University of Southampton

FACULTY OF SOCIAL, HUMAN AND MATHEMATICAL SCIENCES

Social Statistics and Demography

Men's Health in Families in Russia

by

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Thesis for the degree of Doctor of Philosophy (PhD)

January 2019

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Abstract

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The family is a key source of support and strain for the health of family members. This thesis explores the family's health effects by examining the relationship between various types of living arrangements and measures of men's health over the life-course. With the example of Russia, this research is the first attempt at creating a comprehensive understanding of the interlinkages between men's health and co-residing family members in the post-communist context of low male life expectancy and high reliance on family networks through intergenerational living arrangements (ILAs). Drawing on the theories and mechanisms of men's health disadvantage, three papers of this thesis use rich and dynamic information on men, their household members and living arrangements from the Russian Longitudinal Monitoring Survey (RLMS, 1994-2016). The results identify the importance of an ILA and partnership status within this type of a living arrangement for men's health disadvantage in Russia, while multilevel models point to the existence of both causality and selectivity in this relationship, which are overlooked in previous research. While co-residency with a partner protects men's health within ILAs, living with an older generation in poor health can still be detrimental for men's health. In turn, although living with a partner and adult children seems to benefit men's health, multilevel models reveal selection effects of men's transition to a living arrangement where all children left the parental home on their health status, binge drinking and heavy smoking. This thesis demonstrates how the complexity of the family's co-residency and 'linked lives' can affect or select on health differently across the life-course. Despite the theorised protective effect of the family, the case of Russia suggests a need for further research on the possible burden of stress from living in ILAs, particularly with unhealthy parents(-in-law), as the potential causal or selection mechanism of offspring's poor health or nest-leaving, respectively.

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Research Thesis: Declaration of Authorship

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I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

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Signature: Date:

Acknowledgements

I dedicate this thesis to my parents and their hard work to provide me with a bright future. I thank my beloved husband and fantastic supervisory team for their enormous help and support during the challenging times of my PhD, particularly at its very end. Dr Brienna Perelli-Harris and Dr Jennifer Holland guided my work on the first and third papers of this thesis as my co-authors and supervisors. I am also grateful to my mentor and co-author of the second PhD paper, Dr Sunnee Billingsley from Stockholm University. I would also like to thank all of my friends and colleagues from Southampton and Stockholm universities, particularly the demography 'family lunch' group.

I am thankful for the financial support of my PhD research I received from the Economic and Social Research Council (ESRC), in addition to the wonderful people I met at the ESRC Doctoral Training Centre and Centre for Population Change at Southampton. Not only my knowledge and skills have significantly developed, but I have also grown personally since the start of my PhD. Finally, I am grateful for the access to the RLMS survey thanks to the institutions that support and manage it: the National Research University Higher School of Economics, ZAO "Demoscope", Carolina Population Center, University of North Carolina at Chapel Hill and the Institute of Sociology RAS. Particular thanks to Svetlana Sokolova from Demoscope giving me all the explanations of the RLMS follow-up rules via e-mail, and to Katherine Keenan for supporting me and sharing her experience with the RLMS datasets at the start of my journey in advanced Stata syntax.

I am endlessly grateful for the opportunities I had and people I met thanks to the PhD course, particularly my husband, who recently has received his Doctoral degree at Southampton too. I hope that my thesis will be useful for those interested in Russian demography and trying to understand the importance of the family for men's health.

Abbreviations

FDT	First Demographic Transition
FSSS	Federal State Statistics Service (Russia)
ILA	Intergenerational Living Arrangement
MAR	Missing At Random assumption
ONS	Office for National Statistics (United Kingdom)
RLMS	Russia Longitudinal Monitoring Survey
SDT	Second Demographic Transition
SRH	Self-Rated Health
UK	United Kingdom
US	United States
USSR	Union of Soviet Socialist Republics (Soviet Union)
WHO	the World Health Organisation

Chapter 1 Introduction

1.1 The aim and scope of this thesis

In the social sciences, the family is persistently found to be strongly related to health and disease (Ross et al., 1990). The family is one of the core sources of support buffering against stress; supportive relationships within the family can benefit physical and mental health through the reduction of stress effects and improvement of psychological conditions (Umberson and Montez, 2010). Family members can also influence each other's health lifestyle and reduce the risk of poor health outcomes (Umberson, 1992). Contemporary research of family and health looks at their interlinkage beyond the general associations and focuses more on the life-course perspective of health by looking longitudinally at various pathways of family intrarelationships with health (Carr and Springer, 2010; Grzywacz and Ganong, 2009). The importance of the family status for health is inevitably correlated with the cultural differences in gender roles and expectations within families and societies (Ferree, 2010). Risky behaviours perceived as masculine may explain men's tendencies to follow unhealthy lifestyle and underreport their health problems more often than female counterparts (Courtenay, 2000). Focussing mainly on women as mothers and 'kinkeepers', in the last few decades social sciences have started to recognise the importance of men within the families and their health as a response to the increasing concern regarding higher male mortality rates for the demographic and economic prosperities of societies (Barker and Pawlak, 2011; Evans et al., 2011; Robertson and Williams, 2007).

The aim of this thesis is to explore the key role of family in men's health by focussing on the link between the dynamic nature of men's living arrangements and various measures of health and well-being. This thesis contributes to family research by addressing: *1) Is family important for men's health? 2) Does the health of men differ by living arrangements? 3) Is there a positive or negative effect of living arrangements on men's health?* To answer these questions, this PhD research focuses upon the unique case of Russia, a country with high levels of socio-economic instability, premature male mortality, and intergenerational living arrangements (ILAs) since the collapse of the Soviet Union. Three theoretical perspectives guide the investigation of the relationship between living arrangements and men's health in this thesis: socio-demographic, life-course, and gendered approaches. While considering demographic and socio-economic disparities in families and health in Russia, the combination of both life-course and gendered perspectives in this thesis helps to widen our understanding of the health effects of interdependency between family members ('linked lives' approach) across different cohorts of men within the context-specific historical development of family relationships and masculine identity. This thesis

contributes to the sociological literature on health by investigating how and under which circumstances family status and characteristics of family members could improve or deteriorate various dimensions of men's health.

1.2 The Russian case

The male mortality crisis after the collapse of the Union of Soviet Socialist Republics (the Soviet Union or USSR) serves as a notable example of men's health disadvantage in a Russian context. In the 1990s, stress and unhealthy lifestyle were related to higher mortality risks from cardiovascular diseases and alcohol poisoning, especially among working-age middle-class men (Denisova, 2010; Leon et al., 2007; Malyutina et al., 2002; Shkolnikov et al., 2004; Stickley et al., 2007). Among post-Soviet countries and compared to Western countries, Russia had one of the lowest male life expectancies in the 1990s (Bobak and Marmot, 1996; Shkolnikov et al., 2001). Twenty-five years after the USSR collapse, there is still a gender gap in life expectancy in Russia with male life expectancy at 65 years, 10 years lower than that of females (Rosstat, 2018). Substantial research has examined the socio-economic causes of premature male mortality such as high unemployment rates and poverty leading to stress, heavy drinking and smoking in Russia (Bobak and Marmot, 1996; Cockerham, 1999, 2000; Leon and Shkolnikov, 1998; Perlman and Bobak, 2008a, 2009; Shkolnikov, Cornia, et al., 1998).

From the family perspective, working-age Russian men became 'failed providers' for their family members and experienced a crisis of masculinity struggling to reassure themselves during the unforeseen and high unemployment rates in the 1990s (Ashwin and Lytkina, 2004; Kay, 2006; Kay and Kostenko, 2006; Keenan et al., 2015; Kiblitskaya, 2000a; Meshcherkina, 2000). Taking into account the popularity of older and younger generations co-residing together in small living spaces since the Soviet era (Zavisca, 2012), Russian men may have experienced extensively high levels of stress under the social pressure to be 'breadwinners' for their intergenerational households. At the same time, having a spouse or living with other generations might have had a protective effect on Russian men's health, because never married and divorced men have had the highest risks of binge drinking (Pridemore et al., 2010; Stickley, Koyanagi, Roberts, et al., 2013, 2015). Empirical studies suggest that extensive alcohol consumption has been linked to premature male mortality from circulatory diseases, external and alcohol-related causes in Russia (Bobak et al., 1999, 2004, Leon et al., 2007, 2009, 2010; Malyutina et al., 2002; Peasey et al., 2006; Stickley et al., 2007). However, social research focussing on post-Soviet countries has not yet investigated the possible interlinkage between men's health deterioration and their living arrangements as a proxy for the health effects of family support or strained relationships. This

research gap offers an opportunity to investigate the relationship between living arrangements and men's health in contemporary Russia.

1.3 Paper 1. Better off living with family or alone? Men's living arrangements, partnership status and health in Russia

In order to investigate the importance of family for men's health, it is vital to first establish the association between health and family living arrangements. The first paper aims to untangle the relationship between men's health and living arrangements at any life-course stage exploring living with a partner, alone, or with older/younger generations (intergenerational living arrangements, or ILAs). This research contributes to the continued debate on the protective health effect of living with a partner, in ILAs or with others by focussing on the cross-sectional nature of these living arrangements and adult men's self-rated health status as an outcome.

Multiple studies point towards interdependence between one's health and household composition, particularly marital status (Grundy and Tomassini, 2010; Hughes and Waite, 2009; Waite and Gallagher, 2002; Williams et al., 2011), where married men tend to report higher wages and better outcomes of subjective well-being and health (Ashwin and Isupova, 2014; Killewald, 2013; Williams and Umberson, 2004). Social researchers argue that partners tend to be the primary resource of emotional support and social control of health behaviours for men even more than for women (Umberson, 1992a). However, other studies show fewer gender differences in this relationship (Robles et al., 2014; Williams, 2003b). Scholars studying Russia also point to the socio-economic and health advantages associated with men living with a partner (Ashwin and Isupova, 2014). This paper is able to account for men's partnership status within their households in order to answer the first research question of the paper: *are unpartnered men less likely to report good self-rated health status compared to partnered men in Russia?*

In comparison to men living with a partner or other adults, a lack of social support and control of unhealthy behaviours among men living alone could explain these individuals' higher risks of cardiovascular diseases and alcohol-related mortality, particularly prominent in Russia and other former Soviet countries (Stickley, Koyanagi, Leinsalu, et al., 2015; Stickley, Koyanagi, Roberts, et al., 2015). However, previous studies on Russian men living alone paid less attention to the outcome of self-rated health and usefulness of the RLMS. One of the paper's objectives is to close this gap by addressing the second research question: *are unpartnered men living alone less likely to report good self-rated health status compared to all other men in Russia?*

Living with older generations or adult children can also be beneficial for men's health through the exchange of emotional support and social control of men's unhealthy behaviours (Ross et al., 1990; Umberson, 1987; Umberson et al., 1996; Umberson and Montez, 2010). At the same time, ILAs can be associated with stress for men due to the pressure to provide caregiving and financial support to other family members, particularly under the cultural norm of a male 'breadwinner' as the main family provider in the Russian context (Ashwin and Lytkina, 2004; Keenan et al., 2015). Using men's household information, we group men's living arrangements by their partnership and ILA statuses and ask the third research question: *are unpartnered men living in an ILA less likely to report good self-rated health status compared to partnered men living in an ILA and compared to all other men in Russia?*

To answer these research questions, we apply a multinomial logistic regression to men's self-rated health status. Unlike previous studies, the paper has the advantage of analysing this internationally recognised health measure as a three-categorical variable to be able to capture more differences in men's health by various living arrangements. We also employ multiple imputation with the missing at random (MAR) assumption due to missing values in the covariates. Unadjusted results reveal that unpartnered men and those living alone are more likely to report poor health, in comparison to partnered men and men living with others, respectively. These differences attenuated once the model accounted for men's demographic and socio-economic factors. In other words, adjusted models suggest that individual characteristics could explain why these groups of men are disadvantaged in terms of their self-rated health status. However, further models show that a positive association between men's partnership and health statuses remains statistically significant when accounting for their co-residence with younger and/or older generations. The heterogeneity in men's health by their partnership status within ILAs suggests the importance of accounting for the complexity of living arrangements alongside vital socio-demographic predictors of selection into different living arrangements when studying adult health.

1.4 Paper 2. Men's health and co-residence with older generations in Russia: Better or worse?

The second paper of the thesis shifts our attention from the overall relationship between men's health and living arrangements to its particular aspect of ILA. After revealing a significant association between men's self-rated health and ILA by partnership status in the first paper, one could question whether men living in an ILA are healthier because of this type of living arrangement (causality, e.g. due to pooled resources and support) or because healthier men are

more likely to co-reside in an ILA (selectivity, e.g. in good health being able to take care of ill parents). As one third of Russian households are intergenerational, it is particularly important to investigate the overlooked role of ILAs in men's health disadvantage using longitudinal data to account for the dynamic nature of living arrangements. Furthermore, it is unclear as to what type of an ILA is better or worse for men's health – living with younger or older generations. On the one hand, Russian young adults struggle to afford a separate housing due to relatively high unemployment and interest rates since the collapse of the Soviet Union, often relying on family networks and rarely taking out mortgages (Zavisca, 2012). On the other hand, Russia continues to have a below replacement total fertility rate and an increasing share of the population aged 65 years old or older (up to 14% in 2017) who tend to be among those with the poorest health in Europe (Davis, 2017; Gierveld et al., 2012; World Bank, 2018a). This could mean that more working-age adults become exposed to living with an older generation with fewer siblings to share the burden of caregiving to ill elderly parents. The second paper focuses on men aged 25 years or older and explores the health effects of their co-residency with an older generation, such as parents, parents-in-law, or grandparents, and their health statuses as possible explanations for poor men's health in Russia.

Previous studies exploring the relationship between ILA and health are mostly cross-sectional and reveal contradictory findings. On the one hand, scholars show a positive association between living with older generations and adult children's health arguing for a protective effect of social support and control (House et al., 1988; Umberson, 1992b; Umberson, Crosnoe, et al., 2010). On the other hand, studies argue that sharing a living space with parents has a cost for adult children's psychological and physical health, where the main sources of stress could be from informal caregiving and other multiple social roles (Barnett 2015; Bauer & Sousa-Poza 2015; Pinquart & Sörensen 2003, 2004, 2007; Ikeda et al. 2009; Pearlin et al. 2005). Therefore, the first research question of the paper aims to clarify the direction of this association: *is living in an ILA positively or negatively related to health?* To be able to compare our finding to previous studies, we apply a cross-sectional approach. We account for a possible heterogeneity of ILAs by controlling for older generations' health status, which is often overlooked in previous research. Therefore, the second research question aims to close this research gap: *does this relationship depend on whether the older generation is in poor health?*

Establishing a significant association between ILAs and health would not be enough to conclude whether there is a protective or detrimental effect of ILAs on health because of the possible selection bias, where some groups of men could be already more likely to live in an ILA. Furthermore, transitions into and out of ILAs could complicate this relationship. Men's health could be sensitive to various residential and socio-economic changes within their households and

over their life-courses. If men's health improves or deteriorates after moving into or out of an ILA, this might suggest a causal pathway between ILA and health. Therefore, it is important to control for the dynamic nature of ILAs to investigate its health effect on men. Unlike past research, we apply a rigorous analytical design, which keeps 'fixed' the unobserved differences between men, which are constant over time (e.g. genetics). In other words, this 'within-person' approach minimises the selection bias coming from the unobserved and time-constant difference between men, such as a possible selection of low-educated men into poor health, to test the hypothesised interlinkage between the transitions into/out of ILA and health. Using the longitudinal advantage of the RLMS, we ask the next research question: *does this relationship persist or change once we account for selection into/out of ILA?*

The results of the second paper confirm the existence of both directions of the association between ILA and self-rated health that are related to the health status of co-residing older generations. By accounting for the possible selection of men into and out of an ILA, fixed-effects models show that an ILA can be detrimental for men's health if an older generation is in poor health. These findings not only highlight the importance of addressing selection effects, but also provide new evidence of multiple linkages between generations and their health in life-course research.

1.5 Paper 3. How does dad fare when the kids leave the nest?

The final paper of this thesis continues the exploration of the relationship between ILA and health by investigating the health importance of ILA from the parental perspective with middle-aged fathers as the population of interest and their co-residence with the adult children (a younger generation) as an exposure. One of the recent European Policy Briefs (Dykstra et al., 2016) debates the emerging financial and emotional difficulties for middle-aged adults, who experience increasing pressure to look after their adult children 'under one roof' while often also caring for older parents or young grandchildren. The worldwide increase in life expectancy and postponement of first births could explain the change observed in intergenerational patterns of family support.

According to the RLMS, 40% of middle-aged fathers in Russia still co-reside with at least one adult child. In Russia, the departure of all adult children from the parental home often occurs after their transition to marriage and first birth whilst still living with parents. In other words, Russian parents often experience not only the departure of their adult children but also their children-in-law (offspring's partners) and grandchildren. High unemployment rates and unaffordable housing could explain why young adults tend to form their families in the parental households and

postpone nest-leaving until after first birth (Zavisca, 2012). Western studies confirm a significant positive association between nest-leaving and the socio-economic well-being and health of young adults (Aassve et al., 2001, 2002), but those studies lack focus on the consequences of nest-leaving for parents 'left behind'. Unlike in the West, nest-leaving is a unique and overlooked event over the life-course of parents in Russia, who are more likely to have a burden of providing their offspring with financial help and grandchild care 'under one roof' (Utrata, 2015; Zavisca, 2012). Following the main goal of the thesis to uncover the causal interlinkage between the family and health, the third paper focuses on the overlooked health effects of adult children leaving parental home (nest-leaving event) on middle-aged fathers. This paper applies multilevel methods accounting for selection bias to a wide range of the RLMS health measures to explore the 'linked lives' of younger and older generations from various perspectives of father's health.

Living with an adult child can provide emotional, instrumental and financial support and social control for their parents, as well as strengthen the adult child-parent relationships, which, in turn, can positively affect parental health and health behaviours (Umberson, Pudrovska, et al., 2010). However, Western studies show that continuing co-residence of adult children with their parents is associated with unemployment and union dissolution of young adults (Aassve et al., 2001; Stone et al., 2011, 2014). Failure to 'launch' by adult children might explain the deterioration of parental health through the burden of financial support and lower satisfaction with family relationships (Aquilino and Supple, 1991). Furthermore, little is known about how living with an adult child or experiencing nest-leaving affects fathers, because women tend to be the main 'kinkeepers' and men are often excluded from family research. Therefore, the first research question is: *Does co-residence with adult children matter for fathers' life satisfaction, health status and health behaviours?*

A gender perspective could help to uncover nuances in health influences of intergenerational relationships for men. Socially constructed gender roles play an important role in the quality and quantity of the relationships between parents and adult children. Men are expected to provide and receive less support compared to women (Blaauboer and Mulder, 2010; Dykstra and Keizer, 2009), which can be a proximate determinant of poor men's health due to a lack of familial support and control of unhealthy behaviours (Umberson, 1992, for example). At the same time, men tend to depart from the parental home later than women do, which could mean higher dependency of men on intergenerational support (Blaauboer and Mulder, 2010; Schwanitz and Mulder, 2015). Despite the focus in family studies on the consequences of nest-leaving for young adults' well-being, little is known about fathers' well-being and health changes after the departure of adult children from the parental home. In 'familialistic' contexts like Russia, families might not expect adult children to leave home as a life-course event of transition to adulthood

itself, meaning that nest-leaving may not be a universal process in contrast to the expectations in the West. This assumption motivates us to analyse a panel sample of Russian fathers using the random-effects approach and ask the second research question: *Does nest-leaving matter for fathers' life satisfaction, health status and health behaviours?*

Nest-leaving could have a negative effect on fathers' health because of a potentially higher risk of suffering from loneliness, lack of social control, and lower quality of relationships with adult children in comparison to mothers and taking into account the expectations of the ideology of masculinity. However, family characteristics such as parental socio-economic resources and family composition could also influence the decision of adult children to move out from parents as well (Aquilino, 1990; Cherlin et al., 1997; Iacovou, 2010). This could mean that parents and adult children might self-select themselves into nest-leaving. To test this hypothesis, this paper uses fixed-effects modelling with an aim to reduce selection bias from unobserved characteristics and identify a significant change in father's health outcomes in relation to their transition to a nest where all adult children left the parental home, by asking the third research question: *When all children leave the nest, do fathers' life satisfaction, health status and health behaviours change?*

Unlike the second paper, this final paper of the thesis reveals a potential for the health selection of men into co-residence with adult children or existence of reverse causality between this type of an ILA and father's health status and health behaviours. Repeated cross-sectional models suggest that men living separately from their adult children are more likely to report poor health, being a binge drinker or a heavy smoker. However, in longitudinal models there was no association between transition to a nest where all adult children left the parental home and a change in health status and health behaviours. These results combined suggest that health differences between middle-aged Russian men living with their children and those living separately from them may be explained by selection and are not caused by nest-leaving.

1.6 Thesis structure

This thesis consists of seven chapters, three of which present empirical research in a paper format. Chapter 2 provides an overview of the theories applied throughout the empirical papers and summarises the theoretical framework of this thesis. Because this thesis examines the health effect of the family in the Russian context, Chapter 2 also describes the historical development of health, families, and men's gender identity in the Soviet Union and post-Soviet Russia.

