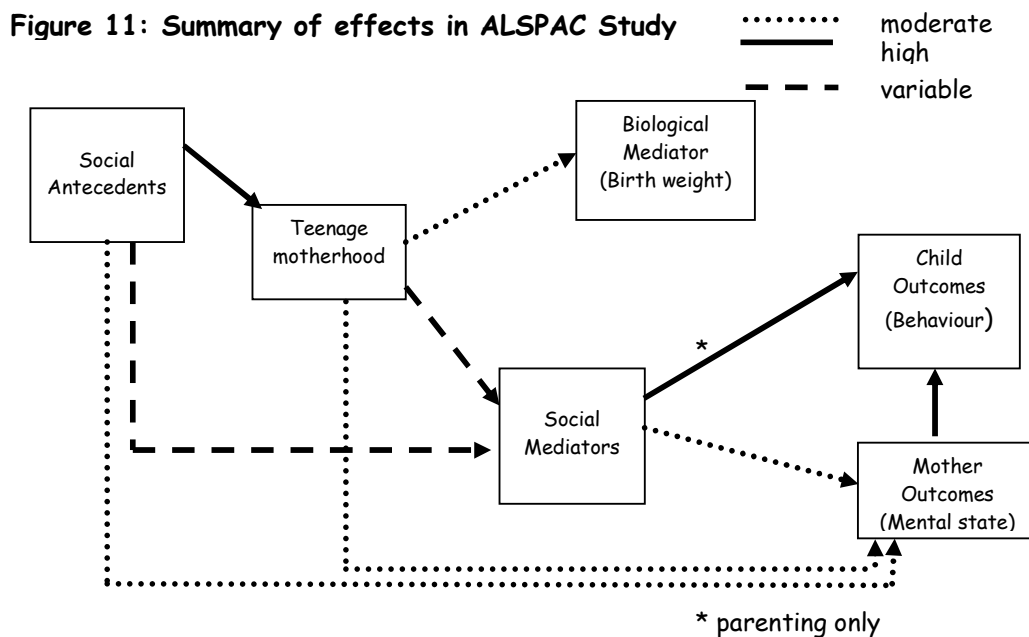
all sig. at $p < .001$

Fig. 10 Comparison of Teenage and Older Mothers on example mediators



all sig. at $p < .001$

In order to understand the inter-relationships between antecedents, mediators and outcome, the conceptual model shown in Figure 1 (section 3.2.4) was tested using structural equation modelling. The results are summarised in Figure 11. These show that child behaviour is strongly influenced by the mother's mental state. This, in turn, is related to teenage motherhood. We find that the poorer mental health of teenage mothers is explained by the tendency of teenage mothers to be more likely to be living without a co-residential partner and to be living in poorer housing (identified as a combination of a number of indices - whether the accommodation was social housing, lacked central heating and a telephone, suffered from damp or was overcrowded). That is to say poor housing quality and lack of a co-residential partner mediate the relationship between teenage motherhood and poor maternal mental health. All of these factors; i.e. teenage motherhood, housing quality and partner presence are, in turn, affected by the level of social disadvantages in the mother's family of origin.



The role of mother's employment is not substantial. Teenage mothers are more likely to be in a job for over 16 hours a week when their child is 21 and 33 months but at the same time these jobs are less likely to provide job satisfaction. Lack of job satisfaction has a more marked, but still slight, effect on mothers' mental health (neither employment or job satisfaction relates to child outcome directly). Being in a family with no adult in the paid labour force during pregnancy is a reflection in part of social disadvantage of the mother's family of origin. It does however make a distinct, though small, contribution to poorer mother's mental state.

This pattern of results suggests that important potential areas for action to prevent the adverse consequences of teenage motherhood for both the mother and the child are in relation to housing quality and the presence of partner. These both carry a

substantial part of the effect of teenage motherhood on outcome as well as some of the effects of the social antecedents in the mother's family of origin.

The analysis included a test of whether these effects were moderated by child gender, parity, ethnicity or the quality of support experienced by the mothers. For example, were first born children more likely to be affected by teenage motherhood than subsequent children? Such an analysis was designed to highlight sub-groups who might be particularly vulnerable to the adverse effects of teenage motherhood, and who might be amenable to targeting for preventive interventions. Alternatively, subgroups that were relatively resilient to the potential adverse effects might provide guidelines for effective action to enhance these resilience factors in teenage mothers and their families. The result was that none of the four moderators tested showed any significant effect.