Chapter 3 shifts the attention to the features of the secondary data used in this PhD research – the Russian Longitudinal Monitoring Survey (RLMS). A major part of Chapter 3 focuses on the preparation of cross-sectional and longitudinal datasets for the statistical analyses conducted in

the papers of this thesis (Chapters 4, 5 and 6), whereas the papers' data and methods sections provide further details on the samples derived from the prepared datasets.

Chapter 4 contains the first paper, "Better off living with family or alone? Men's living arrangements, partnership status and health in Russia." This paper is based on the cross-sectional RLMS dataset. This paper was presented in 2016 at the European Population Conference and the British Society for Population Studies (BSPS) conference. This paper was invited for submission to a Special Issue on "Families and health" of *Journal of Family Research* by the end of October 2018.

Chapter 5 presents the second paper, "Men's health and co-residence with older generations in Russia: Better or worse?" This chapter is substantially based on a paper published in *Journal of Epidemiology and Community Health* (Permyakova and Billingsley, 2017). This paper utilises the longitudinal dataset (1994-2015) and was presented in 2017 at three conferences: 1) the third International Russia Longitudinal Monitoring Survey (RLMS) of HSE User Conference (May); 2) the Understanding Society conference (July); 3) the BSPS conference (September).

Chapter 6 consists of the third paper, "How does dad fare when the kids leave the nest?" The results of this paper are based on the latest dataset harmonised by the RLMS (1994-2016), which were presented in April 2018 at the Population Association of America conference. A condensed version of this paper is intended for submission to *Advances in Life Course Research* by December 2018.

Chapter 7 summarises the main findings of these three empirical papers together with their theory and policy-related implications. Contributions to the existing literature and suggestions for future research conclude this thesis in Chapter 7.

Chapter 2 Background

This thesis employs three theoretical approaches: socio-demographic, life-course, and gender perspectives of health, which guide the three empirical papers on the importance of family for men's health. Throughout, in order to understand the Russian context, these theoretical approaches are explored with reference to the historical unfolding of men's lives, their gender identity and family relationships in Soviet and post-Soviet Russia.

2.1 Socio-demographic perspective of health

High mortality rates in Russia have been a major public health issue since the 1960s, when a stagnation in the increase in life expectancy occurred (Shkolnikov et al., 1996), and then worsened concurrent with the country's transition into a market economy in the early 1990s (Marmot and Bobak, 2005). Despite a significant decrease in infectious diseases and infant mortality in the USSR and the West in the 1960-s, the Soviet health system paid little attention to the substantial increase in cardiovascular diseases (Ginter, 1996; Kharlamov, 2017; Shkolnikov et al., 1996; Vågerö and Kislitsyna, 2005), often leading epidemiologists to relate the Russian mortality crisis to a 'cardiovascular revolution' (Grigoriev et al., 2014). A focus on the consequences of human diseases for the population life expectancy and innovative developments in medicine helps health practitioners to prevent patients' health deterioration and policy makers to improve overall mortality rates. Epidemiological theories, such as the theory of a cardiovascular revolution in Russia (*ibid*), emphasise the changing causes of mortality. Sociological approaches complement epidemiological theories by linking health inequalities with social changes and stratification. Socio-demographic approaches aim to account for possible interactions between population health and social processes, such as the relationship between socio-economic well-being and health behaviours, between cultural norms and health beliefs, and the changing contexts of health (e.g. changing patterns in living arrangements on the family-level, deprivation on the district-level, urbanisation on the region-level, or international migration on the country-level) (Cockerham, 2013). I place my work in the tradition of the socio-demographic perspective of health to capture various demographic (age, gender, family status) and socio-economic (education, income, residence) disparities in Russian health.

Socio-demographic definitions and measures of health

First, it is important to consider that health may be defined in multiple ways. Researchers have not provided a single definition of health because of the challenge of 'merging' multiple

dimensions of health across medical, biological and social sciences (Cockerham, 2013, 2014). Nevertheless, the World Health Organisation (WHO) Constitution defined health in 1948 as *a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*. Although the WHO definition of health covers three important well-being components of human biology (physical state), emotions (mental state) and interrelationships (social state), scholars from different sciences have their own views on the definition of health. From the medical perspective, health status is about whether an individual has any recorded diseases or disabilities (Larson, 1999). From the sociological perspective, however, health status is a human capacity to participate in society (Parsons, 1951; Segall, 1976). While contemporary medicine focuses primarily on infectious diseases and chronic conditions as risk factors of mortality, sociologists and demographers aim to understand how context-specific social inequalities and demographic disparities shape one's quality of life, health behaviours and health-related decisions, which are key to maintaining good health and longer life spans.

Despite the medical importance of collecting biomarkers and health metrics for predicting mortality risks, social sciences add a value to health research by focussing on a personal assessment of one's own physical and mental well-being (e.g. difficulties in daily activities, levels of happiness and satisfaction with life), health lifestyle (e.g. dietary intake, physical exercises, alcohol consumption, smoking frequency) and health care access (Blaxter, 1990, 2010). One of the most frequently used measures in social sciences is self-rated health (SRH) status. Modern surveys and censuses aim to focus on the overall and self-assessed state of one's health (e.g. *How do you feel today? Define your health on a 5-point scale from 'very good' to 'very bad'*). SRH is a holistic measure of overall well-being and health, because overall feelings about one's health can often precede disease diagnoses (Lundberg and Manderbacka, 1996; Maddox and Douglass, 1973; Manor et al., 2001). Empirical findings confirm that SRH status is a strong predictor of disease prevalence and mortality (Idler and Benyamini, 1997; Idler and Kasl, 1995; Jylhä, 2009), including Russian mortality rates (Perlman and Bobak, 2008b), and recognise SRH status as a useful measure for international comparisons (Idler and Benyamini, 1997). All three empirical papers of this thesis focus on SRH status as one of the main health outcomes, in addition to life satisfaction and two health behaviours, outcomes of alcohol drinking and cigarette smoking, in the third empirical paper.

Nevertheless, researchers studying SRH need to be aware that one's own perceptions of ill-health can be sensitive not only to one's socio-economic status, but also to the cultural differences in defining good or bad health and social attitudes towards their own health (Jylhä et al., 1998; O'Donnell and Propper, 1991; Sen, 2002). Such differences could be particularly noticeable in Russia during societal changes and economic instability (Carlson, 2001, 2004). Russians might

underreport their SRH and life satisfaction due to the overall trend of unhappiness in their population found by the World Values Survey (Inglehart and Klingemann, 2000; Veenhoven, 2001). Moreover, historic patterns of low individual agency over one's own health developed under the Soviet-type passive orientation to health could also affect lay health beliefs and interpretations of one's own health status in contemporary Russia (Abbott et al., 2006).

Health inequalities and their possible determinants in Russia

Studying the dynamic nature of population health and well-being in a specific context from a socio-demographic perspective allows us to capture a wider range of health and mortality determinants. Russia's transition from the communist regime to a market economy is a unique example of how socio-economic 'shocks' could be detrimental for individual health. Mortality increased significantly more among adults who were men, of working-age, unmarried, with a low educational level, and from rural areas, particularly in the Northeast regions of Russia (Cockerham, 2000; Pridemore et al., 2010; Pridemore and Shkolnikov, 2004; Shkolnikov et al., 1996, 2013; Shkolnikov, Cornia, et al., 1998) . Post-Soviet Russia experienced one of the sharpest decreases in male life expectancy ever observed across Europe in the twentieth century, from its highest of 69.6 years in 1990 to the lowest of 57.5 years in 1994 (Rosstat, 2018). In contemporary Russia, men continue to have the lowest life expectancy of 65 years with one of the widest gender gaps of 10 years in comparison to the West and other post-USSR countries (*ibid*). There have been numerous studies on the socio-demographic determinants of the Russian mortality crisis (Bobak et al., 2003; Bobak and Marmot, 1996; Cockerham, 2016; Perlman and Bobak, 2008a, 2009; Shkolnikov et al., 2004; Shkolnikov, Cornia, et al., 1998), particularly focussing on the male alcohol-related mortality (Dissing et al., 2013; Keenan et al., 2015; Leon et al., 2007; McKee and Shkolnikov, 2001; Tomkins et al., 2008).To understand the nature of those predictors better, scholars have also started to focus more on the factors associated with the self-reported measures of health status, life satisfaction, and health behaviours, because poor SRH, low satisfaction with life, frequent drinking and smoking are significantly associated with higher mortality risks in Russia (Perlman and Bobak, 2008b).

Overall, determinants of poor SRH in Russia are similar to the described universal trends (Bobak et al., 2000), where those who are men, unemployed and from low social class have worse self-reports of their health status (Cockerham, 1999; Rusinova and Safronov, 2013). However, the socio-economic gradient of SRH in Russia is less clear than in Western and Eastern Europe (Bobak et al., 1998, 2000; Shkolnikov, Leon, et al., 1998). First, educational differences in SRH are weak (Bobak et al., 2000; Perlman and Bobak, 2008b) or often absent (Bobak et al., 1998), although this could be related to the selection bias of more educated people participating in surveys. Second,

adjustment for other socio-economic predictors of health explain SRH and life expectancy advantage of married Russians, particularly among men (Bobak et al., 1998, 2000, Cockerham, 1999, 2000; Pridemore et al., 2010; Pridemore and Shkolnikov, 2004; Shkolnikov, Cornia, et al., 1998). Finally, several studies point out that in Russia income per capita is a weak predictor of wealth (Rose and Mcallister, 1996), mortality (Perlman and Bobak, 2008b) and SRH (Cockerham, 1999), in contrast to the measure of material deprivation (Bobak et al., 1998, 2000) and self-assessment of the family economic situation (Carlson, 2001). In other words, those sub-groups of the Russian population struggling to improve their economic circumstances and have necessities for living have been more likely to have low SRH, particularly in the first decade after the USSR collapse (*ibid*).

Besides the overall persistent association between socio-economic status and SRH on the population level, individual agency can also matter for country-level health inequalities through its possible prediction by social class. Concurrent with the health deterioration of the Russian population, there was a dramatic increase in alcohol consumption and smoking shortly after the USSR collapse (Bobak et al., 1999; Leon et al., 2009; McKee et al., 1998; Perlman et al., 2015; Stickley, Koyanagi, Koposov, et al., 2013). Transition to a market economy allowed tobacco companies to advertise and distribute cigarette sales in Russia, therefore increasing their consumption which was significant for health deterioration (Perlman et al., 2015). The availability of poor quality alcoholic drinks with a high percentage of ethanol, such as vodka, at cheap prices has also been particularly harmful for health in post-Soviet Russia (McKee et al., 2005; Perlman, 2010; Stickley et al., 2007). Although medical researchers find that moderate alcohol consumption has positive effects on cardiovascular system, binge drinking[1] has the reverse effect on health, because it is associated with heart diseases and sudden cardiac deaths, as scholars also showed in Eastern Europe and Russia at times of economic instability (Bobak et al., 2004; Britton and McKee, 2000; Leon et al., 2010; Malyutina et al., 2002; McKee and Britton, 1998; Zaridze et al., 2009).

Unhealthy behaviours have been one of the major public health concerns since the Soviet times. In 1985-87, Gorbachev's anti-alcohol campaign prohibited sales of ethanol-based drinks, but managed to decrease the levels of alcohol consumption only for a short period until the USSR collapsed (Bhattacharya et al., 2013; McKee, 1999). Moreover, recent studies have started to argue that the decreased alcohol consumption was due to a positive change in the culture of drinking rather than the campaign itself, because lower rates of alcohol poisoning occurred before the policy was implemented (Grigoriev and Andreev, 2015). Although contemporary policies target high-risk drinking population subgroups, such as men, young and midlife adults and those

[1] Binge drinking ('zapoi' in Russian) means alcohol drinking continuously for several days

with low socio-economic status or unemployed (Bobak et al., 1999; Bobrova et al., 2010; Perlman, 2010; Tomkins et al., 2007), Russia and other post-USSR regions continue to have the highest share of alcohol-related mortality in the world, with 10-14% of all mortality related to alcohol (Lim et al., 2012; WHO, 2011).

Interestingly, empirical studies of Russia show that health behaviours had a weak mediating effect on the relationship between low socio-economic status and SRH (Carlson, 2001; Nicholson et al., 2005), particularly smoking (Bobak et al., 1998). Moreover, scholars often find that even though heavy drinkers and smokers are more likely to die earlier, they tend to report better SRH status (Reile et al., 2017). This does not mean that unhealthy behaviours do not have health effects *per se*. In fact, binge drinking and smoking do significantly predict sudden deaths of 'healthy' respondents (Perlman and Bobak, 2008b), meaning that the health effects of unhealthy behaviours may not be preceded by illnesses and reports of poor health. Nevertheless, both SRH and unhealthy behaviours, as well as life satisfaction are all strong predictors of mortality in Russia (*ibid*). Therefore, I examine them as separate outcomes of health in the third empirical paper of this thesis, whilst primarily focussing on SRH in the first two papers.

Explanations for mortality and health inequalities in Russia

Although poverty is highly correlated with poor SRH and unhealthy behaviours in various contexts (Goldman, 2001; McDonough and Berglund, 2003), it is still unclear whether poverty leads to the deterioration of health (social causation) or whether unhealthy people are more likely to have a low socio-economic status (health selection) (Goldman, 2015; Manor et al., 2003; Vaalavuo, 2016). In Russia, there has been a little evidence of the mortality increase due to impoverishment across all population groups, because mortality rates fluctuated primarily among working-age, and not as much as among children or the elderly who are usually expected to be the most vulnerable groups in times of economic instability because of malnutrition (Shkolnikov, Cornia, et al., 1998). However, scholars studying high mortality rates and health inequalities in Eastern Europe and Russia showed a strong evidence of the 'mass psychosocial' stress because of the increased difficulty to adapt to new socio-economic conditions in the 1990-s (Bobak et al., 2000; Bobak and Marmot, 1996; Leon and Shkolnikov, 1998). They have proposed several explanations revolving around the stress theory and mainly focussing on its harmful effects on health lifestyle and health outcomes through the following categories: economic uncertainty, social anomie, and a crisis of gender self-identity. Although surveys rarely include direct measurements of stress, it is still possible to measure the levels of stress indirectly on both macro- and micro-levels, for example, through a national rate of unemployment, individual socio-economic status, depression level or fall into binge drinking.

The economic crisis in the early 1990s and the financial crisis in 1998 were associated with the nation's struggle to 'make ends meet' and feel control over their lives (Bobak et al., 1998, 2000, 2005; Perlman et al., 2003). Scholars note two pathways through which low socio-economic status and perceived control could be responsible for health deterioration or even sudden death: either directly through the negative effect of stress, poor nutrition and living conditions on psychological outcomes, the immune system, and cardiovascular illnesses (Brunner, 1997; Steptoe, 1998) or indirectly through the effect of stress on unhealthy behaviours, such as heavy drinking and smoking (Bobak et al., 2000; Cockerham, 1997, 1999; Cockerham et al., 2006; Glei et al., 2013). While most empirical studies rejected the hypothesis of the negative health effects of poor nutrition on the overall mortality rates in post-soviet Russia (Jahns et al., 2003; Popkin, 1998), a strong association between the mortality increase and risky health lifestyle, such as binge drinking and smoking, received significant attention from the scholars (Bobak et al., 2004; Christopoulou et al., 2011; Ginter, 1996; Leon et al., 2009). Those struggling with material deprivation and inability to provide their families might have had the highest stress levels and found an escape in binge drinking (Leon et al., 1997). The health lifestyle theory (Cockerham, 1999, 2000, 2005, 2018) supports this argument and proposes several mechanisms explaining the dramatic increase in alcohol consumption in Russia and related mortality after the regime collapse. During the collapse of the Soviet Union, mechanisms which may have been particularly detrimental for health include communism-built poor conditions of life chances (material circumstances and environmental effects, such as family or work), limited opportunities for life choices (unemployment), little individual agency over own health behaviours (also related to low self-control), and strong cultural reproduction of drinking, particularly its role in social acceptance for men (Azarova et al., 2017; Desai and Idson, 1998; Gerber, 2002; Gerber and Hout, 1998; Hinote and Webber, 2012; Kapelyuk, 2015; Klugman, 1997; Marmot and Bobak, 2005; Perlman et al., 2003; Salmenniemi, 2013).

The proposed explanations for poor health in Russia have mainly focussed on the country-level effects of social inequality and material deprivation but missed the potential health implications of the family-level factors (Cubbins and Szaflarski, 2001; Kravchenko et al., 2015). It is still unclear how family structure, social relationships, and gendered expectations within the family might interplay with men's control over their lives and desire to drink 'until death' in the context of the proposed explanations related to economic uncertainty and social anomie. By considering family circumstances and interlinkages with other family members over the life-course, this thesis aims to understand the overlooked role of family for Russian men's health.

2.2 Life-course perspective of health

Parallel to realising the importance of accounting for the hierarchical structure of social processes, sociologists have started to focus on the meaning of social and family development for personal life histories and health. By distinguishing cohort and period effects on one's health, the life-course theory guides researchers in understanding the dynamic relationship between individual trajectories and health inequalities at different stages of life and historical time-points (Elder, 2000; Elder, Johnson, et al., 2004). One of the principles of this approach is the 'interlinkage' between individual life-courses within networks (Settersten, 2015). In the thesis, I apply this 'linked lives' principle to the Russian case in order to study the micro-level importance of family for health across and between generations. To create a complete picture of the demographic and socio-economic challenges relevant to this population, I first introduce the historical development of Russian families and how they are distinct from the Western world.

2.2.1 Macro-level processes: family as an institution and system

Life-course theory focuses on the interlinkage between individual life events and socio-demographic changes occurring within the multiple life domains. Along with the state and workforce, family is one of the primary socially constructed institutions for personal development over the life-course (Elder, 1987; Mayer, 2004). Western demographic changes over the last decades have shown international diversification of the family patterns through globalisation and decrease in both fertility and mortality rates over the twentieth century (Therborn, 2014), which characterise the theory of the first demographic transition (FDT). The second demographic transition (SDT) describes further development of family systems experiencing an increase in individualisation and cohabitation in the form of marriage postponement and living independently from other generations (Aboderin, 2004; Cherlin, 2012; Lesthaeghe, 2010). Historically, development of family systems differs across Europe, where the 'St. Petersburg – Trieste' line (Hajnal, 1953, 1965, 1982) divides the European continent by East – West countries based on the differences in marriage and fertility patterns. Later marriages and fertility postponement are predominant in places west of Hajnal's line (Western and Northern Europe) together with a greater autonomy of family formation among young adults and weaker kinship networks (Goode, 1963). In contrast, the tendency to live in intergenerational households characterises the Eastern part (Southern and Eastern Europe) together with stronger family ties and intergenerational support (Daatland et al., 2011; Reher, 1998). However, contemporary systems of family formation and their development around the world differ not only geographically according to Hajnal's line, but also by economic, political and cultural circumstances (Therborn, 2014), which, in turn, shape individual lives. This underlines the

importance of acknowledging the potential impact of historical macro-level changes which may be experienced at family-level and individual-level, depending on socio-economic and cultural contexts.

Historical development of families in Russia

In his model, Hajnal (1982) noted that among serfs in the nineteenth century Russian Empire, average household size was over nine people who were usually children and other relatives like grandparents. Although contemporary Russian households consist on average of 3.1 people (FSSS, 2013), the Russian family system has undergone several political and socio-economic changes over the twentieth century. In 1917, the Bolshevik Revolution aimed to destroy the traditional patriarchal structure of the Russian Empire and create the communist State with equal rights for its society. The new communist system claimed lands from peasants and expected them to contribute to the prosperity of the State as a new working-class population employed by the government (White, 2007). Hence, this new regime required households to migrate away from the old settlements they inhabited during the Russian Empire in order to participate in the labour force. However, this process coincided with a rapid industrialisation and urbanisation in the Soviet Union (Vishnevsky, 2006), therefore allowing younger generations to move into cities for education and labour opportunities, away from intergenerational living arrangements (ILAs) in rural areas. Nevertheless, it was still common for younger and older generations to share a dormitory, particularly when living in urban areas (Zavisca, 2012). Although nuclearisation of Russian families started to appear in the 1950s due to the State housing provision for couples with children (*ibid*), ILA continued to be popular in the Soviet Union (20% in 1989 Census).

A major part of the family system changes happened through the influence of communism on social norms and gendered expectations (Ashwin, 2000). Soviet communists built a new nation with a primary focus on the Soviet Union as 'the Big Family' and raising children 'for the State' (Elena Prokhorova, 2006). However, concurrent with essential maternal and domestic responsibilities, the State also expected women to participate full-time in the labour force (Kiblitskaya, 2000b). These shifts placed a double burden on working mothers and subsequently led to decreased fertility rates in the 1970s and increased use of abortions as a primarily available option of family planning (Rivkin-Fish, 2006). Despite the pro-natalist policies from the Soviet government to remind women about their duties of reproduction for the 'society's sake' (*ibid*), Russian fertility rates remained low and dramatically decreased below the replacement level after the collapse of the Soviet Union (Frejka and Zakharov, 2013, 2014).

Together with many other republics of the USSR like Ukraine or Belarus, post-Soviet Russia experienced a demographic crisis with its population shrinkage and ageing burden, because the

number of deaths exceeded the number of births in the early 1990s (Vishnevsky, 2009a; Zakharov, 2008). Since then, Russian life expectancy and total fertility rates have been one of the lowest in Europe (*ibid*), whereas the share of ageing population has been one of the highest in the world (Balachandran et al., 2017). Finally, the Eastern Bloc experienced a significant increase in ILAs, which have been two times higher than in Western and Northern Europe (Kalmijn & Saraceno 2008; Iacovou & Skew 2011). Russia became one of the leading countries east of Hajnal's line in the share of ILAs (*ibid*), with a significant increase up to 30% since the USSR collapse (FSSS, 2004, 2013). With a dramatic rise in divorce rates, ILAs have remained at high levels particularly among the divorced adults and single parents (Prokofieva, 2007; Utrata, 2015). These demographic changes have not only shaped a new family system in Russia, but may have also indirectly affected individual health.

There is continued debate between Russian and Western scholars regarding whether contemporary Russia is already experiencing the SDT on the same level as Europe (Gerber and Berman, 2010; Perelli-Harris, 2006; Vishnevsky, 2009b; Zakharov, 2008). On the one hand, Russian young adults might experience ideational change characteristic of the SDT through the observed postponement of marriage and parenthood together with the level of completed fertility similar to Western Europe (Frejka and Zakharov, 2014; Vishnevsky, 2009b). In addition, the majority of both younger and older generations report their desire to maintain independence from each other through their residence in separate apartments (Levada-center, 2016; Zavisca, 2012). On the other hand, a shift from familism to individualism could be slower in Russia than in the Western world because of the remaining popularity of ILAs, postponed nest-leaving, and neo-traditional views on family formation with earlier ages of entry into marriage and first birth of 22-24 years old (Billari and Liefbroer, 2010; Perelli-Harris et al., 2014; Vikat et al., 2007; Vishnevsky et al., 2009). The effect of the communist regime and its collapse on the Russian family system proposes several explanations in relation to low fertility and high ILA rates in contemporary Russia.

Proposed explanations for family changes in Russia

Shortly after the collapse of the Soviet Union, economic instability possibly motivated young couples to postpone second births (Mikucka, 2016; Perelli-Harris, 2006; Vishnevsky, 2009a) and leaving the parental home (Zavisca, 2012). Young adults struggled with employment adjusting to a new job market structure and low State provision of childcare, while older people faced low pension levels and inadequate formal care from the State. Economic instability has been particularly pronounced among single parents, where half of them co-reside with grandparents (Prokofieva, 2007), mainly to receive help with childcare (Utrata, 2015). These patterns suggest

that sharing a living space with other generations could be one of the adaptive pathways Russian families have chosen as a resilience strategy against negative socio-economic changes in the 1990-s.

Since Russia's transition to the market economy and mass privatisation, unaffordable housing and the persistently unreliable mortgage market could be key factors contributing to low fertility rates and the prevalence of ILAs in small living spaces (Ovcharova and Prokofieva, 2009; Stuckler et al., 2009; Zavisca, 2012). In contemporary Russia, 23% of families consist of four or more people, where one third of these households live in a dwelling with only one or two bedrooms (FSSS, 2013). Therefore, couples co-residing with older generations may postpone having more children simply because of the lack of living space and financial resources to afford a separate housing, even if they desire more than one child. Together with the post-Soviet housing policies of privatisation and high interest rates for mortgages, unaffordability of housing might lead to high levels of ILAs and young people depending on their family networks to either inherit a dwelling or for resources to afford their own living space (Zavisca, 2012). These arguments highlight the significant role of the family over the life-course, which could indirectly affect the well-being and health of individuals who share a living space. In the Russian context, overcrowding could affect stress levels of those taking care of young children or elderly parents in the same household, whereas having only one child could reduce the amount of informal care available later in life, which, in turn, could correlate with health over the life-course.

2.2.2 Micro-level processes: family relations and 'linked lives'

The life-course approach highlights the potential cumulative effects of micro-level interactions between different social roles (marriage, parenthood, work, etc.) on health at different stages of life (Umberson, Pudrovska et al, 2010). Shaped by cultural and socio-economic contexts, diverse patterns of the marital and parental aspects of the family could confound its complex relationship with health (Carr and Springer, 2010; Ross et al., 1990). Individual changes in those aspects might 'interlink' between the family members and affect their relations and health over the life-course (Elder, Johnson, et al., 2004). The quality and quantity of family ties are important sources of both support and stress for the 'linked lives' within the family networks (Umberson, Crosnoe et al, 2010). Similar to the main mechanisms of social networks, various types and levels of family resources (material, informative), support (functional, emotional, etc.) and control (habits, attitudes) could either protect or worsen the well-being and health of family members (Martire and Franks, 2014; Perkins et al., 2014; Smith and Christakis, 2008). In Russia, a lack of social support and solo-living could also be detrimental for health, as studies show that both SRH and unhealthy behaviours are significantly worse among those who feel lonely and live alone (Stickley,

Koyanagi, Leinsalu, et al., 2015; Stickley, Koyanagi, Roberts, et al., 2013). The unique Russian context of economic 'shocks' (Gerber and Hout, 1998) and dramatic socio-demographic changes (Vishnevsky et al., 2004) could help the social sciences understand how multiple domains of social support complement each other and influence health.

Social support and stress

The exchange of support and burden of stress are two important mechanisms of the effect of social and family relationships on health behaviours and health outcomes over the life-course (Umberson, Crosnoe et al, 2010). Researchers hypothesise the interlinkage between social support and health as both the 'buffering' and 'main' effects (Gerich, 2013). On the one hand, social support has a buffering effect on an individual's health through the mechanism of stress, where the positive relationship is modified by the reduction or increase of stress symptoms (Cohen, 1992; Gerich, 2013). On the other hand, different types of social support can also directly affect (the 'main' effect of) health independently from stressful events (Gerich, 2013; Thoits, 1985). Moreover, social support itself can moderate the effect of stress on health (Turner and Schieman, 2008). Finally, stress can have a cumulative effect on health over the life-course and trigger health problems in later life (Pearlin et al, 2005).

Family status and health: protection, burden and selectivity

Within the family network, stress from conflicts and separation could lead to deterioration of health outcomes, whereas family support and control of health lifestyle could improve psychological well-being and physical health (Takeda et al., 2004; Williams and Umberson, 2004). Researchers point to the mediating effect of unhealthy lifestyle on the health implications of stress as a response to negative life events (Umberson et al, 2008). In Russia, binge drinking and premature male mortality is more common among those who experienced family disruption (Saburova et al., 2011). Additionally, life-course studies in Russia reveal the particular importance of family conflicts and divorce for the risk of sliding into binge drinking (Keenan et al., 2011, 2013). Both protective and detrimental health effects of the family might occur at different stages of life depending on the family economic well-being, household composition and relationships (Conger et al., 2010).

Both causality and selectivity could drive the relationship between the family and health differently depending on the stage of life (Hoffmann, Kröger and Pakpahan, 2018). As one of the important turning points in life, transition to adulthood could serve as an example of selectivity, where nest-leaving and returns back to the parental home could depend on the demographic and socio-economic factors of both adult children and parents and are more likely to occur in the

families with a lower socio-economic status (Aassve et al., 2001; Iacovou, 2010). Although cross-sectional studies suggest health benefits of living with a partner (Khlat et al., 2014; Manderbacka et al., 2014) due to access to more resources and support (Ross et al., 1990; Umberson, Crosnoe, et al., 2010; Waite and Gallagher, 2002), life-course research demonstrates that partnership status does not protect against ill-health during negative turning points in life such as transition into unemployment or poverty (Abebe et al., 2016; Tøge and Blekesaune, 2015; Vaalavuo, 2016). Health selection into marriage could explain the 'health and wage premium' of partnered adults (Mastekaasa, 1992; Waldron et al., 1996), particularly notable among men (Antonovics and Town, 2004; Ashwin and Isupova, 2014; Killewald, 2013). At the same time, unhealthy younger and older generations could also be selected into an ILA, which might be burdensome for intergenerational relationships (Umberson, Crosnoe, et al., 2010). Finally, the macro-level selection effects of welfare systems, cultural norms, labour force and housing market could shape the range of opportunities for young adults to live independently from their parents (Aassve et al., 2013; Billari and Liefbroer, 2010).

Intergenerational relationships and co-residence

The model of intergenerational support exchange and 'linked lives' shows that both quality and quantity of relationships between younger and older generations could depend on the needs and availability of resources during different stages of their life-courses (Bucx & Knijn, 2012), which play an important role in improving or diminishing their well-being and health (Umberson, Pudrovska et al, 2010). Family research has been paying particular attention to three key aspects of intergenerational relationships: solidarity, conflict, and ambivalence (Wethington and Kamp Dush, 2007). Under the solidarity perspective, interactions between adult children and their parents interlink with needs of both sides, such as feelings of responsibility or health-related emotional and material support (Roberts et al., 1991; Silverstein, Gans, et al., 2006; Silverstein and Bengtson, 1997). Researchers argue that parents provide more resources and support to adult children than vice versa across the life-course (Lye, 1996), which could be particularly concentrated during the offspring's transition to adulthood (Grundy, 2000). During this turning point in life, intergenerational conflicts are the most salient, when interests and attitudes can clash between parents and children and affect the stability of their relationships (Rossi and Rossi, 1990). Ambivalence could have a similar effect on intergenerational relationships and psychological well-being of parents in mid-life during the radical changes in autonomy of grown-up children and possible continuing financial and instrumental dependence on parents (Kiecolt et al., 2011; Lüscher and Pillemer, 1998). In turn, the direction of support flows and levels of intergenerational solidarity can change with the rise of age-related health issues of parents later in life (Grundy, 2000). Longitudinal comparisons show a significant flow of support from adult

children to ageing parents (van den Broek and Dykstra, 2017), often by co-residing together (Van den Broek et al., 2017; Dykstra et al., 2013) or increasing caregiving hours (van den Broek and Grundy, 2018). The burden of informal caregiving and other multiple roles within the family and society can worsen the well-being and health of offspring though the increased levels of stress (Ikeda et al., 2009) . Nevertheless, according to the 'linked lives' approach, parental ill-health could also have a direct negative effect on the well-being and health of offspring regardless of their experienced levels of informal caregiving (van den Broek and Grundy, 2018).

An ILA is one of the main indicators of intergenerational solidarity and a proxy for the exchange of greater support and lower desire of privacy between parents and children (Smits et al., 2010), which define familialism and describe the areas east of Hajnal's line (Kalmijn and Saraceno, 2008b). One would expect the health of younger and older generations to benefit from higher levels of solidarity when living in an ILA; however, the direction of this relationship could also depend on the cultural and economic contexts. Although Russia stands out as having the highest proportion of instrumental and financial support transferred between generations in Europe (Dykstra et al., 2016), Russian older parents living in ILAs tend to feel significantly lonelier than their Western European counterparts (Gierveld et al., 2012). Cultural norms and attitudes might influence the level of intergenerational support expected in a society, but the availability of family care services, benefits, and policies supporting younger and older generations could also 'push' them towards familialism and ILAs, particularly in countries with higher levels of economic hardship such as Russia (Glaser et al., 2004; Puur et al., 2011). Therefore, ILAs could also be associated with economic strain and psychological burden for both adult children and older parents, particularly when taking into account high levels of informal caregiving, which are socially acceptable in the Russian context (Korchagina and Prokofieva, 2007; Lefevre et al., 2010). ILAs might be associated with negative emotions arising from a low level of satisfaction with intergenerational relationships (Aquilino and Supple, 1991). Nevertheless, empirical findings from the US show that ILAs can have a positive effect on intergenerational support across the life-course (Leopold, 2012).

The literature provides mixed evidence on the value of living 'free' from adult children for parental well-being. Some psychological findings postulate that parents have a positive attitude towards adult children leaving home and report a better state of well-being after nest-leaving (Dennerstein et al., 2002; Harkins, 1978), particularly when it is associated with higher quality of their own marriage (Davis et al., 2016; White and Edwards, 1990). Other studies suggest that parental transition to living separately from adult children is a less stressful event for parents than their transition to unemployment (Crowley et al., 2003), union dissolution, or bereavement (Dare, 2011). However, the heterogeneity in timing of nest-leaving (Harkins, 1978), cohort effects

(Adelmann et al., 1989), and the length of parental marriage (Hiedemann et al., 1998) might highlight the negative association between nest-leaving with health. This relationship could be particularly pronounced in ILAs with children older than the expected age of leaving the parental home (nest-leaving), which is especially common in the countries experiencing the economic transition, such as Russia (Leopold, 2012). For example, Russian young adults have a significantly narrower gap between the median age of leaving home and entering the first marriage and birth (Billari and Liefbroer, 2010; Vikat et al., 2007), and first marriage and birth often precede nest-leaving (Sinyavskaya and Gladnikova, 2007; Zavisca, 2012). This confirms the relationship between nest-leaving and transition into living with a partner (Billari et al., 2007), which could suggest that Russians may interpret the question about the 'expected' age of leaving home as an indirect question about the normative age of union formation and first birth. Therefore, this thesis takes into account the normative age of leaving home in Russia in the relationship between ILAs and health of younger and older generations.

Most studies showing a negative relationship between well-being and a life-course turning point of the departure of all adult children from the parental home focussed only on motherhood (Adelmann et al., 1989; Borland, 1982). A few studies on fathers show less traumatic experiences of nest-leaving for their well-being than for mothers (Axelson, 1960). Moreover, the differences in cultural expectations of attachment and support between the generations might create a unique environment for parents coping with loneliness and depression when living separately from adult children (Borland, 1982; Mitchell and Lovegreen, 2009), as shown in studies on Chinese older parents (Gao et al., 2017; Lv et al., 2013; Wang and Zhao, 2012; Wu et al., 2010). In the third empirical paper of this thesis, I draw a particular attention to the health effects of nest-leaving on parents by focussing on middle-aged men, who have one of the highest risks of premature mortality in the Russian context.

2.3 Gender perspective of health

Worldwide, men have lower life expectancy than women (Doyal, 2001). While medicine concentrates on sex-related biological disadvantages of men's health such as prostate cancer, sociologists and demographers bring together individual, family, and social aspects of men's health risks. A gender perspective aims to uncover 'how' and 'why' some social mechanisms could possibly contribute to men's health inequalities (Cameron and Bernardes, 1998; Doyal, 2000).

Masculinity and health

Social sciences suggest a link between the gender gap in life expectancy and masculine practices of unhealthy lifestyle and ignorance of health-related problems (Doyal, 2000, 2001). Social risks

are as important as biological risks for men's health, where the social construction of masculinity could explain the vulnerability of men in terms of stress effects and disease prevention (*ibid*). For example, while men have a higher biological risk of developing heart diseases than women, they are also less likely to seek help from health services, because addressing health issues among men is often associated with femininity and losing their 'breadwinner' status in the family (Emslie and Hunt, 2009). Social norms of gendered differences in the attitudes towards health could also explain men's tendency to over-report their overall state of health, particularly in the workplace environment (Caroli and Weber-Baghdiguian, 2016). Russian men are not an exception; although on average they live 10 years less than women do, they actually tend to report better health than women. Therefore, gendered perceptions of health problems affect health through the social construction of gender identity, where feminine beliefs are associated with 'poor health' (being weak) and masculine behaviours are associated with 'good health' (being strong and dominant) in both genders (Annandale and Hunt, 1990; Connell, 1993).

Men's health behaviours within the societies and families

The association between social roles, relationships, and health can differ between men and women due to their often contrasting experiences of family and work responsibilities and exposure to stressors (Barnett, 2002; Barnett and Hyde, 2001). Together with the state, family and workplace institutions shape the social construction of gender within a specific cultural context. Social relationships could play a particularly important role in the association between masculinity and men's health. Unlike women, men are more likely to be socially active outside the family network, particularly in socialising at work, which might benefit their health (Walen and Lachman, 2000). A strong association was found between having formal networks and better SRH among Russian men, whereas family networks were important for women's health (Ferlander and Mäkinen, 2009). However, across cultures, men's workplace is also associated with unhealthy behaviours, where 'real' men are those who compete, win, and do not seek any health-related help (Addis and Mahalik, 2003; Farrimond, 2012; O'Brien et al., 2005; Verdonk et al., 2010). Men tend to materialise this 'label' through actions that are risky for health, commonly associated with injuries and unhealthy lifestyle, such as smoking or heavy drinking (Gough, 2007; Hooker et al., 2012; Noone and Stephens, 2008; O'Brien et al., 2005; Robertson and Williams, 2007; Verdonk et al., 2010; Williams, 2003a). Occupational conditions and social surroundings at work could also facilitate men's daily routines of unhealthy behaviours and be detrimental for their health outcomes (Messing and ÖStlin, 2006), which has been the case in Russia (Bobak et al., 2005).

The public health issue of unhealthy behaviours and subsequent poor health of Russian men has been related to their masculine identity since the Bolshevik Revolution in 1917 (Hinote and

Webber, 2012). After the revolution, the nation's masculinization process encouraged women to take on traditional men's roles of being both a 'provider' and 'father', while expecting men to succeed in the public sphere (Kiblitskaya, 2000b). For men, a new ideology of Soviet manhood meant less patriarchal importance at home and offered no alternative self-realisation other than employment (Hashamova, 2006). Even during the pro-natalist policies in the 1970s aiming to increase fertility rates in the Soviet Union, the government did not consider the role of men in the family (Rivkin-Fish, 2006). This historical challenge of marginalisation of Russian men in the domestic sphere led to the 'masculinity identity crisis' (John Round, 2013). Because hegemonic masculinity is associated with risky behaviours, scholars argue that these post-revolutionary gender shifts towards little self-control over one's own health and a lack of choices for self-realisation prompted Soviet men to re-gain their dominance and power through alcohol drinking, particularly as a routine practice in male group activities (Hinote and Webber, 2012; Saburova et al., 2011). Unemployment meant demoralisation for men (Pietilä and Rytkönen, 2008a). In line with the health lifestyle theory (Cockerham, 2005), the Soviet construction of male identity and its 'crisis' could be one of the mechanisms explaining the detrimental relationship between health levels and alcohol consumption and subsequent mortality rise among working-class men, particularly among those who were unemployed during the economic 'shocks' in the 1990s (Hinote and Webber, 2012; Keenan et al., 2015; Pietilä and Rytkönen, 2008a; Saburova et al., 2011).

The 'family status' mechanism of social adaptation to neo-traditionalism was crucial for men in terms of 'coping with life' in Eastern Europe (Watson, 1995). Contemporary qualitative studies on Russian men identify family and fatherhood as one of the greatest life spheres influencing their masculine identity and self-esteem (Ashwin and Lytkina, 2004; Bullough, 2013; John Round, 2013; Kay, 2006; Kay and Kostenko, 2006; Utrata, 2008). Empirical research in other contexts such as the US shows that marriage and parenting can have a positive effect on health beliefs and behaviours of men, linked to taking health problems more seriously (Markey et al., 2005; Umberson, 1987). In Russia, life-course studies show that men who are married and have children are more likely to significantly reduce alcohol consumption, realising that they are a 'role model' for their children, particularly avoiding socially-accepted binge drinking with peers in the Eastern European context (Keenan et al., 2015). A father's continuous co-residence with a spouse is associated with better SRH status in comparison to single and separated fathers in both early and mid-life stages of fatherhood (Dykstra and Keizer, 2009; Meadows, 2009). However, the Russian case shows that men's 'failure' to provide for their families could lead to higher divorce rates in times of economic instability, possibly due to women's disappointment in men's contributions to their families as husbands and fathers (Kay, 2006; Utrata, 2015). Russian fathers struggling with

life-course changes of unemployment or divorce could feel excluded by society if they do not provide their children with more material support (Kay, 2006). Union dissolution and separation from children can be detrimental for fathers' health through the deterioration of their health behaviours and psychological well-being (Ross et al., 1990; Utrata, 2008), as shown in Russia and the US (Saburova et al., 2011; Williams and Umberson, 2004). These findings might explain why unmarried men have been more likely to practice unhealthy behaviours and die earlier in Russia, compared with married men (Cockerham, 2000; Pridemore et al., 2010; Pridemore and Shkolnikov, 2004).

Over the life-course, intergenerational relationships can play a different role in men's lives and health. Most European societies continue to have a gendered pattern of upward flow of support, where sons tend to provide less support to their elderly parents than daughters do (Umberson, Pudrovska et al, 2010), while the opposite is true in some Asian countries like China or Taiwan (Chu et al, 2011). As for the downward flow of support, men tend to have weaker family ties and exchange less support with children than women do (Pudrovska, 2009; Silverstein, Gans, et al., 2006; Simon, 1992). This could be explained by the continuing cultural expectation of mothers to be the main 'kinkeepers,' to handle more stress from their offspring's negative life-course events, and to experience more strained relationships with their children due to their greater emotional and instrumental contributions to parenting in comparison to fathers (Lye, 1996; Scott and Alwin, 1989). Therefore, we might expect relatively small health effects of fathers' relationships with adult children. Nevertheless, longitudinal studies show a potential for the negative consequences of family transitions for fathers. For example, the life-course event of union dissolution can worsen the quality of intergenerational relationships among separated fathers (Lye, 1996; Shapiro, 2003; Wethington and Kamp Dush, 2007). In turn, this deterioration could leave fathers with less support within their family networks and put a strain on their well-being and health.