The absence of a moderating effect of good or poor support experienced by the mothers suggests that the adverse consequences of teenage motherhood for the mother's mental health - and for the child's behaviour - are not modified by the presence of what the mothers regard as being good support. The social support measure was based on the mother's evaluation of the quality of support she received from family and friends (not from local services). The results suggest that the negative impact of being in a lone parent family is not altered whether or not the woman perceives herself to have good support. The presence of a partner may provide more than just the potential for emotional support, for example, in relation to sharing household tasks and in terms of household income. It may be this relief from some of the burdens of family care and enhanced resources that are more significant than the mother's report of whether she sees herself as well supported or not. The presence of a partner may also protect against some adverse life events, some of them acute such as eviction and some chronic such as living in a socially deprived neighbourhood associated with, for example, poverty. It is known that such life events are a major contributor to depressive episodes and single mothers are particularly prone to experience this type of event (Brown and Moran, 1997).

3.7.2 Children's involvement in accidents

There have been reports that accidents are more likely to occur in certain types of family. Young children of teenage mothers have an increased risk of injury (Murphy, Gilliland and Growold-Rhymer, 2001) and this extends to a relative risk of death through injury of 2.2 compared with children of mothers over 30 years of age (Scholer, Mitchel and Ray, 1997). The risk of injury or accidents is affected by the teenage mother's behaviour, such as aggression, shown earlier in her own development (Serbin, Peters and Schwartzman, 1996). Previous analyses of the ALSPAC data have shown that children living with single parents and in stepfamilies are at greater risk than other families (O'Connor, Davies, Dunn and Golding, 2000).

These findings suggest that part of the risk is transmitted by the mother's behaviour and this will be affected by her mental state. It has been shown that accidents are more likely to occur at times when mothers are experiencing a depressive episode (Brown and Davidson, 1978). Accordingly, we undertook a secondary analysis of the ALSPAC data to examine the effects of antecedents and mediators on the relationship between teenage motherhood and accidents in the child between the ages of 24 and 38 months. In particular, we investigated whether the risk of accidents in the children of teenage mothers was mediated via maternal mental state. Accidents were identified as whether the child had been burned or scalded, the child had been dropped or badly fallen, the child swallowed something he/she should not have and 'other' accidents. The accident was reported whether or not the child was injured as a result.

There were significantly greater rates of accidents overall, and of bad falls and swallowing substances but not of burns/scalds or of 'other' accidents, in the children of teenage mothers than in children of mothers over 20 years of age (see Table 4).

Table 4: Rates of accidents in children of teenage and older mothers in ALSPAC study

<i>type of accident 24 to 38 months</i>	<i>teenage mothers</i>			<i>older mothers</i>			<i>Odds ratio (95% CI)</i>
	<i>n</i>	<i>N</i>	<i>%</i>	<i>n</i>	<i>N</i>	<i>%</i>	
<i>Burnt/scalded</i>	20	236	8.5	610	9038	6.7	1.28 (0.80 to 2.04)
<i>bad fall</i>	58	235	24.7	1737	8992	19.3	1.37 (1.01 to 1.85)
<i>swallowed substance</i>	22	233	9.4	467	9052	5.2	1.92 (1.22 to 3.00)
<i>other</i>	30	233	13.2	1196	8906	13.4	0.98 (0.66 to 1.44)
<i>any accident</i>	112	236	47.5	3404	9083	37.5	1.51 (1.16 to 1.95)

The accident rate in the children was not affected by the provision of safety equipment in the home. Specifically, the use of electric socket covers and safety gates on stairs and hall ways was not associated with differences in the rates of accidents.

When the multivariate structural equation modelling analysis was carried out, it was found that teenage motherhood did not have a *direct* effect on accident rates. The effect of teenage motherhood was via mother's mental state. The antecedents to teenage motherhood were also associated with higher accident rates in the bivariate

analyses, but this effect was carried by teenage motherhood and its relationship with mother's mental state. The latter, however, did have a direct effect on accident rates.

The effect of social antecedents of teenage motherhood on accidents was via the mother's mental state, the exception being low education attainment in the mothers. This had a direct effect on accident rates but was in the opposite direction to what might have been expected. For both teenage mothers, and for older mothers, those with educational attainment at Certificate of Secondary Education, vocational or no qualifications had children, fewer of whom had accidents than did mothers with higher qualifications. The accident rates were 43.2 versus 52.3 percent for teenage mothers and 34.3 versus 38.5 percent for older mothers, for lower and more highly qualified mothers respectively. In the multivariate analysis, this unexpected result was not due to the impact of low educational attainment, nor on mothers' working or on the quality of parenting mothers provided. This finding for both teenage and older mothers warrants further examination and attempted replication using other data sets.