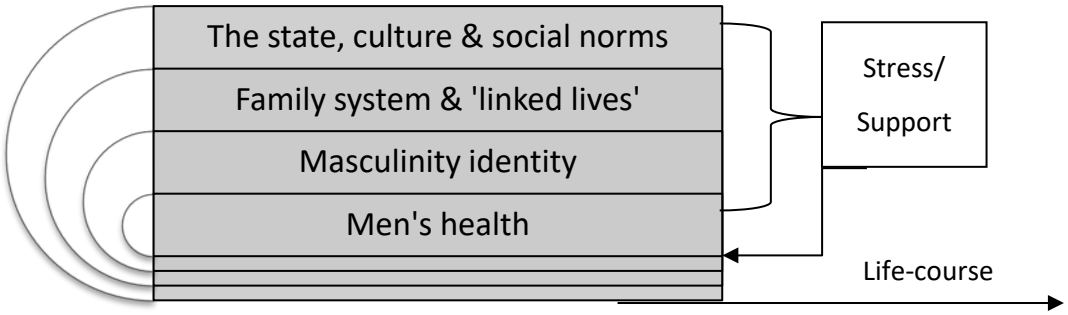
In conclusion, it is important to note that Russia still lacks the governmental and social support for fathers in comparison to mothers, particularly single fathers taking care of children or divorced fathers living separately from biological children (Rivkin-Fish, 2006). With the ideological changes in Europe, men have started to co-reside more often with step-children (Hogan and Goldscheider, 2001). The same applies to Russian family norms, with the general assumption that children will always live with their biological mothers after parental separation (Kay, 2006). These family patterns could explain why only 2% of households in Russia are headed by single fathers living with their biological children compared to 23% of households headed by single mothers. Moreover, it is still unclear how these family shifts could interplay with the health deterioration among working-age Russian men who were at the highest risk of experiencing a crisis of

masculinity, particularly a mid-life crisis of self-realisation of achievements and failures (Stephen Hunt, 2005) after the dramatic socio-economic changes and stress levels in the 1990s.

2.4 Summary: Gendered Life-Course Stress Approach to study the family 'linked lives' effects on men's health in Russia

Each theory introduced in this chapter is important for studying the importance of family for health and has been applied in the previous empirical studies in this field (Grzywacz and Ganong, 2009; MacMillan and Copher, 2005; Ross et al., 1990; Rossi and Rossi, 1990; Umberson et al., 2008; Umberson, Crosnoe, et al., 2010; Umberson and Montez, 2010). In this section, I draw these theories together into a coherent theoretical framework of studying men's health in the Russian context (Figure 2.1).

Figure 2.1 Theoretical framework for a contextual understanding of men's health



In this theoretical framework, I argue that micro-level interrelationships between older and younger generations can bring stress or provide support buffering against stress, which might indirectly affect men's health over the life-course. Often difficult to capture, the broader macro-level effects of the state, policies, and cultural norms, in turn, shape the historical development of family systems, gender identity, and intergenerational relations, which could affect men's health indirectly as well. Hence, I argue that context is important for men's health. Within the life-course theoretical framework, both individual experiences and historical developments shape men's masculine identity, family relationships, and health differently, depending on birth cohort. Although the empirical chapters of this thesis do not focus on the health impact of historical changes and masculinity, it is still important to acknowledge what socio-economic challenges recent generations have faced in Russia and how these challenges might have shaped men's gender identity and health outcomes.

Similar theoretical frameworks on men's health over the life-course already exist in the West (Evans et al., 2011; Springer et al., 2017). However, those studies did not account for the 'linked lives' hypothesis of one family member's life event or well-being affecting the health status of

another member and how the effect may differ depending on their life-course stages. I place the gendered life-course stress approach in the unique Russian case of prevalent intergenerational living and the continued public health issue of unhealthy behaviours and premature male mortality. Previous literature on family effects and men's health has specifically lacked a life-course focus. I address this gap by investigating the health effects of family status on Russian men's health outcomes across their life-course stages, with a particular focus on men's co-residence with younger or older generations as a proximate determinant of support flows and stress burden.

Chapter 3 Data

In this chapter, I describe the secondary data source used in all of the empirical papers of the thesis, the Russian Longitudinal Monitoring Survey (RLMS). I focus the features, definitions and sampling procedure of this survey. I also explain the steps of the complex data manipulations I performed to capture information on the living arrangements and co-resident household members for each individual.

3.1 Purpose(s) of the RLMS

The RLMS is the only annual and nationally-representative survey in Russia which covers more than twenty years of socio-economic transition since the collapse of the Soviet Union (Kozyreva et al., 2016). The survey complements the Russian Federal State Statistics Service by providing rich information on the social, economic and health aspects of the population across all regions of Russia. Several measures collected in the RLMS are of importance for the Russian economy, including immigration, income and expenditures, labour force participation, education attainment, use of health- and child-care services and detailed health assessment (with a separate questionnaire on women's health and childbearing). The RLMS also contains an adult health assessment, collecting information on self-rated health and health-lifestyle factors (smoking and alcohol consumption, and occasionally about their dietary intake and physical activity). This assessment also covers several medical factors, including body mass index, a wide range of chronic illnesses (heart, lung, liver, kidney, gastrointestinal, neurological, gynecological, oncological, eye, endocrine, diabetes, high blood sugar, high blood pressure and others), surgical operations, serious conditions (myocardial infarction, stroke, blood haemorrhage in the brain, tuberculosis, hepatitis, and anaemia) and mental health (with infrequent questions about well-being, serious nervous disorders, anxiety or depression). In addition, the survey contains questions on life satisfaction and disabilities in every iteration.

Several features of the RLMS provide a unique opportunity to explore the dynamic relationship between family and health in post-Soviet Russia. First, the survey consists of three-level questionnaires for the population centres, households and individuals (with a separate questionnaire for children younger than 14 years old). Second, in addition to the income and expenditure information at the household level, the survey provides a detailed matrix of the relationships between co-residing individuals and the reasons for changes in the household roster. Importantly, the survey collects information on all individuals co-residing within sampled households. Therefore, researchers may explore the interlinkages between household members

who completed the Individual Questionnaire and examine annual transitions occurring at the individual level connected within households. Finally, data can be compared with surveys from other countries owing to the international standards used in the survey's methodology, which is explained in the next section.

3.2 Sample design of the RLMS

The RLMS consists of two phases: Phase I ran from 1992 to 1994, and Phase II runs from 1994 to the present. When Phase II began (Round 5, 1994), a new sample design was employed: a multi-stage probability sample with stratification (Kozyreva et al., 2016). It is important to note that the data providers do not advise researchers to use Phase I due to the entirely different sample design and its unrepresentativeness at the population level (RLMS-HSE, 2018a). The survey consists of two samples: the sample of original addresses drawn in 1994 (cross-sectional sample) and the sample of the follow-up addresses (panel sample). These two samples play two different roles in the analysis. While the cross-sectional sample is representative at the population level, the panel sample can also include households and individuals who moved during one of the previous rounds (therefore, they are not a part of the representative sample any more) and should be used only for the longitudinal analysis to observe individual changes over time.

In Phase II, the nationally representative sample in each round consists of adults and children nested within households with the target sample size of 4000. The final number of sampled households is on average 15% higher to compensate for non-response. The sampling frame of the RLMS is based on households in rural areas (usually as one house) and dwellings in urban areas (usually as private or communal apartments, enterprise dormitories, etc.), because a single dwelling can consist of more than one *household* defined as a group of people living together at the same address and share everyday income and expenditures. In the case of existing multiple households in a dwelling on the day of an interview, the interviewer is instructed to choose only one household; however, the final list of households should already include enumerated households within the dwellings. The definition of a household in the RLMS also includes unmarried minors (aged 18 years old or younger) who live temporarily outside the household (e.g. due to studying) at the time of interview.

In Round 5 (the first wave of Phase II in 1994), households in RLMS were drawn systematically with the first random selection in the first interval from villages in rural areas or districts in urban areas (second-stage units, or SSUs). In rural areas, one village (SSU) was selected for each 10 households from each rural substratum using the method of probability proportional to size (PPS). In urban areas, each district (SSU) was defined as the census enumeration district or residential

postal zone and one district was systematically selected from each urban substratum (without applying PPS due to already equal population size in census enumeration districts). In some cases, districts were selected using the PPS method if they were defined as voting districts. Overall, each SSU was selected from each stratum as a primary-sample unit (PSU) with about 100 households in each PSU. The RLMS consisted of 38 strata in total, which were divided by two substrata: three self-representing (SR) strata and other 35 non-self-representing (NSR) strata. SR strata included three major population centres in Russia (Moscow city, Moscow Oblast, St. Petersburg), which were selected with certainty and contained 61 districts (SSUs). NSR strata were equally-sized and consisted of 1847 SSUs in total (95.6% of the Russian population, excluded 178 remote SSUs due to the costs and Chechnya due to armed conflict), which were distributed within the strata by the level of urbanisation and geographical characteristics as well as by ethnicity. It is important to note that the RLMS sample does not have enough strata drawn per region of Russia to make the sample representative at the regional level due to limited funding, with the exception of Moscow and St. Petersburg (RLMS-HSE, 2018a).

At the start of Phase II in 1994, the response rates exceeded 97% for individuals and 88% for households (Kozyreva et al., 2016). Comparison of the RLMS cross-sectional samples (unweighted) in 2002 and 2010 with the appropriate Russian Censuses in the same years shows that the survey had a nationally-representative distribution of households by the number of co-residing individuals. However, the survey underestimates one-person households living in urban areas of Russia, with the proportion of such households in the survey being 4% lower than in the 2010 Census. In addition, adults with tertiary or higher education and those who are men are under-represented in the cross-sectional sample, particularly young or middle-aged men (1% smaller share in comparison to the 2010 Census). Finally, the survey has been struggling with the highest level of underrepresentation of households and individuals in Moscow and St. Petersburg. The survey provides yearly post-stratified weights to account for the cross-sectional sample's underrepresentation by age, gender, education, settlement type and geographical region. In addition, several replenishments have been conducted in RLMS in order to improve the response rates (Kozyreva et al., 2016). In Round 10 (2001), a new cross-sectional sample was drawn specifically for Moscow and St. Petersburg using the same sampling design. Within the same stratum, the Novosibirsk region was entirely replaced by the Khanty-Mansiisk region in Round 12 (2003). In Round 15 (2006), most regions in the survey experienced a replenishment to the original sample drawn in 1994. In addition, the total number of households required for the representativeness of the cross-sectional sample on the population level was increased up to 6000 households in Round 19 (2010). To achieve a greater sample size, additional samples of smaller sizes were drawn in each PSU with the same sample design (RLMS-HSE, 2018a). Because

the survey also includes those households which moved to another address (follow-up sample), the total household sample size exceeded 8000, with almost 18000 adults in Round 20 (2011), but experienced a decrease in Round 23 (2014) due to funding cuts.

3.3 Data access

The use of secondary data from RLMS for this PhD research is approved by the Ethics and Research Governance Online (ERGO) of the University of Southampton (submission No. 21454). The data can be accessed for free from the Carolina Population Center (CPC), University of North Carolina at Chapel Hill (https://dataverse.unc.edu/), in collaboration with the Higher School of Economics (HSE), ZAO Demoscope, and the Institute of Sociology RAS. Both CPC and HSE have official web-sites which contains descriptions of the RLMS in English[2] and Russian[3], respectively. In the first half of this PhD research, RLMS could be accessed only through a data use agreement and data security plan. In addition, only cross-sectional files could be downloaded (per round) to create a longitudinal file. Finally, two versions of the RLMS cross-sectional files existed: in English from the CPC web-site and in Russian from the HSE web-site. In Chapter 4, I use the English version of the data, the steps of which I discuss in the next section. Since June 2016, CPC and HSE have been harmonising cross-sectional files into two longitudinal files for individual- and household-levels, which cover all variables ever included in the RLMS since 1994 (available only in English from the CPC Data Portal). CPC and HSE removed the cross-sectional files in 2017 but require only on-line registration to access the new data files,[4] which they update once a new round is released. In Chapter 5 and Chapter 6, I use the newly released data; however, I attempted to create a longitudinal file prior to the official release of a harmonised file, the preparation of which I discuss in Section 3.5.

3.4 Cross-sectional data preparation

In the first empirical paper of this thesis (Chapter 4), I conducted a cross-sectional analysis of the associations between men's self-reported health and various types of living arrangements, including their partnership status. To retrieve information on men's living arrangements, I re-shaped *a matrix of relationships* within their households from the household-level to the individual-level. In this section, I discuss this process using Round 22 (2013-2014) as an example.

[2] The official RLMS web-site within CPC: https://www.cpc.unc.edu/projects/rlms-hse
[3] The official RLMS web-site within HSE: https://www.hse.ru/rlms [in Russian]
[4] With an exception for sensitive data such as the full date of birth and answers on a separate questionnaire about woman's health and family planning.

The main source of information on living arrangements and partnership status was the household roster, which contains the number of family members and types of relationships between them. The RLMS Household Questionnaire includes a 'card' of the family relationships, which creates half of a 'matrix' with diagonals indicating the relationship between the same individual (see example of a household card in Appendix A.1). To merge the household roster with individual dataset and have information on relationships within the households for each individual, I created 'mirrored' variables for each relationship (with zero value on diagonal) to re-shape the household dataset from wide to long. As a result, I had twenty rows for each household holding information on relationship types with each family member for each individual in each household. Then, I was able to merge the datasets to include individual-level information for each family member by using their unique identifiers (both adults and children datasets). The final file consisted of 21,753 individuals clustered within 8,149 households (Round 22). I then calculated the age of each individual using the interview and birth dates coded in both household and individual datasets. In the total sample, 31 individuals had their birthday between the individual and household interview's dates (or vice versa); for each of these individuals, I chose the oldest age. There were no conflicts for individual sex between the household and individual levels. Finally, I created new variables containing various information on each household member (a variable per member: sex, age, drop out reason, death cause, etc.) and their relationship types with an individual (per row) by using their household identifiers. From this point, I was able to distinguish different types of living arrangements and draw the final sample of adult men for the analysis (Chapter 4).

3.5 Longitudinal data preparation

The second and third empirical papers (Chapter 5 and Chapter 6) focussed on longitudinal analyses of the relationship between men's living arrangements and a range of health outcomes, including the reports of their household members. The next sub-section explains the steps of creating a longitudinal file with matrices of household-level relationships for each participant per round, before deriving specific sub-samples of adult men for each empirical paper.

3.5.1 Longitudinal merging

Before creating households' relationship matrices in each round of RLMS, I explored their household files. Before Round 16, there were no combined household files per round; instead, the data providers used to create five separate files per each section of the Household Questionnaire within each round (household roster, housing, land use, expenditure and income variables). For this thesis, I focussed on the files which included information on the types of relationships between household members, household socio-economic position (income,

characteristics of living space) and residential characteristics (settlement type, region). To merge them together, I used three variables uniquely identifying each household, which were site, census and family (from Round 18, region was instead of site and census was dropped). To merge between years of the survey, I renamed the variables into names consistent across all rounds (including further rounds with single household files per round) and created a new variable indicating the number of the round. The same principle applied for the individual files of each round. Because the numbers of relationship pairs per household were inconsistent across the rounds (e.g. 19 and 24 possible relationship pairs in Round 13 and 16, respectively), I increased the maximum number of relationship pairs in each round's household file up to 24. After that, I could re-shape the relationship matrices with a consistent shape across all rounds. Using the technique explained in the previous section, this step was applied separately for each round's household file.

After applying the changes to the household-level files of each round, I explored their individual-level files. Similar to the household-level files, rounds preceding Round 15 had six separate individual-level files in relation to each section of the Individual Questionnaire (employment, anthropometry & health, women's section, time use, child questionnaire, sexual history questionnaire variables). To get information on demographic, socio-economic and health characteristics of individuals in each round, I merged the required files separately for each round using a combination of four variables with a unique identification of each individual, which were site, census, family and person before Round 18, and region, family and person afterward. Then, I examined the combined individual-level files for the variables' consistency in terms of their names and categories over time. For instance, I found differences in categorisation within drinking, marital and cohabitation measures, which are further explored in the Variables section of each empirical paper. Finally, I merged each round's individual-level file with the unique individual identifiers provided as a separate file by the RLMS team.

Because the re-shaped household-level file included information on households and their members per individual in each row, I needed to use only the household-related identifiers of the region (site and census before Round 18) and family to create a single file per round with both individual and household levels together. It is important to note that these variables uniquely identified each household only within the specific round and could not be applied to merge the households longitudinally, unlike the individuals' unique identifiers. In each file per round, I imputed the reports on sex between the merged household and individual information. Then, I created a sub-sample of adult men for each round to reduce the time spent on the process of merging the rounds together. Finally, I merged those files round by round and re-shaped the final file from wide to long format to create a longitudinal file of adult men ever participating in RLMS.

3.5.2 Harmonised datasets

Two harmonised datasets for individuals and households became available later after the start of this PhD research. According to the guidelines, the data holders constructed these datasets through similar steps of merging cross-sectional files per round (RLMS-HSE, 2018b). However, the harmonised files have various distinctions from the longitudinal file which I created. Firstly, the household-level file started to include individual unique identifiers ('idind') for each member of a household. Secondly, according to CPC, the data holders improved misreports in several variables (unique identifiers, dates of birth, education, etc); however, no details were provided on which households and individuals were changed (RLMS-HSE, 2016). In addition, I found a remaining inconsistency in the dates of birth (mostly, years) in the panel sample of adult men, who participated at least two times in RLMS. Therefore, differences between the longitudinal dataset I constructed and the harmonised dataset might affect the results of this thesis.

For the purpose of the analyses conducted in Chapters 5 and 6, I followed similar steps for re-shaping matrices of relationships in the harmonised household-level file, but with the newly written Stata syntax allowing for the calculation of matrices multiple times within each year already included in the file (Appendix A.2). After re-shaping the data to a long format, I was able to merge this file to the individual-level file by using 'idind' (as it was already provided in household roster). However, a match between the variables revealed that several individuals had a miscoded 'idind' and years of birth within the original household-level file, details of which with a syntax for corrections are provided in Appendix A.3. After correcting those misreports in the household-level file with re-shaped matrices of relationships, I was able to avoid errors in merging with the harmonised individual-level file. Appendix A.4 provides the syntax used for the preparation of the individual harmonised file by re-naming the variables of interest and dropping duplicates before merging with the modified household-level file. At this step, I was able to retrieve information on each household member and identify the types of their relationships with each individual in a row in the final longitudinal file (Appendix A.5). The final step was to correct any misreports in the types of household relationships, dates of birth of each household member and their presence in the household since the last round of participation (Appendix A.6). Among individuals and their household members who had different years of birth over time, I relied on their mode to have a consistency for calculating their age at each time point. After improving the final file with all the family and individual information, I retrieved a sample of men and conducted several sample selection processes described in Chapters 5 and 6. The last sample which I retrieved for Chapter 6 consisted of 108,223 observations of 19,968 men who were aged 16 years or older and participated at least once in RLMS in 1994-2016.

3.6 Follow-up and attrition in RLMS

Having discussed the sampling frame and response patterns of the RLMS cross-sectional sample in Section 3.2, it is important to pay attention to the features of the longitudinal (panel) sample in the dataset, which was constructed in the previous section. The followed-up households and individuals in the panel sample can still represent the population, if they remain in the addresses from which they were originally drawn. However, those households which move to another address become a part of the unrepresentative followed-up sample of RLMS. Therefore, researchers need to be careful in interpretations of their results at the population level, when analysing the panel sample of the survey.

Several features of the survey design have implications for the observation of changes in men's living arrangements and household members in this thesis. First, the definition of a household as a group 'sharing income and expenditures' in RLMS implies that there can be more than one household residing in the same address (or dwelling). Second, the data construction does not allow to have unique household identifiers due to the dynamic nature of households and the survey's focus on dwellings rather than households (RLMS-HSE, 2018c). For instance, if one household changes address, the survey would interview a new household which moved into the originally observed dwelling and assign the same household number the previous household used to have. RLMS assigns a new household number to those households which moved out from the sampled dwelling, including those households which have been 'created' through a household splitting. Importantly, RLMS follows-up only those households which move within the same region they have been sampled from. These data limitations do not allow for observing residential relocations of men and their younger or older generations over time.

One could argue whether RLMS has a 'true' panel, because the survey started to follow-up households which moved to another address in 1996. Moreover, the RLMS was not conducted in 1997 and 1999. This could lead to a misinterpretation of changes in men's health whilst missing the information on living arrangements and a lagged health status of both men and their household members (e.g. older generation's health considered in Chapter 5). However, we can assume that having a long period of more than twenty years analysed in this thesis will minimise the potential bias from the absent records on moved or separated households (1994 – 1995) or health (1997, 1999). Moreover, the individual attrition rates did not significantly change in 1996 – 1998 and 1998 – 2000 in comparison to 1994 – 1995 and 1995 – 1996 periods of the survey, staying at the level of 5% (Denisova, 2010).

When analysing panels, it is crucial to account for the possibility of attrition to differ by the participants' characteristics (therefore, be non-random) (Alderman et al., 2001). Attrition in RLMS

is not random in relation to demographic, health and socio-economic factors (Gerry and Papadopoulos, 2015). In other words, we are likely to have biased estimates due to selection on such observables as age, gender, health, education, settlement type and region of Russia. More importantly, the following-up sample starts to be nationally unrepresentative over the three years period (Keenan et al., 2014). For this thesis, a particular concern arises about high attrition rates among men, which are two times higher than among women in the RLMS. In general, the survey is less likely to capture Russian men than women because of men's poor health and low life expectancy. However, two types of a panel attrition could have distinct patterns and be associated with different selection biases observed among men in RLMS. On the one hand, permanent attrition of men (5-10% completely lost to follow-up in each year) is more likely to be observed among men who are older, unhealthier (e.g. high blood pressure, poor self-rated health), have lower socio-economic status and live alone (Gerry and Papadopoulos, 2015). Most common reasons for permanent attrition are unwillingness to participate, difficulty to be approached (e.g. hospitalisation or moved to another address with no contact details) or death. On the other hand, temporary attrition in the panel sample (on average, 19% of adult men in each year) is associated with different causes of absence (e.g. university, army service or work) and, therefore, is more likely to occur among men who are young, living in urban areas (particularly Moscow and St Petersburg), have never been married, have higher level of education and in the top two income quintiles (*ibid*).

Having both permanent and temporary attrition could exacerbate any potential selection bias. The lack of longitudinal weights in RLMS did not allow the empirical papers in Chapters 5 and 6 to adjust the study samples for panel attrition. Although the cross-sectional weights are available for both individual- and household-levels of a given year, their application would drop anyone who left the nationally-representative sample, because their weights are assigned with a value of zero. The non-random nature of attrition in RLMS may result in an underestimation of the negative effects of living arrangements on men's health in this thesis due to higher attrition rates among unhealthy men. However, earlier studies which adjusted for other individual characteristics (Denisova, 2010; Gerry and Papadopoulos, 2015) show that health-related attrition did not have a significant effect on the overall prevalence of men's self-rated health status over time. Moreover, the empirical papers of the thesis include robustness checks on attrition and suggest little effect of attrition bias on the derived samples of men due to the lower rates of both permanent and temporary attrition among those living with a partner and younger or older generations.

Chapter 4 Paper 1: Better off living with family or alone? Men's living arrangements, partnership status and health in Russia

4.1 Abstract

Substantial research has examined the causes of premature male mortality such as heavy drinking in Russia, but few studies have investigated how living arrangements and family may be associated with health. Russia is a unique case in comparison to the Western world, with noticeably higher divorce rates and a high proportion of men living in intergenerational living arrangements (ILAs). The aim of this study is to establish whether there is a significant relationship between living arrangements, partnership status and men's health in contemporary Russia. We test whether: unpartnered men are unhealthier than partnered men; unpartnered men living alone are unhealthier than other men; among those living in ILAs, unpartnered men are the least healthy group compared to partnered men or others. We also test whether men's health differs by income quintiles within the living arrangements. Multinomial models with self-rated health as the outcome were estimated separately for each research question using Round 22 of the Russian Longitudinal Monitoring Survey (RLMS 2013-2014). Our results show that the significant relationship between men's health and living arrangements disappears after controlling for family covariates (income, residence, living space). However, we uncover a significant difference between partnered and unpartnered men living in ILAs in the highest income quintile. Given the complexity of the living arrangements in Russia, this analysis is the first step to disentangling the relationship between living arrangements and men's health. Our study points to the importance of family income and partnership status in maintaining positive health among Russian men living in ILAs. Further research needs to investigate the direction of causality.

4.2 Introduction

Premature male mortality in Russia has received a lot of attention in the social and health sciences: Russia has had one of the lowest male life expectancies compared to other post-Soviet and Western countries since the collapse of the Soviet Union (Shkolnikov et al., 2013; Shkolnikov, Cornia, et al., 1998; World Bank, 2018b). While many scholars concentrate on the contribution of unhealthy lifestyle to mortality among working-age men (Bobak et al., 2003; Leon et al., 1997,

2009, 2010; Malyutina et al., 2002), possible effects of the family structure on men's health have been missed in Russian research (Cubbins and Szaflarski, 2001; Kravchenko et al., 2015).

Many scholars have found that family structure and living conditions interlink with the health status of men together with social influences and economic opportunities (Courtenay, 2000; Ferrer et al., 2005; Koskinen et al., 2007; Lohan, 2007; Takeda et al., 2004). Russia has a unique combination of these factors, which can contribute to men's health disadvantage. During the 1990s, the country faced an economic crisis with financial problems and expensive living costs (Lane, 2011). In this period, the share of households consisting of two or more adult generations (intergenerational living arrangements, or ILAs) increased to 30% and has been remaining stable in contemporary Russia together with an increased share of adults living alone (FSSS, 2004, 2013).

Russia is a unique case in comparison to the West, with a higher proportion of men experiencing poor health and ILAs (Ovcharova and Prokofieva, 2009). We argue that living arrangements can play an important role in the health status of Russian men. The main research question of this study is whether living arrangements and partnership status are significantly associated with men's self-rated health (SRH) status in contemporary Russia. This paper presents a multinomial analysis of SRH based on three research questions, each focussing on different aspects of living arrangements in Russia:

1) *Are unpartnered men less likely to report good SRH status compared to partnered men?*
2) *Are unpartnered men living alone less likely to report good SRH status compared to all other men?*
3) *Are unpartnered men living in ILAs less likely to report good SRH status compared to partnered men living in ILAs and compared to all other men?*

To disentangle the basic relationship between men's health and living arrangements, we use cross-sectional data from the Russian nationally-representative survey (RLMS, 2013-2014), while acknowledging the potential for selection effects (introduced in Chapter 2).

4.3 Background

4.3.1 Family and health

Family is one of the most important determinants of men's health: family members can provide emotional and instrumental support for men and affect their health behaviours through social control (Lohan, 2007; Umberson, 1987; Umberson, Crosnoe, et al., 2010). The majority of studies

on family structure and the health of adults show a significant contribution of family to men's health (Ferrer et al., 2005; O'Flaherty et al., 2016; Takeda et al., 2004; Turagabeci et al., 2007). Nevertheless, some scholars find a small impact of family structure on individual's health across the life-course (Power et al., 1998). Individuals share their life experiences within a family, whereby multiple socio-economic disadvantages can accumulate over time having a negative effect on men's health behaviours and health outcomes (Shapiro and Cooney, 2007; Williams, 2003a). Flaherty et al (2016) shows that negative family trajectories (specifically, early or no family formation, disruption and high parity) over time are more closely aligned to men's poor health than with women's health. Adults at different life-stages transition to various types of living arrangements (living alone, with parents, in a nuclear family, with an adult child, etc.). In relation to social support and family-related stress, living with a partner, child, parent or grandparent as the closest relatives can influence an individual's health behaviours and increase the risk of reporting the same diseases at different life-stages due to shared environmental and risk factors (Brenn, 1997; Di Castelnuovo et al., 2009; Hippisley-Cox et al., 2002; Hippisley-Cox and Pringle, 1998). These findings highlight the importance of analysing the relationships between an individual's health and family status.

4.3.2 Russian case

One of the mechanisms operating between cumulative disadvantages in the family and ill-health is stress and a lack of social support (Umberson, Crosnoe, et al., 2010). Scholars argue that this was also the case for Russian working-age men due to the high unemployment rates in the 1990s (Cockerham, 1997; Leon and Shkolnikov, 1998; Perlman and Bobak, 2009; Pietilä and Rytkönen, 2008b). Changes in the Russian economic regime brought not only stress but also high levels of men's social exclusion within families (Ashwin and Lytkina, 2004). It is possible that this led to an increase in alcohol consumption among men who felt they were 'breadwinner failures' being unable to provide for family (Kay and Kostenko, 2006). As a result, family relationships had a significant effect on the health of both spouses in Russia in terms of their family processes in decision-making, labour participation and work-family balance (Cubbins and Szaflarski, 2001). Taken together, literature on men's health and family in Russia underlines the importance of family for men's health demonstrating that this relationship can exist in both directions.

4.3.3 Partnership status

Social sciences have widely established the protective effect of marriage and cohabitation on an individual's health (Grundy and Tomassini, 2010; Hughes and Waite, 2009; Williams et al., 2011). Several mechanisms may protect partnered adults against ill-health: marital quality (Robles et al.,

2014; Williams, 2003b), emotional support (Ross et al., 1990; Umberson, Crosnoe, et al., 2010), control of health lifestyle (Umberson, 1992a) and pooled economic resources (Waite and Gallagher, 2002). Scholars argue that this association is particularly strong for men (Ben-Shlomo et al., 1993; Gove, 1973; Killewald, 2013; Umberson, 1992a), where transitions into marriage have a significantly higher positive effect on men's health status as opposed to women (Williams and Umberson, 2004), although other studies indicate no gender difference (Williams, 2003b). Some empirical studies argue that partners tend to be the primary source of emotional support and social control of health behaviours for men even more than for women and losing a spouse is associated with a worsening health lifestyle for men (Kiecolt-Glaser and Newton, 2001; Robles and Kiecolt-Glaser, 2003; Umberson, 1992a).

Although marriage continues to be an important social institution providing social support, European marital rates are declining, primarily due to the Second Demographic Transition (SDT) being characterised by more individualistic focus on family formation and freedom of choice (see Section 2.2.1 in Chapter 2). Empirical research in the US shows that married and cohabitating couples do not statistically differ by social ties or well-being (Musick and Bumpass, 2012). In Nordic countries like Finland, both married and cohabiting men have a lower mortality rate in comparison to unpartnered men, especially among working-age men (Koskinen et al., 2007). Western literature argues that living with a partner as a couple only or with children has the most protective effect against ill-health among middle-aged men, whilst the effect is reversed for unpartnered men in other types of family structure (Hughes and Waite, 2002).

Little is known about the association between spousal support and health in Russia. In this study, we anticipate that unpartnered men are more disadvantaged in terms of their health status in comparison to partnered men in Russia. Most Russian studies on men's health do not show a significantly protective effect of living with a spouse (Bobak et al., 1998; Jukkala et al., 2008). However, other scholars find a 'monitoring' effect of wives which is positively related to men's social status in Russia (Ashwin and Isupova, 2014), where marital status together with socio-economic class plays an important protective role against premature male alcohol-related mortality (Pridemore et al., 2010). In association with unemployment, lower social class, lower educational level and less social support (McKee and Shkolnikov, 2001; Plavinski et al., 2003), unmarried Russian men were at higher risk of premature mortality even during the Soviet era (Watson, 1995). After the collapse of the Soviet Union, working-age married men were less likely to die from circulatory diseases compared to unmarried men if they were economically active and had higher education (Shkolnikov et al., 2004). These findings show the importance of partnership status for men's health in Russia, particularly taking into account their economic disadvantage. In relation to this, this paper will also investigate the effect of family income as an objective measure

of household's economic well-being on the relationship between living arrangements and men's health in Russia.

The established effect of marital transitions on individual's health can have a reverse relationship, where adults with poorer health behaviours and outcomes are more likely to stay unpartnered or transition to separation and divorce (Antonovics and Town, 2004; Manor et al., 2003; Robards et al., 2012). The health selection effect can play an important role in the distribution of men by age and household structure, where middle-aged adults living alone can be especially vulnerable to multiple partnership dissolutions in terms of their mental well-being (Demey et al., 2013, 2014). This could be explained by social selection among adults, whereby those with poor relationship skills and low socio-economic status are more likely to have multiple marital transitions and less likely to have frequent social contacts with family members (Shapiro, 2012). Previous studies on family and health show the importance of a careful interpretation of the relationship between living arrangements and men's health, where social selection can reverse the direction of causality.

4.3.4 Living alone

One of the important changes in family patterns of Western societies during the SDT was an increase in the proportion of adults living alone. For example, among young adults in some European countries, the increased popularity of one-person households was related to a rise in divorces and postponement of marriage, but was mostly pronounced among young adults of a higher social level (Hall et al., 1997). Among those countries, an increasing proportion of the older population living alone was found to be related to several factors such as economic opportunities and social norms, but possibly also the ability of older people to live separately from family members due to an overall improvement in their health status (Grundy, 2001). Here, it is important to acknowledge that both gendered preferences and selection effects could determine the decision of an individual to live alone. Studies in the UK show that young men are more likely to live with parents compared to women due to economic disadvantage (Stone et al., 2011). Moreover, they show that middle-aged men living alone are especially vulnerable in terms of socio-economic resources and health status if they are childless, low educated and economically inactive (Demey et al., 2013). Moreover, marriage plays an important role in the association between living alone and adult health. Unmarried older adults are more likely to live alone if they report better health and less long-term illnesses compared to those moving to live with others, for example (Young and Grundy, 2009).

In the 1990s, the USSR collapse postponed a shift towards a solo-living family pattern in Russia in comparison to Western countries. At the beginning of the 2000s, the proportion of one-person households started to increase from 22% in 2002 to 26% in 2010 (FSSS, 2013). However, in line with Western societies (Grundy, 2001), Russian men are almost two times less likely to live alone than women are (FSSS, 2013). Although the proportion of Russian men living alone increases with age (to 15% among men aged 65 years old and over), it still remains significantly lower in comparison to women (*ibid*). Yet, none of the Russian studies have focussed on the mechanisms operating behind the possible association between solo living and health of Russian men. Mortality studies related to living arrangements in different countries show that working-age men especially differ in their health by living arrangements compared to women, where men living alone are the most disadvantaged group in comparison to married men and unmarried men living with others (Joutsenniemi et al., 2006; Koskinen et al., 2007). A recent study of adult men in Russia and the eight other post-USSR countries shows that those middle-aged and older unpartnered men who live alone and have fewer financial resources are more likely to drink alone, report poor health and receive less social support (Stickley, Koyanagi, Roberts, et al., 2015). Hence, in our second research question we expect that unpartnered Russian men living alone are the most disadvantaged group in terms of their health status in comparison to all other men in Russia. However, we acknowledge that social selection can affect the direction of this relationship where men can live alone due to poor health or vice versa.

4.3.5 Intergenerational families

Together with the SDT, ILAs started to appear less frequently in American and Western countries. The SDT theory expects intergenerational ties to get weaker and have a smaller effect on individual's health. However, supportive relationships between younger and older generations might still have an important effect on family members' well-being (Bengtson, 2001). Many scholars point to the importance of parental support and extended family for men's health as the most important resource of social control (Robertson, 2007; Turagabeci et al., 2007). However, studies show that living in a nuclear family is more beneficial for men's health than in an extended family (Denton et al., 2004) and men's quality of life and healthy lifestyle can be worsened in lager family sizes or ILAs (Takeda et al., 2004). Therefore, in the Russian context, we would expect negative associations between ILAs and men's health, either due to health selection of unhealthy men into ILAs or due to the stress caused by the small physical household size and financial burden.

Empirical findings suggest that the relationship between intergenerational support and health differs across regions and cultures (Daatland et al, 2011). European findings show that even with

closer family ties and higher shares of ILAs, Eastern European older adults have higher levels of loneliness in comparison to the Western European countries (Gierveld et al., 2012). Intergenerational support is shaped by policies and laws provided in each country: examples could be mandatory financial support for children by other relatives if parents are unable to support them or a paid care leave to adults who have sick family members, both of which exist in Italy (Dykstra et al, 2016). Taking into account men's health disadvantage and the shortage of formal care in Russia, we would expect middle-aged and older men to rely more on intergenerational support from their younger generations through living with them in the same household. At the same time, with the increase in divorce rates and housing prices, we would also expect both single and married Russian young adults to rely more on their family networks and parental support through ILAs (Zavisca, 2012). For instance, single mothers in the US are more likely to live in a three-generational household to receive help with childcare (Pilkauskas, 2012), and single parents in Russia are not an exclusion in this case (Prokofieva, 2007; Utrata, 2015).

Two factors could mediate Russian men's health disadvantage living in intergenerational families: partnership status and family socio-economic well-being of a man. The first argument suggests that men's partnership status could interplay with both intergenerational relationships and men's likelihood to co-reside with other generations to receive more support, even though partner's support was found to provide stronger protection for psychological well-being rather than a co-resident child's support (Gierveld et al, 2012). The quality of both marital and intergenerational ties and their changes could be one of the mechanisms operating behind the relationship between ILAs and men's health, particularly in the Russian context where it is common for Russian young families with small children to co-reside with an older generation. As an example, empirical findings in the US show less cooperation in intergenerational relationships among adults who experienced union dissolution and had two or more marriages or cohabitations (Shapiro, 2012). Although studies show negative effects of divorce on both mental and physical health of adults and children, family-level socio-economic and interpersonal factors could determine the transitions to separation and explain its selection effects on health (Amato, 2010). Furthermore, partnership dissolution might have an indirect effect on health through its association with the quality of intergenerational relationships and the timing of ILAs (Shapiro and Cooney, 2007).

The second argument comes from the existence of socio-economic disparities between families in Russia, where ILAs are associated with lower educational level of family members in comparison to nuclear families and adults living alone (Prokofieva, 2007). The higher likelihood of individuals with lower socio-economic status to live in ILAs might indicate a possibility of social selection into ILAs. In addition, healthier men might be selected into union formation (Mastekaasa, 1992; Waldron et al., 1996). Both types of selection effects are important to account for when analysing

health differences by family status. Therefore, the third question of this paper focuses on Russian men's health differences by both intergenerational and spousal living arrangements. In addition, all research questions addressed by the paper are tested for the interaction between family income quintiles, living arrangements and men's self-rated health. We expect socio-economic and health advantage for men's health living with a partner in ILAs due to receiving both spousal and intergenerational support.

4.4 Data and methods

4.4.1 Analytical sample

To explore the relationship between living arrangements and men's health, we use the cross-sectional sample of Round 22 (2013-2014) of the Russian Longitudinal Monitoring Survey (RLMS). Chapter 3 describes the survey's features and data preparation for the sample extraction and analysis of this study. From 21,753 individuals within 8149 households, we sample 7,525 men who were aged 18 years and older and whose reports on partnership (whether marital or cohabiting) status matched between individual and household datasets. We consider a man as an adult if his age is 18 years or older due to the start of the official age of mandatory conscription of men in the Russian Federation. Next, we exclude 539 men whose reports on partnership status did not match between individual and household datasets (see the cross-tabulations in Table B.1 in Appendix B). From the remaining sample of 6,986 men, we exclude 85 men with missing information in the main health outcome of this study, a single question on men's current self-rated health (SRH) status. Due to the definition of minors as being aged 16 years old or younger and not being related to a man as a partner in this study, we also exclude one man who did not meet our criteria due to living with a partner aged 16 years old. For the nationally-representative analysis the final weighted sample consists of 5,168 men.[5]

Comparison of the distribution of adult men by their household structure between the RLMS 2013-2014 wave (unweighted) and the 2010 Census (FSSS, 2013) shows underrepresentation of men living alone in the survey by 1.5%. Interestingly, the share of women living alone in the survey was very close to the population level (<1% difference), suggesting that among adults living alone, men were more likely to drop out from the survey than women were. Although this study is based on the cross-sectional sample of men with similar age distribution to the population of Russia, the age distribution of men living alone was 2-5% lower in the survey in all 10-years age

[5] After applying individual post-stratified weights, the study sample lost 1,732 men due to zero p-weights. See Chapter 3 for more details on the RLMS p-weights.

groups in comparison to the census. Therefore, careful interpretation of the results in this study is required due to a possible bias from the high attrition rates in RLMS among men (Keenan et al., 2014; Gerry and Papadopoulos, 2015), particularly those living alone. However, the pattern of increases and decreases in the share of men living alone across their age groups was the same in the survey and census. Furthermore, the surveys might struggle with approaching this group of men, because men are almost three times less likely to live alone than women are, according to both the RLMS and the 2010 Census.

4.4.2 Dependent variable: self-rated health status

For the assessment of men's health in Russia, we use a measure of self-rated health (SRH) status. Previous studies recognise SRH status as an appropriate proxy for individual health, because SRH status is a strong predictor of mortality (Idler and Benyamini, 1997), use of health services (Miilunpalo et al., 1997), ill-health and well-being of adults (Bowling, 2005; Idler and Kasl, 1995; Kaplan et al., 1976). Some studies note a high level of reliability of SRH status, particularly among older men (Lundberg and Manderbacka, 1996). In the RLMS, SRH is measured using the question 'How would you evaluate your health?' with responses based on a 5-point Likert scale from 'very poor' to 'very good'. We re-construct SRH status from 5 to 3 categories due to a low proportion of men who reported 'very good' or 'very bad' SRH status (Figure B.1 in Appendix B) and because of the result of the model-selection statistics[6] based on two ordinal models using the original and recoded 'SRH status' variables. The new variable of SRH status consists of 2,895 (42%) adult men who reported 'very good/good' health status and 675 (10%) men with 'bad/very bad' health status.