The main conclusion of the role teenage parenthood plays in increasing the rate of child accidents is that teenage parenthood itself is *not* having a direct effect on accident rates. The effect is mediated by the greater vulnerability of teenage mothers to depression and anxiety which, in turn, is related to increased levels of accidents. The social background of teenage mothers' families of origin does not affect child accidents directly. Those mothers with better educational qualifications in both the teenage mother and older mother groups have children who are more likely to experience accidents. The reasons for this last finding are unclear.

3.8 Overall implications for Policy

A number of issues have been identified that may be of relevance to policy in the area of teenage parenthood and its consequences. As with any such analyses, however, it should be borne in mind that we have identified many more *general* patterns in the relationships between variables. Although the criterion of statistical significance should protect against over-interpretation of results, we are restricted by the nature of the questions asked of the participants of these surveys, as well as by the changing social and cultural contexts in which the cohort members have grown up. For these reasons, and others, we cannot point to specific direction for policy to pursue, but merely to areas which would appear to warrant further consideration.

In terms of predicting who will become a teenage mother in the first place (and father, albeit to a lesser extent), our results support the well-established relationships between (a) increased risk and social deprivation, and (b) the age at which the cohort members' own mothers had their first children. Much has been written elsewhere about the importance of aspirations as a factor affecting young women's risk of early teenage conception (as well as their abortion decisions). We found that the level of the mothers' own aspirations for their daughters - measured when the latter were aged as young as

ten years - was an additional predictor of entry into teenage motherhood. The question on which this was based was concerned with the probability of the daughter staying on in education after 16 years of age. Clearly, efforts to counter these - apparently normative - negative assumptions regarding their children's (especially daughters') potential may well repay dividends. Targeting efforts may well be possible if suitable data are collected at appropriate times.

Over and above these structural and contextual factors, individual attributes at age 10 years - such as a history of conduct disorder, having poor reading ability, having an external locus of control (that is to say a fatalist approach to life, perhaps reflecting a lack of empowerment) - are also associated with becoming a young parent, especially for women. Again, early identification of those most vulnerable using these risk factors may be feasible.

In general, teenage mothers are more likely to suffer a range of disadvantages in adulthood, including poor physical and psychological health. However, these patterns result from a complex interplay of predisposing factors (that is, those that predicted their entry into teenage motherhood) in conjunction with the additional consequences of being a teenage mother. The higher levels of malaise, poor psychosocial health and poor overall health found at age 30 amongst those who were teenage mothers are mediated through a higher risk of partnership dissolution, living in a non-work family, being dissatisfied with their neighbourhood and not having a confiding relationship. The age at which these participants were young mothers predated a number of policy innovations, including Connexions, Sure Start Plus and supported housing. It is therefore not possible to say to what extent these recent innovations may help to counteract the negative results of early parenthood. The patterns of results that we obtained do, however, suggest areas that should be fully explored in evaluations of these recent innovations, and adjustments made if and where necessary. We note that analysis of the ALPSAC did not identify increased social support as a moderator of the factors affecting childhood behaviour problems or mother's mental state, but this finding is based on a single question about whether the respondent has anyone to share their feelings with and it may be that the enhanced provision these schemes entail may be beneficial.

Over and above the predisposing factors that predict entry into early fatherhood, men who became fathers in their early twenties were twice as likely to be unemployed at age 30 and to be non co-resident with their first child. This latter result appears to be predicted by personal characteristics, such as a history of conduct disorder and having an external locus of control. Over and above this teenage fathers are particularly likely to have never lived with the child reflecting the more casual type of relationship within which many of these children are conceived. Policies aimed at young fathers need to take this high level of non co-residence into account.

A new partnership for either the mother or the father has a negative impact on the frequency of contact by the father. A new partnership impacts on the likelihood of

paying maintenance irrespective of age of entry into fatherhood. These findings, as well as those regarding the negative impact of being alone on young mothers in terms of their psychological health and economic circumstances, suggests that, although the State can hardly force people to stay in relationships which have failed (or did not even start), any barriers to maintaining potentially successful relationships should be minimised.