4.4.3 Main independent variables: living arrangements and partnership status

To answer the three research questions in this study, we separate adult men by living arrangements and partnership status in three models as 'unpartnered vs partnered men', 'unpartnered men living alone vs all others', and 'unpartnered men living in ILAs vs partnered men living in ILAs vs all others'. The main source of information on living arrangements and partnership status is the household roster with the number of family members and types of relationships between them. All groups of men's living arrangements can include men living with at least one minor as well. In this study, we define a minor as a household member aged 16 years old or

[6] Both the Akaike information criterion (AIC) and Bayesian information criterion (BIC) point to the model with 3-categorical 'self-rated health status' as the best-fitting model (see Table B.3 in Appendix B).

younger. The definition of an intergenerational household in the study includes men who are living in the same household with at least one parent or grandparent or adult child.[7]

Table 4.1. Distribution of 5,168 men aged 18 years and over by three covariates of living arrangements in relation to three research questions, RLMS 2013-2014

Research questions	Living arrangements			
	Grouped by	Categories	N	%, weighted
Are unpartnered men less likely to report good health status compared to partnered men?	Partnership status	Unpartnered	1,394	28.2
		Partnered	3,774	71.8
Are unpartnered men living alone less likely to report good health status compared to all other men?	Unpartnered living alone or not	Yes	265	5.0
		No (others)	4,903	95.0
Are unpartnered men living in ILAs less likely to report good health status compared to partnered men living in ILAs and compared to all other men?	Living in an intergenera-tional household or not	Yes, unpartnered	1,039	21.5
		Yes, partnered	1,377	26.4
		No (others)	2,752	52.2

Table 4.1 shows the descriptive statistics for each of three research questions. In the RLMS 2013-2014 as well as on the population level of Russia, the proportion of partnered adult men is twice as large as the proportion of unpartnered men. Only 5% of adult men are living alone and have no partner (can live with minors aged 16 years old or younger). Almost half of adult men are living in ILAs, among whom about 45% of men are unpartnered. In other words, one fifth of adult men in Russia are living without a partner in ILAs (21.5%), whereas more than a quarter of men are living with a partner in ILAs (26.4%).

4.4.4 Additional covariates

In this study of the association between men's health and living arrangements in Russia, we control for both individual (demographic and socio-economic) and household (family and residential) characteristics. Based on previous studies, we assume that demographic (age, nationality, and previous marital status), socio-economic (education, economic activity, and army service), and family and residential (region, settlement type, income quintile, number of minors, and physical household size) characteristics of men in Russia could potentially mediate or

[7] 1) We do not distinguish between biological- and step-parents/ grandparents/ children due to a very low count of the latter relationships; 2) in this empirical paper of the thesis, we do not count parents-in-law or children-in-law in the definition of an intergenerational household.

confound the association between men's health and living arrangements. The details on the original and merged independent variables of this study are described in Table B.5 of Appendix B.

Demographic characteristics: age of men was controlled for as a continuous covariate (distribution presented in Appendix B, Figure B.2) together with its quadratic term. Men's nationality is represented by a dichotomous variable with categories of being Russian or another nationality. Another dichotomous variable describes whether each man has ever been previously married, where two categories of 'never married' and 'first marriage' marital statuses are merged into a new category of men who 'have never been previously married'; other four categories of marital status ('second marriage', 'divorced', 'widower' and 'married, but do not live together') are merged in the second category 'have been previously married'.

Socio-economic characteristics: to avoid low counts in original categories, the covariate of the highest educational level is reduced from twelve to six categories. Four categories are kept unmerged, which are 'general or incomplete secondary school (SS)', 'complete SS', 'professional courses (of driving, tractor driving, accounting, typing, etc.)', and 'college/training school'. Two categories of 'vocational training school (VTS) without secondary education (SE)' and 'VTS with SE, technical trade school (TTS)' are merged together as a new category of 'VTS with or without SE / TTS'. A new category of 'higher education' is defined by merging together categories related to the educational level of an institute, university or academy including men with a 'Specialist Diploma' and less than 1% in each category of a 'Bachelor's degree', 'Master's degree', 'Post-Graduate course, residency', 'PhD degree' and 'Doctoral degree'. Men's economic activity status is based on the question about an individual's primary work at present and indicates those men who were 'currently working' and 'currently not working or on (un)paid leave' (34%). A dichotomous question 'Have you been in mandatory army service?' with answers 'yes' and 'no' indicates that 60% of adult men from the study sample have already served in the army in Russia.

Family characteristics: for the purposes of analysis, several regions of Russia are merged together based on the similarities of some regions by the distribution of self-rated health status and family income quintiles of adult men in the study sample (see Figures B.3 and B.4 in Appendix B). Five geographical regions of Russia are presented in this study: Moscow and St. Petersburg (10%), Central, North and North-West (24%), Volga and Ural (32%), North Caucasus (15%), and Siberia and Far East (19%). In addition to geographical regions, a three-categorical variable of settlement types divides men by 'urban', 'pgt' ('poselok gorodskogo tipa', meaning a town with a population size falling between urban and rural criteria) and 'rural' areas of Russia. We classify adult men by their family income 'What was the monetary income of your entire family in the last 30 days?' including all the types of income (e.g. wage, pension, incidental earnings, etc.). We apply the

OECD (Organisation for Economic Co-operation and Development)-modified scale to our sample calculating family income per capita. Then, we divide the sample in quintiles (Hagenaars et al., 1996), where the household head (in our study, one adult man) is assigned with a value of 1, any additional family member – with a value of 0.5 and each child (in this study, a minor) – a value of 0.3. Physical household size is the number of family members (including adult men) divided by the total number of living rooms in a dwelling (excluding kitchen, bathroom, etc.). We categorise the calculated variable into 'undercrowded/normal' and 'overcrowded' physical household sizes if the value of the variable is less/equal or higher than '1', respectively. We consider any family member (relative or not, except a partner) as a minor if he/she is aged 16 years old or less and lives in the same household together with an adult man from our final sample.[8] Using the household information on the relationship types and age of family members, we divide men by those who have 'no minors' (55%), '1 minor' (28%) and '2 or more minors' (17%).

4.4.5 Methodology

Researchers use a measure of self-rated health (SRH) status either as a dichotomous, categorical or continuous variable in statistical analysis. Although there are more scholars who find it practical to analyse SRH status as a binary variable, as is common with research using RLMS data (e.g. Perlman and Bobak, 2008; Rusinova and Safronov, 2013), there is an evidence that dichotomizing SRH results is associated with a loss of efficiency and information on health (Manor et al, 2000). In our sample, SRH status did not meet the criteria of a proportionality assumption (see Table B.4 in Appendix B). Hence, we apply a multinomial logistic regression model with 95% confidence intervals separately for three research questions of this study. The likelihood of reporting 'bad/very bad' or 'good/very good' health status versus 'average' (reference) category was predicted in several steps by including a series of demographic, socio-economic and family covariates. To control for residual confounding obscuring the association between self-rated health status and living arrangements, we adjust for the additional covariates using a stepwise technique interpreting the results with an extra care.

We apply a Chi-square test in the descriptive analysis of the univariate tabulations between SRH status and independent variables to test for significance. To account for clustering of adult men within households in our sample, we estimate robust standard errors using the 'vse(cluster)' option in the command of multinomial regression modelling 'mlogit' in Stata13 (StataCorp, 2013).

[8] Although we consider men as adults if they are aged 18 years old or over, we do not apply the same rule for their family members to avoid any misreports due to the inclusion of two adult men with a partner aged between 17 and 18 years old in our final sample.

To generalise the results of this study to the population level, we apply post-stratified weights to account for the sampling design of the RLMS (see more details in Chapter 3).

Under the missing at random (MAR) assumption, we apply the multiple imputation (MI) procedure using chained equations (White et al., 2011) for the missing values in the 'family income quintiles' covariate (4%), as well as in the covariates of nationality, education, economic activity, army service and physical household size (all less than 1%).[9] We use the 'mi impute chained' command in Stata13 (StataCorp, 2013).[10] In MI chained equations, Rubin's rules require the assumption of asymptotic normality to be met (White et al., 2010), which is implied in the regression analysis based on categorical variables in this study. MI is an important procedure to test whether there is a reduction of the estimates' power in modelling the relationship between SRH status and living arrangements when all missing values are excluded from the study sample. In general, the purpose of implementing the MI procedure was reinforced by biased estimates in the association between living arrangements and self-rated health when all the missing values were excluded in the sample in comparison to MI results.

4.5 Results

4.5.1 Descriptive statistics

Our aim was to assess whether men's self-rated health (SRH) status in Russia would differ by their partnership status, living alone status, and living in ILAs by partnership status. Overall, weighted cross-tabulations between SRH status and living arrangements in Table 4.2 show that more than a half of unpartnered men in Russia were likely to report 'good/very good' SRH status (52.1%) with almost the same figure for partnered men reporting 'average' SRH status (51.3%).

[9] The health outcome of self-rated health status and all of the complete covariates were used in the MI equation (age as a logistic function to avoid right-skewedness, previous marital status, geographical region, settlement type and number of minors). Covariates of living arrangements were also included as predictors in the MI models respectively to three research questions of the study. The decision to impute missing values in three separate models in relation to each of three hypotheses was to avoid high level of incompatibility of the MI and analyses models (White et al, 2011) due to different covariates of living arrangements. To allow the relationships between other variables to vary between the groups of interaction terms (White et al, 2011), the MI model for the third research question included the condition of interaction between living arrangements and family wealth quintiles.

[10] Fifty imputations were applied due to low values of the Monte Carlo (MC) errors ('mcerror' option) in comparison to the results based on a number of imputations lower than fifty. For justification of the appropriate level of MC errors for choosing the best model-fitting number of imputations with smaller variation due to the random component, this study followed the guidelines by White et al (2011).

Table 4.2. The distribution of self-rated health status by living arrangements for 5,168 men aged 18 years and over, RLMS 2013-2014, weighted %

Living Arrangements	Self-Rated Health (SRH) status			Total	
	Very bad/bad, %	Average, %	Good/very good, %	N	%
Partnership status					
Unpartnered	*9.3*	*38.5*	*52.1*	**1,720**	*100*
Partnered	*10.0*	*51.3*	*38.7*	**5,180**	*100*
Unpartnered living alone status					
Yes	*20.2*	*47.5*	*32.3*	**265**	*100*
No (others)	*9.3*	*47.7*	*43.0*	**4,903**	*100*
Living in intergenerational households and partnership status					
Yes, unpartnered	*6.1*	*36.4*	*57.5*	**1,039**	*100*
Yes, partnered	*9.8*	*51.8*	*38.4*	**1,377**	*100*
No (others)	*11.4*	*50.3*	*38.3*	**2,752**	*100*
Total	***9.8***	***47.7***	***42.5***	**5,168**	***100***

Note: all three variables of living arrangements are significantly associated with SRH status at the 0.001 significance level.

Unpartnered men living alone were two times more likely to report 'very bad/bad' SRH status in comparison to men from other types of living arrangements (20.2% compared to 9.3% respectively); however, unpartnered men living alone did not differ from other men in the percentage reporting 'average' SRH status (47.5% and 47.7%, respectively). Living in an intergenerational household, more than half of unpartnered men were likely to report 'good/very good' SRH status (57.5%), which was around 20% points higher in comparison to partnered men (38.4%) living in ILAs and those men living in other types of households (38.3%).

Table B.6 in Appendix B shows the significant univariate associations of men's SRH status with all covariates including the missing values. Confirming the decrease in men's health status with age, middle-aged and older men in Russia had a similar pattern of reporting the 'average' health status (58-59%). By nationality, Russian men were less likely to report 'good/very good' health status in comparison to other men of other nationalities (10% points difference), but both nationality groups had the same percentage of reporting the worst health status (10%). Men who have never been previously married were associated with better health status among men in Russia, where previously married men were almost twice as likely to report the worst health status. Interestingly, more than 42% in both groups of men with a lower education (general, incomplete or complete SS) and higher education (technical training school, college or higher) were more likely to report 'good/very good' health status. Being economically active was associated with a 7 times lower likelihood of reporting 'very bad/bad' health status among men in Russia. Men who

had never served in the army were the most likely group to report 'good/very good' health status. Men from North Caucasus tended to be the healthiest group across other regions in Russia, where men had almost the same likelihood of reporting the worst health status. Men living in the PGT settlement type were 10% points more likely to report 'good/very good' health status in comparison to both urban and rural areas which had almost the same pattern of reporting SRH status. Men with 'good/very good' health status tend to fall within the fourth and fifth income quintiles in Russia, but also surprisingly the lowest (1st) income quintile. Having at least one minor in the household was associated with better SRH status among men in Russia. In contrast to our expectations, living in overcrowded dwellings was associated with better SRH status among adult men in Russia.

4.5.2 Multinomial regression models

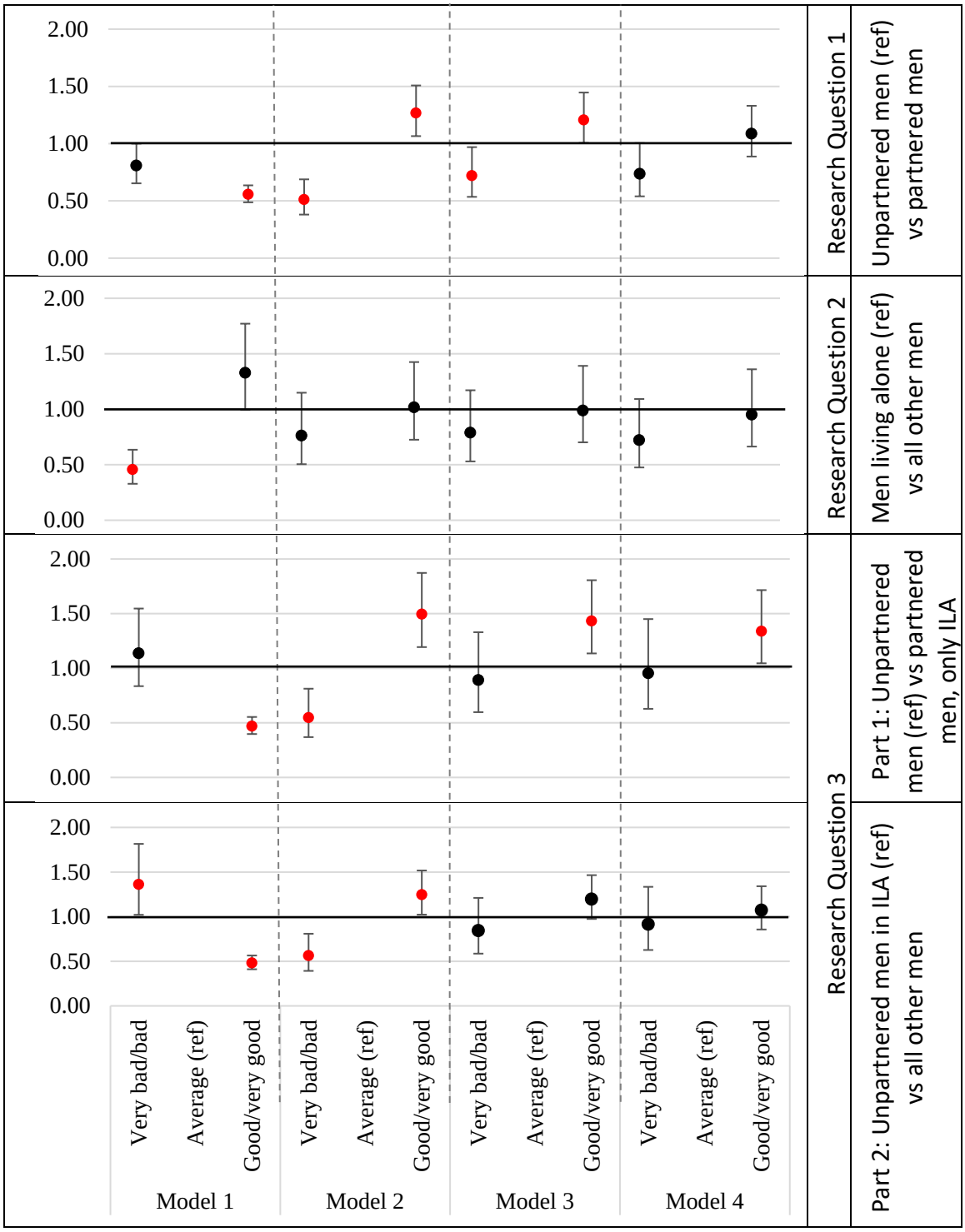
Health, partnership status and living arrangements

To analyse the relationship between men's self-rated health (SRH) status and living arrangements in Russia, we conducted a multinomial regression model based on multiple imputation (MI) separately for each of three research questions. The results of MI regression models are presented in Table B.7 in Appendix B (see the comparison between the complete-case and MI models in Table B.8).

Figure 4.1 presents the prevalence ratios of reporting worse or better health status in comparison to the 'average' SRH status among adult men in Russia. In general, baseline multinomial models of the bivariate relationship between living arrangements and self-rated health (Model 1) for each research question show that adult men in Russia significantly differ by their living arrangements and partnership status in reporting of their self-rated health status.

For the first research question, the results of Model 1 show that partnered men are significantly less likely to report 'good/very good' and 'bad/very bad' health statuses (versus 'average') than unpartnered men at the 99% and 90% significance levels, respectively. For the second research question, unpartnered men living alone are significantly less likely to report 'very bad/bad' health status and more likely to report 'good/very good' health status (both versus 'average') than other men at the 99% and 90% significance levels, respectively (Model 1). For the third research question, partnered men living in ILAs and other men (from other types of living arrangements) are significantly less likely to report 'good/very good' health status (versus 'average') compared to unpartnered men living in ILAs at the 99% significance level (Model 1). In addition, other men are significantly more likely to report 'bad/very bad' health status (versus 'average') compared to unpartnered men in ILAs at the 95% significance level in Model 1.

Figure 4.1. Multinomial Logistic Regression based on multiply imputed (MI) data, prevalence ratios of Self-Rated Health status with 95% confidence intervals, RLMS 2013-2014, weighted and clustered within household sample of 5,168 adult men



1) Significant PR are in red colour ($p < 0.05$);
2) Nested models are the next:
   - Model 1 = bivariate model (only living arrangements);
   - Model 2 = M1 + demographic characteristics (age, nationality, previous marital status);
   - Model 3 = M2 + socio-economic characteristics (education, economic activity, army service);
   - Model 4 = M3 + family and residential characteristics (geographical region, settlement type, income quintile, number of minor children in a household, physical household size).

3) Full results are presented in Tables B.7 – B.9 of Appendix B.

After controlling for demographic covariates of age, nationality and previous marital status (Model 2), the significance of the association between self-rated health status and living arrangements disappears between unpartnered men living alone and others in the second research question. In the first and third research questions, adjusting for demographic characteristics makes the 95% confidence intervals smaller showing the significant difference between unpartnered and partnered men in the probability of reporting 'bad/very bad' health status (versus 'average') at the 99% significance level. In addition, due to the inclusion of age the direction of the significant association in reporting 'good/very good' health status reverses from negative to positive in the models for the first and third research questions.

Additional adjustment for socio-economic covariates (education, economic activity and army service) in Model 3 changes the pattern of association in both research questions (but insignificance remains in the second research question). Firstly, prevalence ratios (PRs) of reporting 'bad/very bad' or 'good/very good' versus 'average' health status tend towards the value of 1.0 in both cases for partnered men in comparison to unpartnered men in general (research question 1) and particularly living in ILAs (research question 3). Model 3 for the first research question still indicates that partnered men are significantly less likely to report 'bad/very bad' versus 'average' health status in comparison to unpartnered men, but the level of significance changes from 99% to 95% and the PR attenuates from 0.5 to 0.7. In relation to the PR of reporting 'good/very good' versus 'average' health status among partnered versus unpartnered men, the 95% confidence intervals widen and partnered men are significantly more likely to report better than average health status only at the 90% significance level. For partnered men living in ILAs, the PR of reporting 'good/very good' versus 'average' health status remains at 1.4 (was 1.5 in Model 2) with 99% significance level. However, controlling for both demographic and socioeconomic covariates eliminates the significance ($p>0.1$) of the difference between unpartnered living in ILAs and other men (none-ILA) in reporting both categories of self-rated health status.

Adjusting for family characteristics (geographical region, settlement type, income quintile, physical household size and number of minors) together with demographic and socio-economic covariates eliminates the significance of the association between living arrangements and self-rated health status of men in Russia at the 95% level in the first and second research questions and partially in the third research question (Model 4). Within ILAs only, partnered men remain significantly more likely (PR=1.3) to report 'good/very good' versus 'average' self-rated health status in comparison to unpartnered men with the 95% significance level in the third research question.