Given the realities of high levels of partnership dissolution and repartnering among young parents policies need to recognise the diverse and complex family situations and living arrangements of young parents. Policies to help young resident fathers may not be applicable to the substantial number who are not co-resident. Nevertheless, two thirds of the non-resident teen fathers had regular contact and made some contribution towards their child - policies therefore need to support young fathers in this role whilst at the same time recognising that they are likely to have responsibilities within new families. As noted in the recent evaluation of Sure Start Plus (Wiggins et al. 2005), it may be appropriate for different advisers to be allocated to young women and their partners to help avoid situations of conflict of interest.

The observed higher rates of accidents (overall, bad falls and swallowing substances, but not burns/scalds) amongst the children (aged between 24 and 38 months) of teenage mothers are mediated by the mothers' mental state. In other words, it is not the age at first motherhood *per se* that is important, but that teenage mothers are more likely to suffer from anxiety and depression (which are themselves associated with poor housing quality and lack of partner presence). The same holds true for behaviour problems in the children of teenage mothers. Given these findings, the emphasis, for example within Sure Start Plus, on policies to address young mothers' emotional wellbeing seems well-placed.

In sum, it is clear that a life course perspective is required, since individual measures taken when the child is aged 10 years old (such as conduct disorder, parental aspirations, educational achievement) are found to be important predictors, to varying degrees, of subsequent entry into early parenthood, over and above the more general contextual aspects of poverty, family composition and the receipt of benefits. By taking a life course perspective we have also shown that teenage motherhood is a key mediating pathway through which poorer socio-economic conditions in childhood are translated into socio-economic and health inequalities in adulthood. In other words teenage parenthood is one route through which there is an inter-generational transmission of disadvantage.

The pattern of results suggests that important potential areas for action to prevent the adverse consequences of teenage motherhood for both the mother and the child are in relation to minimising workless families, improving housing quality and wider neighbourhood quality and encouraging the presence of a co-residential partner. These factors clearly inter-relate and carry a substantial part of the effect of teenage motherhood on outcomes for the mother and child.

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4 OUTPUTS FROM PROJECT

4.1 Substantive Findings

Berrington, A., Borgoni, R., Smith, P.W.F., Ingham, R. and Stevenson, J. (2004) Life course determinants of poor psychosocial health in adulthood: young motherhood as a mediating pathway. Submitted to *Social Science and Medicine*.

Berrington, A., Cobos Hernandez, M.I., I. Ingham, R. and Stevenson, J. (2005) Antecedents and Outcomes of Young Fatherhood: Longitudinal evidence from the 1970 British Birth Cohort Study. University of Southampton Statistical Sciences Institute Applications and Policy Working Paper no 05/09.

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Stevenson, J., Berrington, A., Borgoni, R., and Ingham, R. and ALSPAC Team (2004b) Why do children of teenage mothers have more accidents? Submitted to *Social Science and Medicine*.

4.2 Technical Papers

Borgoni, R., Berrington, A. and Smith, P.W.F. (2003) Handling the effect of non-response in graphical models for longitudinal data. Published in Proceedings of SCO 2003 Conference: Complex Models and computer intensive methods for estimation and forecasting, Treviso, Italy, 4th-6th September 2003.

Borgoni R. and Berrington A. (2004) A tree based procedure for multivariate imputation. *Atti della XLII Riunione Scientifica della Società Italiana di Statistica*, 323-326.

Borgoni R. and Berrington, A. (2004) Evaluating a sequential tree based procedure for multivariate imputation of complex missing data structures. Paper presented at Royal Statistical Society Meeting, 28th May 2004.

Borgoni, R., Berrington, A. and Smith, P.W.F. (2004) Constructing and fitting graphical models to longitudinal data with attrition. University of Southampton Statistical Sciences Institute Methodological Working Paper no. 04/05

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4.3 Poster presentations

Berrington A., Borgoni R., Diamond, Ingham R., Stevenson J., and the ALSPAC team (2002) Exploring the Consequences of Teenage Parenthood: Some Preliminary Analyses From a Longitudinal Study in Avon. Poster presented at British Society for Population Studies Annual Conference, September 2002, Newcastle.

Berrington, A., Borgoni, R., Ingham, R., Smith, P.W.F., and Stevenson, J. (2004) Determinants of Poor Psychosocial Health in Adulthood: Young Motherhood as a Mediating Pathway. Poster presented at Population Association of America Conference, Boston, March 30th-April 3rd 2004.

4.4 Conference and other presentations

Berrington, A. (2002) Using the BCS70 to investigate the consequences of teenage parenthood. Centre for Longitudinal Studies, University of London, December 2nd, 2002.

Berrington, A., Borgoni, R. Ingham, R., and Stevenson, J. (2003) Pathways which minimize the longer- term impacts of teenage parenthood. Teenage Pregnancy Research Programme Meeting, National Children's Bureau, 15th July 2003.

Berrington, A. and Borgoni, R. (2003) Graphical Chain Modelling of Pathways Into and Subsequent From Teenage Motherhood. European Population Conference, Warsaw, 27th-30th August 2003.

Berrington, A. (2003) Graphical Chain Modelling of Pathways Into and Subsequent From Teenage Motherhood. British Society for Population Studies Annual Conference, Bristol, 10th-12th September 2003.

Berrington, A. (2003) Investigating the outcomes of teenage motherhood. ESDS Meeting for Government policy makers on "Social and demographic change in Britain - informing the future", The Institute of Mechanical Engineers, London, 1st December 2003.

Borgoni, R., (2003) Handling the effect of non-response in graphical models for longitudinal data. SCO Conference: Complex Models and computer intensive methods for estimation and forecasting, Treviso, Italy, 4th-6th September 2003.

Borgoni, R. (2004) A tree based procedure for multivariate imputation. Paper presented at XLII Conference of the Italian Statistical Society, 9th-11th June 2004, Bari, Italy

Borgoni R. and Berrington, A. (2004) Evaluating a sequential tree based procedure for multivariate imputation of complex missing data structures. Paper presented at Royal Statistical Society Meeting, 28th May 2004.

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5 APPENDICES

5.1 Developmental outcomes not found to differ significantly between children born to teenage and older mothers in the ALSPAC Study.

On the whole, children born to teenage mothers within the ALSPAC study are doing well. For a number of developmental indicators described below, no significant differences between children born to younger and older mothers were found and hence no further multivariate analyses were carried out. The two areas where significant differences for children born to younger and older mothers were identified were behavioural difficulties and accidents. These were discussed further in the overview of findings.

In the following analyses, we use all available cases for that particular outcome. Since different outcomes were measured within different questionnaires and at different time points, the sample upon which the analyses are based varies for the different outcomes.

The following pattern of non-significant differences is not unexpected. There is little evidence that, once associated background characteristics are taken into account, there are significant residual effects of teenage motherhood on children's development. One elegant demonstration of this result was the study by Lopez Turley (2003). She used a national sample of cousins from a total sample of 10918 children born to women in the National Longitudinal Study of Youth in the USA. Her analysis showed that children born to older mothers are not doing any better than cousins born to younger teenage mother on measures of maths, reading and vocabulary. Using three lines of evidence, Turley concludes that it is the social disadvantage in the backgrounds of the teenage mothers - rather than maternal age itself - that adversely affects outcome for the child. First, there was no evidence that subsequent children born to mothers starting child bearing in their teenage age years are faring better than the first born children. Second, maternal age disappears as a significant predictor of child outcome when social background factors are controlled statistically. Third, there was no evidence that maternal age was related to developmental changes as the child became older.

In this same analysis, child behaviour problems were also shown to be more strongly related to the mother's social background than to teenage motherhood *per se*. As discussed in section, 3.2.3 rather than simply controlling for these background variables as nuisance confounders, it is more appropriate to guide policy to try to model the mechanisms whereby they affect outcome. This was undertaken for behaviour

problems in Stevenson *et al.* (2004). For the following measures, the *absence* of an effect of teenage motherhood on the child outcome made such an analysis unwarranted.

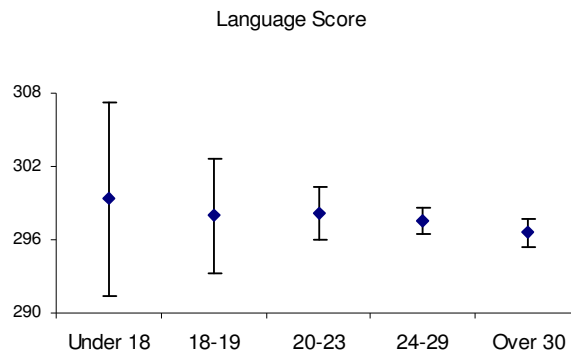
Language Score at 38 months - KG870

This score is derived as the sum of four original scores; vocabulary score (KG865), plurals score (KG866), past tense score (KG867) and word combination score (KG858). The language score takes values ranging from 0 to 326, with higher values associated with a better language performance of the child.