Health and other covariates

Full results of multinomial logistic regression models with covariates are presented in Table B.9 of Appendix B. In the fully-adjusted and multiply imputed models for each research question (Model 4), adult men's health differs significantly by age, nationality, education, economic activity, army service, geographical regions, settlement types, family income quintiles and the number of minors in households at the 95% significance level. Two covariates indicating the status of being previously married and a physical household size are not significantly associated with self-rated health of adult men in Russia in all models of three research questions. To summarise, 'bad/very bad' health status of adult men in Russia is associated with being older, having the lowest education level (general or incomplete), economically inactive, have never being in army, living in urban area and having no minors in a household. As for 'good/very good' health status, reporting better than 'average' health status for adult men in Russia is associated with being younger, being of another than Russian nationality, having lower educational level, attending an army, living in North Caucasus, in PGT or rural settlement types as well as being in the 4th or 5th (highest) income quintiles.

Interaction terms

Additional tests of the interactions between age and living arrangements were carried out for each research question, where none of the interaction terms were statistically significant (Table B.10, Appendix B). A sensitivity analysis was performed to investigate a different categorisation of living arrangements as a single covariate of interest with an interaction term with age revealing no significant differences (Appendix B.2). Interaction terms between living arrangements and family income quintiles were also included in Model 5 with an aim to find a difference in the relationship between men's self-rated health status and living arrangements across five income quintiles. Results show that interactions between living arrangements and family income quintiles are significant only in the third research question (Table B.11, Appendix B), where the effect of family income on self-rated health status is significantly different at the 95% level between those unpartnered and partnered men who live in ILAs and are from the 5th (highest) quintile. In other words, the effect of being in the 5th (highest) income quintile for partnered men is 2.6 times that for unpartnered men in reporting 'good/very good' versus 'average' self-rated health status (p-value=0.013) among men living in intergenerational families.

4.6 Discussion

Few studies have investigated how the complexity of living arrangements may affect men's health in Russia, where most studies have focussed only on health differences by partnership status

(Grundy et al., 2017) or the quality of relationships in the family (Kravchenko et al., 2015). Following the social support exchange theory (introduced in Chapter 2), we argue that both living arrangements and partnership status can play an important role in the health of Russian men. This study investigated three research questions in relation to this argument. First, we tested whether unpartnered men have a higher risk of reporting poor self-rated health (SRH) status than partnered men. Second, we tested whether unpartnered men living alone report to be less healthy than men having other living arrangements. Finally, we tested if living in ILAs (with parents/grandparents/adult children) is associated with poorer SRH status for unpartnered men than those living with a partner in ILAs or other men. We focus on Russia due to its unique case in terms of men's health and living arrangements in comparison to the West. With one of the lowest life expectancies in Europe, Russian men face high rates in union dissolution and ILAs, often in very small spaces (Prokofieva, 2007; Zavisca, 2012). This leads us to question whether unpartnered men in Russia would be better off living in ILAs or living alone.

Using the subjective measure of SRH status from the RLMS (2013-2014), we estimated four nested multinomial logistic regression models separately for each research question. In general, the comparison between unadjusted and adjusted results in this study show that the relationship between men's health, living arrangements and partnership status disappears after controlling for individual socio-demographic and household-level covariates. However, the importance of partnership status within ILAs for men's health remains statistically significant at the 5% level. Moreover, inclusion of interactions between household income quintiles and living arrangements shows that the association between partnership status and health is stronger among men living in ILAs with the highest income quintile.

According to the social support exchange theory, adults are expected to be better off living with a partner (Grundy and Tomassini, 2010; Hughes and Waite, 2009; Williams et al., 2011). In Russia, previous studies on the link between partnership (e.g. marital) status and various measures of men's health provide contrasting results. On the one hand, studies show that men's marital status is not significantly associated with their SRH status *per se*, after accounting for other socio-demographic factors (Bobak et al., 1998, 2000; Cockerham, 1999). On the other hand, scholars find that physical functioning is significantly poorer among unpartnered and divorced Russian men (Bobak et al, 1998). In addition, mortality-related studies in Russia show that the risk of death among working-age men differs significantly by educational level, income and marital status when fully-adjusted for (Cockerham, 2000; Pridemore et al., 2010; Pridemore and Shkolnikov, 2004; Shkolnikov, Cornia, et al., 1998). Moreover, some studies show that these findings might apply to both groups of married and cohabiting men (Ferlander and Mäkinen, 2009; Pridemore et al., 2010). Focussing on the SRH status throughout this study, multinomial

models from the first research question suggest that household-level characteristics explain the health difference between partnered and unpartnered men. Our finding contradicts the support exchange hypothesis and suggests a potential selection effect for partnership status on men's health in Russia.

Western studies have shown that unpartnered men living alone are at the highest risk of being unhealthy in comparison to other groups (Grundy, 2001; Koskinen et al., 2007; Sun et al., 2011; Young and Grundy, 2009). In this study based in Russia, the results for the second research question do not support the expectations from the literature (*ibid*), because there were no health differences between unpartnered men living alone and other men. The significant bivariate association between poor SRH status and living alone without a partner status disappears after controlling for men's demographic characteristics. Studies suggest that the poorer health of unpartnered men living alone in comparison to other men could be related to their socio-demographic factors and life-course stages, such as being unemployed, divorced or middle-aged (Demey et al., 2013, 2014). At the same time, the UK based studies show that being older and living alone is associated for adults with better health (Grundy, 2001; Young and Grundy, 2009). The results in our study suggest that demographic disparities in age, nationality and partnership history could explain the risk of reporting poor health status among unpartnered men living alone in Russia.

Previous studies in Japan have shown that living with parents or adult children is associated with better health outcomes (Takeda et al., 2004; Turagabeci et al., 2007), but little is known about the protective health effects of a partnership status within ILAs. Our first finding for the third research question contradicts the previous literature on the health benefits of ILAs through the social support and control (*ibid*), suggesting that the association for ILAs might be an artefact of selection. We find no health differences between unpartnered men living in ILAs and men from other living arrangements, once we account for their socio-economic characteristics. In the Russian case, selection into unpartnered living in an ILA is potentially related to men's socio-economic status due to an educational disadvantage among adults living in ILAs in comparison to those in other living arrangements (Prokofieva, 2007). In turn, low socio-economic status is persistently associated with poorer SRH status and lower life expectancy in Russia (Bobak et al., 1998; Nicholson et al., 2005; Perlman and Bobak, 2008b). However, our second finding supports the ongoing debate on the protective effect of a partnership status (Ross et al., 1990; Umberson, 1992a; Waite and Gallagher, 2002; Williams and Umberson, 2004), but only when focussing on men living in an ILA, unlike our results for the first research question. Within ILAs, we find that unpartnered men are the most disadvantaged group in terms of their SRH status in comparison to partnered men, net of socio-demographic and family-level factors. The comparison of these two

findings suggests that partnership status might be more important for health among men living in ILAs rather than the ILA status on its own.

To our knowledge, this study is the first in Russia to attempt to estimate the effect of living arrangements on the established relationship between men's health and household income. After applying interaction terms, the results uncover the strongest health difference between partnered and unpartnered men living in ILAs with the highest income quintile. Previous Russian studies underline a strong association between family income and SRH status, particularly among men (Bobak et al., 1998; Perlman and Bobak, 2008b). In addition, both economic satisfaction and income in Russian families are significantly associated with the quality of family ties and men's SRH status (Cubbins and Szaflarski, 2001; Kravchenko et al., 2015). Although we were not able to control for the quality of relationships and level of social support, the results on the interaction between living arrangements and family income support this argument (*ibid*). Our study contributes to the social support exchange theory suggesting that both a high family income and partner's support when living in ILAs can protect men against poor health.

It is important to note several points on the careful interpretation of the results in this study. Health-related selection effects can play an important role in the direction of association between living arrangements and SRH of men in Russia. It may be that Russian men with poor health are less likely to have a partner (Mastekaasa, 1992; Waldron et al., 1996), and more likely to live in families with low socio-economic status continuing to seek help through ILAs (Prokofieva, 2007; Zavisca, 2012). Previous longitudinal studies from Europe and the US show that changes in living arrangements can play an important role in improvement or deterioration of adult physical and mental health among men (Joutsenniemi et al., 2006; Khlat et al., 2014; Meadows, 2009). At the same time, previous research has explored the possibility of reverse causality finding a significant effect of changes in adults' health status on their transitions across different forms of living arrangements (Brown et al., 2002; Martikainen et al., 2008; Mutchler and Burr, 1991; Sarma et al., 2009; Sarma and Simpson, 2007). As we base our study on cross-sectional data (RLMS 2013-2014), we were unable to explore a causal association between SRH and living arrangements of men in Russia. This will be explored further in Chapter 5 and Chapter 6.

Secondly, other covariates unobserved in this study could mediate the relationship between living arrangements and men's health, such as drinking behaviour. As an example, studies show that unpartnered men living alone in Russia are at higher risk of solitary drinking than men from other types of living arrangements if they have poor health status and bad financial situation (Murphy et al., 2012; Stickley, Koyanagi, Roberts, et al., 2015). Another study in Russia shows that living with a partner is associated with lower risk of alcohol-related male mortality after account for the

socio-economic status of men (Pridemore et al., 2010). Moreover, qualitative research in Russia shows that the spouse and other family members play an important and positive role in the social control of drinking among men (Keenan et al., 2015, 2017). At the same time, other studies in Russia find no protective effect of partnership status on male binge drinking (Jukkala et al., 2008). Furthermore, complex ILAs could be a burden for men, as previous Japanese studies have shown a negative relationship between men's health behaviours and living with both older parents and adult children (Takeda et al., 2004). Further research on the importance of family for men's health in Russia should consider the established negative relationship between their hazardous drinking and health outcomes, where the association could be particularly strong for mental health (Dissing et al., 2013).

Another important limitation of this study is the inability to show the variation of men's SRH status by their living arrangements over the life-course. In the analysis of this paper, the RLMS data could not be stretched enough to apply the life-course approach and show a significant effect of the interactions between living arrangements and life-course stages on self-rated health of men in Russia (see Appendix B.2 for more information). Previous studies show that Russian men are particularly vulnerable in terms of poor health and premature alcohol-related mortality if they are middle-aged (Cockerham, 2000; Hu et al., 2016; Perlman and Bobak, 2008a; Pridemore et al., 2010; Stickley, Koyanagi, Roberts, et al., 2015). In addition, a life-course study of SRH status in Russia confirmed the cumulative effect of earlier socio-economic disadvantages on men's health later in life (Nicholson et al., 2005). At the same time, some life-course studies based in other contexts like the UK show insignificant differences in men's SRH status by their family structure in the beginning of their mid-life (Power et al., 1998). Such contradictory findings between the contexts and a lack of the life-course research in Russia highlight the importance of exploring the dynamic and complex relationship between men's health and living arrangements over the life-course, which will be assessed in Chapter 5 and Chapter 6.

The results in this study need to be generalised on the population level with caution. Previous studies established that attrition in the panel sample of the RLMS survey has a non-random pattern with higher risks of dropping out among young men and those living in urban areas, with poor health, being unmarried with low education and drinkers (Gerry and Papadopoulos, 2015; Keenan et al., 2014). At the same time, earlier research by Perlman and Bobak (1998) shows that the distributions of male mortality rates in RLMS are similar to national figures if to analyse adults aged 18 years and older. Although the distribution of adult men by household size in our study sample is similar to the 2010 Census in Russia (FSSS, 2013), the interpretation of the results needs to be careful due to possible biases in the analysis based on associations between attrition, SRH, demographic and socio-economic characteristics. In addition, the results can be biased due to the

subjective nature of the reports on health status sensitive to cultural expectations and personal experiences (O'Donnell and Propper, 1991; Sen, 2002). Overall, the association between living arrangements, partnership status and men's health in Russia could be potentially established using the objective health outcomes such as death rates or medication use, as shown in other countries (Koskinen et al., 2007; Pulkki-Råback et al., 2012). At the same time, one longitudinal study in the Russian context based on the same survey used in this paper (RLMS) confirms the strong association between men's SRH status and mortality (Perlman and Bobak, 2008b). In addition, potential biases due to the missingness pattern and the reduction of the estimates' power in this study are reduced by conducting the multiple imputation procedure, the results of which suggest that the pattern of missing values in the RLMS survey is not random by living arrangements in the association with SRH of men.

Previous Western and Asian studies have shown that various living arrangements are associated with psychological well-being, physical health and mortality rates among men (Takeda et al., 2004; Turagabeci et al., 2007), especially by partnership status (Joutsenniemi et al., 2006, 2007; Koskinen et al., 2007). Focussing on men's SRH, our results contribute to the literature from two perspectives. From the perspective of selection health effects, our findings show that selection processes could explain the health disadvantage among unpartnered Russian men, particularly those living alone or in ILAs in comparison to men in other living arrangements. In Russia, it may be that men from low socio-economic class are more likely to be unpartnered living in an ILA and report poor health. From the perspective of protective health effects, our study reveals significant health differences between men living in an ILA by their partnership status. The combination of both partnership and ILA statuses in our study suggests that living with a partner is an important determinant of SRH of those men who live in ILAs, particularly within the highest family income quintile. ILA is often associated with caregiving or financial support to other generations (Lai, 2012; Pruchno et al., 1993), which, in turn, can be associated with stress and worsen health (Berg-Weger et al., 2000; Pinquart and Sörensen, 2003, 2007). Receiving partner's support and control when living with other generations could buffer against stress and unhealthy behaviours, therefore explaining the protective effect of living with a partner in an ILA on men's health. Nevertheless, our study demonstrates that men's health differences are more likely to be related to individual- and family-level determinants than living arrangements or partnership status in isolation. Furthermore, our finding that the effect of partnership status on health within ILAs appears to be stronger for the wealthiest men needs further investigation. Future research should explore potential mechanisms that might explain the health disadvantage of unpartnered men living in ILAs in Russia, particularly the role of economic status.

Chapter 5 Paper 2: Men's health and co-residence with older generations in Russia: Better or worse?

5.1 Abstract

Previous studies on the link between intergenerational living arrangements (ILAs) and health find both negative and positive relationships. However, it is unclear whether there is a health-protective or health-damaging effect of ILA because of the possibility that selection effects underlie what could be interpreted as a causal effect. Logistic regression analysis of self-rated health status was conducted for 11,546 men pooled from the RLMS data who participated in at least two waves over 1994-2015. Cross-sectional approach was applied to compare the results to the previous studies, whereas fixed-effect approach was used to control for unobserved heterogeneity of ILA effect on men's health. We expand previous cross-sectional findings on a significant relationship between ILA and health confirming a statistically significant health effect of ILA over time. Moreover, we show that the influence of ILA on health of men as adult children depends on the health status of co-residing older generations. We find a negative health effect of a presence of an unhealthy older generation in a household for male adult children. The approach of this study shows the need for disentangling selection and causal effects to clarify the relationship between ILA and health. To prevent the deterioration of health for those who co-reside with an older generation, our study underlines the importance of considering how policies that are related to health and ageing influence intergenerational co-residence.

5.2 Introduction

A shared household between younger and older generations, defined as intergenerational living arrangements (henceforth ILAs), has the potential to meet diverse needs. By pooling resources, human, social, physical and economic capital could potentially be maximized and improve the well-being of individuals (Rossi and Rossi, 1990). Previous cross-sectional studies on the link between co-residence with older generations and health find both negative and positive relationships. Sharing a living space with parents can increase the risk of physical and mental health problems, which can be associated with stress from informal caregiving and multiple social roles (Barnett, 2015; Bauer and Sousa-Poza, 2015; Berg-Weger et al., 2000; Copp et al., 2015; Ikeda et al., 2009; Oshio, 2014, 2015; Pearlin et al., 2005; Pinquart and Sörensen, 2007, 2003, 2004). Moreover, studies on informal caregiver's health indicate that co-residence with those in need of care is one of the strongest predictors of physical health more than mental health due to

shared health-related habits in a household (Pinquart and Sörensen, 2007). However, other studies proposing that co-residing with parents can be beneficial for adult children's health have argued that this living arrangement may curb unhealthy behaviors, which prevents heart disease (Takeda et al., 2004; Turagabeci et al., 2007). Parental coping strategies, quality of relationships with adult children, social support and control can buffer against adult children's ill-health by preventing unhealthy lifestyle and boosting well-being (House et al., 1988; Umberson, 1992b; Umberson, Crosnoe, et al., 2010), particularly when co-residing together (Pruchno et al., 1997; Takeda et al., 2004; Turagabeci et al., 2007).

Whether there is indeed a beneficial effect of co-residing with older generations has been a subject of interest to social scientists from multiple disciplines. Although the relationship between ILA and health has been explored in various contexts already, it is unclear whether a relationship is due to factors that brought about the ILA or consequences of the ILA. In other words, we cannot conclude whether there is a health-protective or health-damaging effect of ILA because of the possibility that selection effects underlie what could be interpreted as a causal effect.

Previous studies suggest an interdependency between younger and older generations related to resources and needs over the life-course, which often drives the decision to move into or out of ILA (Choi, 2003; Li and Huang, 2017; Wang et al., 2015). This phenomenon of 'linked lives' of family members is important to take into account when assessing outcomes related to ILA, in particular because income and health operate as important mechanisms for residential movement and a change in household structure (Aassve et al., 2002; Bailey et al., 2004; Lu, 2008). However, we know surprisingly little about the selection into and out of ILA when this basic dynamic can confound our understanding of how ILA influences health.

Both selection and causal effects are critical for disentangling how transitions into and out of ILA are related to health. ILA would appear to negatively influence health if ill and/or economically insecure adults are more likely to live with an older generation, whereas a positive health effect could appear if it is healthy and financially secure adults who are more likely to offer informal care and support to other family members in need. Likewise, a positive relationship between ILA and health may appear if those who become ill and/or who can no longer support an older generation exit an ILA, whereas a negative relationship would be observed if the older generation started to have health problems and exited an ILA (e.g. hospitalization or death) in the case when a younger generation becomes ill.

In the literature on intergenerational co-residence and adult children's health including the studies on informal caregiving, the majority of findings are cross-sectional and cannot inform on the causal effect (Pinquart and Sörensen, 2007; Takeda et al., 2004; Turagabeci et al., 2007).

Several studies attempted the fixed-effects approach in the topic of ILA and health, but they focussed specifically on the estimation of informal care effect on caregiver's health (Van Den Berg et al., 2014; Oshio, 2014) and missed the importance of the selection effect into and out of co-residence with unhealthy parents to reduce the potential endogeneity bias (Coe and Van Houtven, 2009). To establish whether there is a causal relationship between ILA and health and whether the effect of ILA on health is negative or positive, we need a methodological approach that allows controlling for the potential influence of within-individual selection factors.

To the best of our knowledge, this study is the first to apply an analytical design that attempts to minimise the potential influence of selection effects, which are time-invariant in the relationship between ILA and health, which are inadequately addressed in the previous research. In this study, we provide insights into the conflicting findings on the protective and detrimental effect of ILA on health and contribute to this literature by proposing a methodological approach which reduces a possible effect from the selection into and out of ILA. We focus solely on the case of adults who may or may not be co-residing with older generations (either parent, grandparent or parent-in-law). Relying on longitudinal data and explicitly using the dynamic nature of ILA to explore its effect on health, this paper addresses the following questions:

1) *Is living in an ILA positively or negatively related to health?*
2) *Does this depend on whether the older generation is in poor health?*
3) *Does the relationship persist or change once we account for selection into/out of ILA?*

The fixed-effects approach gives this study an opportunity to account for unobserved heterogeneity of men and see whether older generation's health has an effect on men's health, conditioning on living in the same household. We locate this study in the context of Russia, where ILA are common: one third of Russian families reside in intergenerational households (FSSS, 2013), which is a much higher proportion than is usual in the West (e.g. only 1.1% in the UK (ONS, 2015)). In Russia and other Eastern European countries, ILA is often addressed as an 'adaptive strategy' to life events, such as widowhood or falling into poverty, and linked to economic conditions since the collapse of the Soviet Union in the 1990s (Ahmed and Emigh, 2005). However, housing constraints in Russia can play a major part in ILA: young people face high unemployment rates and often cannot afford housing due to dramatically increased prices since the regime collapse, or mortgages due to high interest rates; hence, they rely on housing support from their or partner's older generations in a form of a shared co-residence, which eventually leads to inheritance (Zavisca, 2012). Living in a dwelling owned by parents and relying on their financial support may lead to worse quality of intergenerational relationships and well-being. These features of ILA in Russia give us a unique opportunity to examine its effect on adult children's health. We focus

exclusively on Russian men, because they have unusually high mortality and poor health (Shkolnikov et al., 2013). We hope to learn more about living conditions that will support better health of this vulnerable group of individuals.

5.3 Main study sample

We use the Russian Longitudinal Monitoring Survey (RLMS) and prepare a panel dataset according to the steps described in Chapter 3. From this dataset, we derive a sample of 11,546 men aged 25 years and older (78,123 observations) who participated in at least two waves in the RLMS over 1994-2015 and did not have any observation containing a missing value for self-rated health, education or work statuses. This sample excludes any men younger than 25 years old because the mean age of leaving the parental home is 24 years old in Russia (Aassve et al., 2013) and our focus is on adults who have or are expected to live independently from their parents.