Table A.1: Language score at 38 months - KG870, according to age of mother

	<i>under 18</i>	<i>18-19</i>	<i>20-23</i>	<i>24-29</i>	<i>over 30</i>	<i>teen</i>	<i>over 20</i>	<i>total</i>
<i>Mean</i>	299.3	297.9	298.1	297.5	296.6	298.3	297.2	297.2
<i>valid sample n</i>	71	196	994	4364	4014	267	9368	9635
<i>std dev.</i>	34.17	33.53	35.48	36.03	37.33	33.64	36.54	36.46
<i>SE mean</i>	4.06	2.40	1.13	0.55	0.59	2.06	0.38	0.37

Figure A.1: Language Score - variable KG870



Social Development Score - Variable KJ493

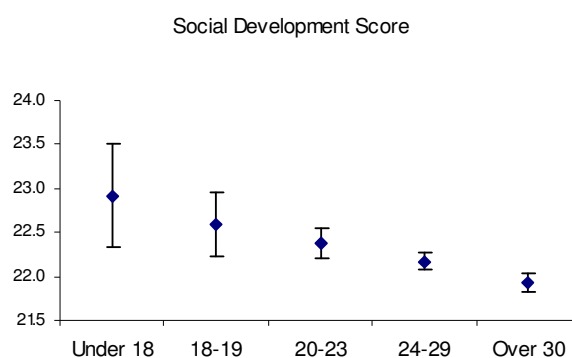
This variable is derived as the sum of 13 original variables indicating whether the child has reached some typical developmental milestones, including being able to drink from a cup without spilling, whether they can put on a T-shirt by themselves, whether they can put on their shoes by themselves. The mother is asked to indicate whether the child 'has not yet done', 'yes, does but not very well', or 'yes, can do well', scoring 0, 1 and 2

respectively. The Social Development Score thus has a minimum of 0 and maximum of 26.

Table A.2: Social Development Score at 42 months - KJ493, according to age of mother

	<i>under 18</i>	<i>18-19</i>	<i>20-23</i>	<i>24-29</i>	<i>over 30</i>	<i>teen</i>	<i>over 20</i>	<i>total</i>
<i>mean</i>	22.92	22.59	22.38	22.17	21.93	22.67	22.09	22.11
<i>valid sample n</i>	74	217	1021	4473	4121	291	9615	9906
<i>std dev.</i>	2.57	2.75	2.83	3.06	3.29	2.70	3.14	3.13
<i>SE mean</i>	0.30	0.19	0.09	0.05	0.05	0.16	0.03	0.03

Figure A.2: Social Development Score - variable KJ493



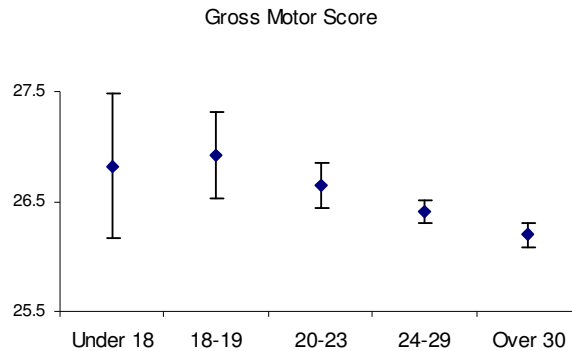
Gross Motor Score at 42 months - Variable KJ535

The variable is derived as the sum of 15 original variables which contain the mother's report as to how well her child can perform a variety of gross motor skills including walking, running, going down steps, throwing a ball, jumping, balancing. For each skill the mother is asked to report whether the child 'has not yet done', 'yes, does but not very well', or 'yes, can do well', scoring 0, 1 and 2 respectively. Thus, the derived variable ranges from 0 to 30.

Table A.3: Gross Motor Score - KJ535, according to age of mother

	<i>under 18</i>	<i>18-19</i>	<i>20-23</i>	<i>24-29</i>	<i>over 30</i>	<i>teen</i>	<i>over 20</i>	<i>total</i>
<i>Mean</i>	26.82	26.92	26.64	26.41	26.20	26.90	26.34	26.36
<i>valid sample n</i>	74	217	1023	4479	4125	291	9627	9918
<i>std dev.</i>	2.90	2.95	3.37	3.59	3.64	2.93	3.59	3.57
<i>SE mean</i>	0.34	0.20	0.11	0.05	0.06	0.17	0.04	0.04

Figure A.3: Gross Motor Score - KJ535



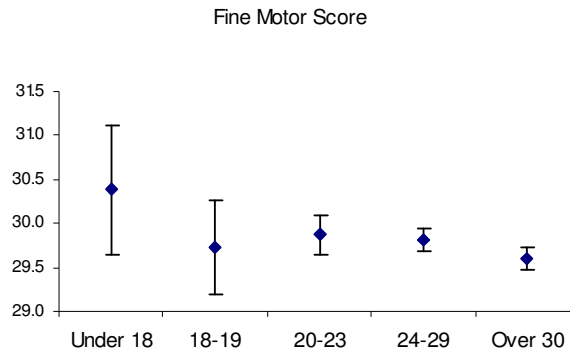
Fine Motor Score at 42 months - Variable KJ519

The fine motor score is constructed in the same way as the gross motor score, with the mother reporting on the ability of her child to undertake 19 fine motor activities including 'hold a pencil and scribble', 'draw a circle', 'build a tower', and 'being able to pick up a small object using finger and thumb'. Each skill is coded from 0 (poorest fine motor ability) to 2 (highest fine motor ability). Thus the derived variable ranges from 0 to 38 (however no child has a score higher than 34).

Table A.4: Fine Motor Score - KJ519, according to age of mother

	<i>under 18</i>	<i>18-19</i>	<i>20-23</i>	<i>24-29</i>	<i>over 30</i>	<i>teen</i>	<i>over 20</i>	<i>total</i>
<i>Mean</i>	30.38	29.72	29.87	29.81	29.60	29.89	29.73	29.73
<i>valid sample n</i>	74	217	1022	4475	4123	291	9620	9911
<i>std dev.</i>	3.28	4.00	3.67	4.04	4.17	3.84	4.06	4.05
<i>SE mean</i>	0.38	0.27	0.11	0.06	0.06	0.22	0.04	0.04

Figure A.4: Fine Motor Score - KJ519



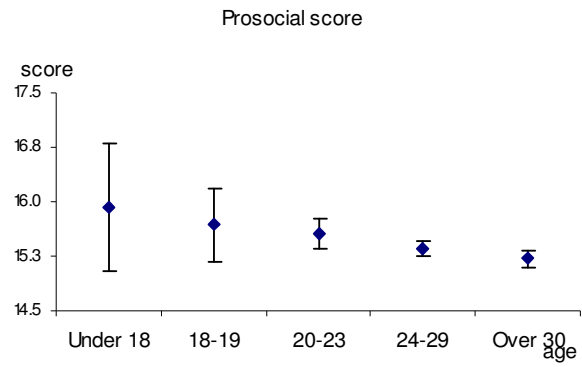
Pro-social score - Variable KJ646

This variable forms part of the Revised Rutter Parent Scale for Pre-School Children. It is derived by summing the values of 11 original variables where the mother is asked to indicate the extent ('yes certainly' = 2, 'yes sometimes' = 1, 'no' = 0) to which her child for example tries to be fair in games, volunteers to help, is kind to younger children, tries to stop fights etc. The final variable ranges from 0 to 22. The higher the Pro-Social Score the more social the child.

Table A.5: Pro-social score - Variable KJ646

	<i>under 18</i>	<i>18-19</i>	<i>20-23</i>	<i>24-29</i>	<i>over 30</i>	<i>teen</i>	<i>over 20</i>	<i>total</i>
<i>mean</i>	15.93	15.7	15.56	15.35	15.22	15.74	15.32	15.33
<i>valid sample n</i>	74	217	1023	4475	4121	291	9619	9910
<i>std dev.</i>	3.86	3.79	3.47	3.60	3.64	3.80	3.60	3.61
<i>SE mean</i>	0.45	0.26	0.11	0.05	0.06	0.22	0.04	0.04

Figure A.5: Pro-social score - Variable KJ646



Reference

Lopez Turley, R.N. (2003) Are children of young mothers disadvantaged because of their mother's age or family background? *Child Development*, 74, 465-474.

5.2 Technical note on simulation

Graphical modelling explicitly models inter-dependencies between covariates showing all of the possible routes through which an intervention may affect the outcome of interest both directly and indirectly. In order to evaluate properly the effect of a policy intervention on the target outcome we need to account for this propagation effect. In this appendix we describe how we simulate the effect of intervening on one or more variables, which we term the intervening variables on a target variable Y . We decompose the set of predictors into three sub-vectors: W is the set of q intervening variables, X is the vector of k non-intervening predictors potentially affected by W , and B is a set of m background characteristics we assume cannot be affected by W . For instance, in the first substantive case described in section 3.5.3, Y is a binary variable representing the mental health or the general health status of a respondent; W consists of the variables "satisfaction with the area where the respondent live" and "whether the respondent experienced any partnership dissolution"; and B is the vector of background characteristics of the respondent,

In terms of a statistical model an intervention takes the form of a predictor whose value is known or may be predetermined. Therefore, in what follows we condition on the values of W . Furthermore, as we assume that there are no causal links going from a block which comes later in the chain to earlier blocks, we simplify our analysis by conditioning on a particular profile for B . In other words we are interested in conditional distributions given $W=w$ and $B=b$.

We can factorise the conditional probability of the target outcome and variables reacting to interventions as:

$$p(Y, X | w, b) = f_Y(Y | X, w, b) f_X(X | w, b). \quad (1)$$

Once the joint distribution is available we can integrate out the effect of non-intervening variables by

$$p(Y | w, b) = \sum_x f_Y(Y | X = x, w, b) \times f_X(X = x | w, b) \quad (2)$$

to obtain the conditional distribution required to assess the effects of interventions. Note that by marginalising over X we are propagating the effect of the intervention through the system. In other words, we allow the variables in X to change in response to the intervention and, in turn, to affect Y .

With a very large data set the simplest estimate of $p(Y | w, b)$ is the empirical estimate. However, the particular profile b may be very poorly represented in the sample and therefore empirical probability calculations may be unreliable if not unfeasible. By borrowing strength from smoothing by using statistical models, we can investigate policy interventions even in small domains, such as particularly disadvantaged groups of the society which are often of interest for policy makers.

The first conditional probability law in the right hand side of equation (1) can be estimated using a model for the conditional distribution of Y given the variables in X , $W=w$ and $B=b$. In many situations such conditional probability laws are identified by regression models. We restrict ourselves to this case in this context. Similarly, the

second probability of equation (1) can be estimated using a multivariate model for the conditional distribution of \mathbf{X} given the variables in $\mathbf{W}=\mathbf{w}$ and $\mathbf{B}=\mathbf{b}$. Alternatively, a set of univariate regressions of X_j on $\mathbf{X}_{[-j]}$ and \mathbf{B} , $j=1,\dots,k$, provides an estimate of the full conditionals $f_j(X_j|\mathbf{X}_{[-j]}, \mathbf{b})$, where $\mathbf{X}_{[-j]}$ indicates the vector \mathbf{X} from which variable X_j , is removed. These full conditionals can be used to estimate via the Gibbs sampler the joint distribution, $f_x(\mathbf{X}|\mathbf{w}, \mathbf{b})$, we need in (1).

In the first substantive example of section 3.5.3 this formula provides us the conditional probability of being in good (either mental or general) health for the profile \mathbf{b} , given whether or not the respondent was satisfied with her neighbourhood, w_1 , and her partnership breakdown history, w_2 . For each partnership breakdown history group we are able to estimate the probability of being in good health for those in the profile \mathbf{b} , who are satisfied with their neighbourhood. This probability estimates the proportion of women who suffer health related problems after an intervention aiming to improve the quality of the environment that makes all of the people satisfied with their neighbourhood, controlling for the indirect effect of those covariates affected by the considered policy lever. Clearly such an intervention is unrealistic. More realistic scenarios may, however, be simulated by weighting $p(Y|\mathbf{w}_1, w_2, \mathbf{b})$ by various marginal distribution of w_1 , in order to assess the effect of interventions that achieve such a marginal distributions for the profiles of interest and a given value of w_2 .

A sensitivity analysis based on qualitatively different profiles could be conducted to assess the effect of a policy on different segments of the population. Alternative, if the marginal distribution of \mathbf{B} can be estimated in a reliable way (possibly by using data from a large survey or census), one could marginalise the conditional distribution $p(Y|\mathbf{w}, \mathbf{b})$ over \mathbf{B} in order to obtain a result pertaining to the whole population instead of to a particular profile or profiles.



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