Within our derived sample of 11,546 men, we follow-up every man who enters the survey in each wave conducted in 1994 – 2014 until they reach the last wave (2015) or experience a permanent attrition. Table C.1 in Appendix C shows that the lowest number of observations (2,554) was observed in 1994 (3.27%), which was steadily increasing until 2012 (5,903 or 7.56%), in line with the overall sample size changes over time in RLMS. The overall rate of the first ever entry into the survey of 11,546 men was 15%, varying from the highest of 33% in 2010 (the sample size increased due to financial improvements in RLMS) to the lowest of 6% in 2014 (the sample size decreased due to financial cuts). There were no new participants in 2015 due to no available next wave to follow them up. Table C.2 in Appendix C shows that the most common pattern of response for men was to participate in four waves over the study period(9.02%), in line with previous studies (Keenan et al., 2014). Overall, Tables C.1 and C.2 show that 77% out of 11,546 men appeared in at least two consecutive waves over 1994-2015. In this study, we follow men for at least two waves to avoid low counts and improve the robustness of our analyses.

Another feature of the main study sample is the inclusion of temporary attritors. Among 2,705 men, who were temporary attritors at least once (23% of the study sample), 66% had a maximum of one-wave gap between the required two waves of participation. The likelihood of temporary attrition increased with the total length of participation, where the highest share of observations of temporary attritors was observed for the total participation of 19 waves (64.58%). To check whether the inclusion of men who were temporary attritors has a potential to bias our results, we run the models (discussed in the Methods section) with samples of men limited to those participating only consecutively or with a maximum of a one-wave gap. The results were similar between the two, which confirmed that temporary attrition did not bias the effect of ILA on men's

health. To gain a bigger sample size of men, we keep all the temporary attritors in our presented analyses of this study.

Short spells of participation and high frequency of temporary attrition could point to the selection effects among particular groups of men. Chapter 3 discusses the overall patterns of attrition in RLMS suggesting that the results of this study could be biased due to the possible underestimation of men and their older generations in the panel sample who were unhealthy or had a low socio-economic status (SES). Nevertheless, we are more likely to observe men from an ILA due to the higher chances of response in shared households than in one-person households. The same can be applied for the urban-rural location: even though urban areas had higher attrition rates, rural areas provided more opportunities to survey intergenerational households due to a higher proportion of families living in houses with more living space available for several generations in comparison to small apartments in urban areas of Russia.

5.4 Methodology

In this section, the advantages and disadvantages of the statistical methods applied in this study of ILA's effect on men's health are discussed. There are four main multivariate regression models used in this study, and each one of them has a unique methodological approach which answers the following questions:

1) Whether there is a significant relationship between men's health and ILA or co-residing older generation's health (multivariate cross-sectional regression of men's health);
2) Whether ILA or co-residing older generation's health has a "causal" effect on men's health (multivariate fixed-effects regression);
3) Whether this relationship remains once we account for men's transitions into ILA (multivariate fixed-effects regression for the sub-sample of men who were not living in an ILA in the first wave of participation);
4) Whether this relationship remains once we account for men's transitions out of ILA (multivariate fixed-effects regression for the sub-sample of men who were living in an ILA in the first wave of participation).

All four models have the same dependent variable of self-rated health (SRH) status, which is used as a binary health outcome due to its skewed distribution and rejected parallel test assumption on its ordinal nature; hence, all four models are treated as logistic regression models with a reference category of poor SRH (merged 'bad' and 'very bad' health) status. The same binary variable of SRH is used as a measure of older generation's health co-residing with a man (categorised as poor, fine or missing health). The Variables section provides more information on

the features of SRH and reasons for its dichotomising based on the RLMS survey. This section describes each methodological approach applied in relation to each research question of this study.

5.4.1 Cross-sectional regression modelling

In the first model, we treat our longitudinal dataset as cross-sectional, adjusting the standard errors for non-independence of 78,123 observations of 11,546 men. The cross-sectional analysis was most common in the past research on the relationship between ILA and health showing both positive and negative associations. By applying a cross-sectional logistic regression model to our data, we want to confirm whether there is indeed a significant association between co-residence with an older generation (in other words, an ILA) and men's health in Russia and whether this relationship is positive or negative.

We model the original five-categorical self-rated health outcome of men (Y) numerated as '*i*' (n=11,546) and we examine its linear relation to men's ILA status (ILA_i) and a 'j' set of other independent variables X_{ij} (age, relationship status, education and economic activity of men), including the wave of participation. Then we are interested in the estimation of a vector of coefficients ($ß$) for ILA_i and each X_{ij} to model men's health Y_i as the latent variable Y^*_i. It can be shown as the next equation regressing Y^*_i on ILA_i and each X_{ij}:

$$Y^*_i = \alpha + ß_{ILA} ILA_i + ß_j X_{ij} + \varepsilon_i \quad (1)$$

In this equation, there are two additional parameters: α is the total time-constant effect of ILA and other covariates X_i on Y, varying across men; ε_i is a vector of errors (residuals from the difference between the observed Y_i and estimated Y_i^*), which are time-variant, unobserved and independent from ILA_i and X_{ij}, but dependent on Y. In this linear model, a restriction applies to ε_i that the global mean for residuals is equal to zero, and there is a constant variance for all men. However, in the case of a binary self-rated health outcome,[11] this assumption is relaxed in a logistic regression: a standard logistic distribution of ε_i is assumed to have a fixed variance of 3.29. Applying this distribution, we calculate the predictions of the natural logarithm of the odds (P) of having fine health (Y=1) versus poor health (Y=0), which are the *logit* and are assumed to be linearly related to ILA and each X_j in a logistic regression:

$$Ln\,[P/(1-P)] = \alpha + ß_{ILA} ILA_i + ß_j X_{ij} + \varepsilon_i \quad (2)$$

[11] In our case, merging together 'average', 'good' and 'very good' health statuses; likewise, merging 'bad' with 'very bad' health statuses (see more details in the Variables section of this chapter).

Note that we control for a correlation between men's observations at each point of time by applying a '*vce*' option at the end of a regression command in Stata 13 (StataCorp., 2013) to avoid biased estimates. However, the robustness of our results will still be vulnerable because of the unknown level of bias coming from unobserved heterogeneity of men in our sample. Men can differ from each other in demographic and socio-economic characteristics, which are commonly captured in censuses and surveys; however, not all characteristics of men are likely to be observed in the RLMS. This unobserved heterogeneity can cause unobserved variance in the regressors, biasing the estimated effect of ILA and other X_j on *Y*. In other words, if men are selected into poor health and/or ILA on unobserved differences other than controlled for age, partnership status, education and economic activity, we are likely to overestimate the importance of ILA for men's health.

As a result, the caution with non-linear regression models is that the coefficients should not be directly compared to each other: the variance size will differ in each logistic model with different samples of men and covariates included in each model (Mood, 2010). When regressing *Y* on *X*, we acknowledge that the effect of one independent variable will be confounded with the effect of another *X*, hence, the coefficients ß for each *X* will provide an estimation together with the effect of other *Xi*. However, unlike in a linear regression, the residual (ε_i) variance will increase due to a change in coefficients every time when a new independent variable *X* is included in the equation. This problem comes from the fact that, even when unrelated to any observed *X*, unobserved heterogeneity will still affect the *logit* estimates.

The next sub-section describes a methodological approach for analysing longitudinal data controlling for unobserved heterogeneity of men. As in the previous studies on ILA and health, the main limitation of a cross-sectional analysis is that we cannot observe a causal relationship due to inability to model a within-person variance over time and account for unobserved heterogeneity. This model nevertheless addresses some unobserved heterogeneity because, unlike past research, our specification of ILA distinguishes between poor and fine health of the older generation with which the respondent lives (see more details in the Variable section of this chapter).

5.4.2 Fixed-effects approach in the longitudinal modelling

When studying men's health and family dynamics, one should remember that men and their family background can be heterogeneous in many personal characteristics which persist over time, but cannot always be observed directly in a regression model. For example, men will differ by their geographical location of birth, upbringing and genetic predispositions. In terms of men's

health, analyses can often miss the differences in men's subjective well-being, as well as unreported disabilities and illnesses, which men could have since their birth. This information on men's health will affect the differences between their overall health status over the life-course. Furthermore, differences in men's ILA status can depend on the quality of intergenerational relationships, which are unmeasured in RLMS. Within the country, men's family-related norms can be unique and shaped by culture-specific obligations and within-generation traditions, leading to different choices of whether sharing a dwelling and money with one's own or wife's parents and grandparents or living in separate households. Because of these unobservable differences between men, the regression estimates could be biased and not isolate the causal effect of ILA when analysing men's health with longitudinal data.

The fixed-effects methodology controls for pre-existing, time-invariant characteristics of men, such as their family background and upbringing, which can influence men's health and their choice of living arrangements. In other words, fixed-effects models exclude the selection effects caused by this, often unobserved, heterogeneity of men, which 'hide' the true relationship between their health and ILA. Moreover, the fixed-effects approach provides unbiased estimates of individual effects through controlling for time-invariant observed measures, such as gender, birth cohort or nationality. The ability to control for stable characteristics over time comes from the main feature of a fixed-effects methodology of focussing specifically on the within-person variation. This gives our study an opportunity to examine the effect of ILA on men's health by analysing the within-men variation; in other words, we will compare men's measures only to their own over time.

To the best of our knowledge, there are no studies on the link between ILA and health which have applied a fixed-effects approach yet, with some exclusions in the topic of informal caregiving of adult children for older parents with a potential implication of sharing an ILA (e.g. Oshio, 2014). Meanwhile, individual-level fixed-effects are widely used in life-course studies (Klaus and Schnettler, 2016), particularly in research on marriage, such as the marital wage premium (Antonovics and Town, 2004) or the marital effect on social contacts (Kalmijn, 2012) and subjective well-being (Kalmijn, 2017; Musick and Bumpass, 2012; Soons et al., 2009). However, most of those demographic studies apply a linear fixed-effects methodology, which has different implications for the sampling approach in comparison to a logistic fixed-effects model. The difference is that a linear type of a fixed-effects model measures the effect of changes in an independent variable on the dependent, without limiting the sample only to those respondents who experienced a change in the dependent variable as well. In contrast, a logistic fixed-effect model requires this restriction on the sample, because it cannot estimate an average outcome like a linear model does for a continuous dependent variable comparing respondents to their own

average outcome. The following explanations and formulas (extracted from Allison 2006, 2009) give a clearer understanding of a fixed-effect approach in a multilevel analysis and its differences in linear and logistic regression models.

To make the interpretation of a logistic fixed-effects model for more than two observations per individual clear, let us start from a simple ordinary least squares (OLS) two-period case model. If we treat our health outcome (*Y*) as a continuous variable for a set of men (i=1,…,n), where Y has a linear relationship with a set of observed time-varying variables (x_i) and time-constant variables (z_i), and we have only two waves t=1,…,T (two observations per each man: T=2), then the basic linear fixed-effects models for each time point will be:

$$y_{i1} = \mu_1 + \beta \mathbf{x}_{i1} + \gamma \mathbf{z}_i + \alpha_i + \varepsilon_{i1}$$
$$y_{i2} = \mu_2 + \beta \mathbf{x}_{i2} + \gamma \mathbf{z}_i + \alpha_i + \varepsilon_{i2}$$

Where the parameters β, α_i and ε_{it} (including γ as a parameter for time-constant variables z_i) can be recognised from the linear cross-sectional model (1) from the previous sub-section, and a new parameter of μ_t represents intercepts separately for each wave. Here, the error term α_i presents the total individual effect of a set of random and unobserved time-invariant men's characteristics (e.g. birth cohort effect) on their health outcome *Y*. Fixed-effects allows any correlation between α_i and the observed time-varying observed variables *X*, as well as between α_i and time-constant observed Z_i characteristics of men. Another error term ε_{it} has the same strict assumption of the dependency only on *Y*, having the mean of zero and a constant variance at each *i* and *t*. We also assume statistical independence between these two error terms α_i and ε_{it}.

In a fixed-effect approach, we have two fixed parameters α_i and z_i, meaning that they do not depend on each point of time and can be directly estimated or easily removed once we want to estimate the difference scores between two time-points (implying that we will not be able to estimate γ). In other words, to get unbiased estimates of the effects of independent variables *X* on the health outcome *Y*, we can estimate the next 'first difference' equation by removing a potential bias from a correlation between α_i and X_{it}, α_i and Z_i:

$$y_{i2} - y_{i1} = (\mu_2 - \mu_1) + \beta(\mathbf{x}_{i2} - \mathbf{x}_{i1}) + (\varepsilon_{i2} - \varepsilon_{i1})$$

The fixed-effect linear model eliminates a bias on the estimates of β once the *Y* is regressed on the difference scores, because *Xit* and error ε_{it} do not depend on each other. However, if we have a dichotomous *Y*, where health status will be either poor or fine, then we will need to estimate a two-period case logistic fixed-effects model, where we will provide a probability Pr_{it} of each man to report fine health status (*Yit*=1), relative to the probability of reporting poor health status

(*Yit*=0). Then the dependence of this probability on *Xit* can be formulated as the next 'first dependence' model:

$$\text{Log}\left(\frac{P(y_{i1}=0,\ y_{i2}=1)}{P(y_{i1}=1,\ y_{i2}=0)}\right) = (\mu_2 - \mu_1) + \beta(x_{i2} - x_{i1}) + (\varepsilon_{i2} - \varepsilon_{i1})$$

In this equation of difference scores, we already applied the independence assumption in the logistic regression model (see Equation 2 in the previous sub-section), except that the fixed-effects approach also implies to have intercepts μ and 'differentiates out' the effect of time-constant heterogeneity of men (Z_i) and an error term α_i. This form of a logistic regression is often called 'conditional', using maximum likelihood to predict Y_{i2} with the difference scores as predictors.

The left part of the above equation shows that in the logistic set-up of a fixed-effects model we are able to estimate the parameters on the right side of the equation only for those men who had at least one change in their dependent variable of health status in at least one of their observations (either from poor to fine health or vice versa). Hence, it will lead to a reduction of the sample size of men due to a necessary elimination of those men who have never had a change in their health status over the total period of their participation. Fixed-effect approach will require only some part of the sample to have a variation in independent variables over time.

The 'first difference' method cannot be used for deriving the estimations of Y for more than 2 time-points. The data need to be set up as one record of each variable per person per wave. The dummy variable method is often used in the fixed-effects OLS regression, where the regressors are computed together with dummy ID variables for all individuals (minus one person as a reference dummy variable). However, as this method was recognisable weak for big datasets, the mean deviation method is used instead in a linear regression; this method is based on the regression of the person-specific means of *Xit* on person-specific means of *Yit*, where the means are extracted from the observed values of *Yit* and *Xit* (each man gets assigned a mean of each time-varying observed *Y* and *Xit*):

$$\bar{y}_i = \frac{1}{n_i}\sum_t y_{it}$$
$$\bar{\mathbf{x}}_i = \frac{1}{n_i}\sum_t \mathbf{x}_{it}$$

$$\Longrightarrow \quad y_{it}^* = y_{it} - \bar{y}_i$$
$$\mathbf{x}_{it}^* = \mathbf{x}_{it} - \bar{\mathbf{x}}_i$$

The mean deviation method does not provide any estimates for the fixed-effects dummy variable coefficients (men's ID variable), that is why it is often called a 'conditional method'; however, those estimates are rarely needed in the interpretation of effects of *Xi* on *Y*. Note that even though the mean deviation method cannot provide estimations for the coefficients of time-

invariant variables *Zi* (it becomes equal zero for all men in the person-specific mean due to a stable value over time), a conditional fixed-effects OLS model will still control for their effect on *Yit* and gives an opportunity to include interactions between *Zit* and *Xit*.

But what happens if we want to apply a fixed-effects approach for more than two waves of men's observations of a binary dependent variable? We cannot apply a dummy variable approach for a logistic regression with a fixed-effect methodology, because a bias comes from the 'incidental parameters problem', where longitudinal data with more than two time points cause the same rate increase in the sample size and the number of all of the parameters in a fixed-effects model. This leads to biased estimates and incorrect test statistics in nonlinear regression models. In this case, conditional maximum likelihood is used for a multiple-wave fixed-effect logistic regression.

As a result, in the second model, we made use of the panel nature of our data and applied a fixed-effects approach to control for unobserved heterogeneity related to men's characteristics that are stable over time. Because we analyse men's health over at least two waves, we end up with a sample of multiple observations within men, who can also participate inconsistently in different waves over the total of twenty available waves in RLMS. This multiple-wave structure of the data requires a hierarchical feature of a regression model to avoid any biased results from the correlation between men's observations. Hence, we pre-set the data as a long-format file with a panel feature of men's observations nested within waves using the Stata command 'xtset' and applying the multilevel regression commands with the prefix 'xt-', which will allow us to control for unobserved heterogeneity.

Because a fixed-effects approach based on a logistic regression relies only on within-person variation in the dependent variable (Allison, 2009a), our sample was reduced to 2,808 men who had an observed change in health status. In other words, the reduced sample consists of those men who experienced a change from fine ('average', 'good' or 'very good') to poor ('bad' or 'very bad') health status or vice versa over the survey period. It is important to note that the fixed-effect approach accounts for all experiences of both types of health transitions for each man over the period of his participation. The within-person variation of health status over time shows that 62% of men from the reduced sample experienced either a transition from poor to fine health status or vice versa.

The reduction of the original sample of 11,546 men by 76% (8,738 men) can have implications for the fixed-effects analysis of men's health status. Selection of men by having any change in their health status over time can result in an even bigger under-estimation of men in poor health than in the main sample of men (due to a large association between poor health and attrition in RLMS). We are also less likely to capture transitions from poor to good health among both men and their

older generations. Even though we expect to have more follow-ups of men in good health, the survey is likely to fail in following some of those men if they attrit when they have a transition to poor health. Low follow-up of unhealthy men can lead to unobserved heterogeneity among men who participated in the survey and can cause a selection bias on the estimates. However, this negative effect of attrition can be balanced by its positive effect through the higher chance of following-up men who are from ILA compared to men living alone. However, applying a fixed-effects approach in a logistic regression leads to a 75% decrease in the number of ILA/non-ILA transitions among 11,546 men from the main study sample. Having a reduced sample of transitions in the ILA status (630 out of 2,474 events) can limit the ability of our analysis to show a significant relationship between men's ILA and health.

A first glance at the distribution of men by their health status leads us to believe in a lower chance of having health-related selection bias when modelling men's health with a fixed-effect approach. Opposite to our expectations, men selected into the reduced sample (having at least one change in health) were more likely to report poor health (around 10% difference) than men from the main study sample. Interestingly, there was no difference in reporting the 'average' health status between the two samples, if we look at the original five-categorical health status. This health difference between two samples occurs on average over 1994-2015 and can be explained by an increase in age over time (because health decreases with age). Hence, we would expect an over-estimation of the 'fine-poor' health transition among men included in the fixed-effect model rather than vice versa. Meanwhile, health-related attrition in RLMS can be a barrier in capturing transitions to poor health status. The distribution of health transitions in the reduced sample shows that 55% of all the events of health changes were attributed to the change from fine to poor health status. This allows us to assume that we have a low chance of under-estimating transitions from poor to fine health status, which would mean a decrease in a potential health-selection bias in our study using a fixed-effect approach.

5.4.3 Further isolation of selectivity in fixed-effects models

As shown in the previous sub-section, the fixed-effects approach can be used in this study to examine the effects of men's ILA status on their health by focussing on within-men variation, controlling for their time-invariant heterogeneity. Fixed-effects models, however, do not address bias from time-varying unobserved characteristics and reverse causal relationships (Allison, 2009a). Therefore, as a further step in isolating a health effect of ILA, we observed health changes that were tied to a change in ILA.

By isolating any possible pre-existing selection of men into and out of ILA, we model the effect of ILA on men's health separately for two groups of men: those, who had an ILA in the beginning of their first participation, and those who did not (assuming that they did not experience an unobserved transition into or out of ILA before their first participation). By ensuring we know their health status before living with the parent, we learn whether a change in *x* is related to a change in *y*. We are not the first to use this methodological approach to isolate causal and selection processes in health and well-being research (Van Den Berg et al., 2014; Musick and Bumpass, 2012; Oshio, 2014).

In this study, the reduced sample of 2,808 men who had at least one change in their health status over time (fixed-effect approach) consists of men who differ by their ILA status in their first observation (the first wave of their first participation in case of a temporary attrition). Among 2,808 men, almost 20% lived within an ILA in their first observation. For each sub-sample of men, we have a fixed-effect model, where we follow them and estimate the effect of transition in the ILA status (out of ILA for those, who had an ILA in the first observation, and into ILA for those, who did not) or its continuation over the period of participation. Once we use the ILA status together with information on the health status of older generation living with a man (as a four-categorical variable), we make the transition pathways more complex for both sub-samples of men. More specifically, men are allowed to have multiple transitions over the time of participation not only into or out of ILA, but also within their ILA status depending on older generation's health status (poor, fine or missing). This approach helps us to control for some health-related heterogeneity of men's household members and be one step closer to revealing a causal effect of ILA on men's health, hypothesising that older generation's health is one of the main ILA mechanisms affecting health of adult children.

Pre-selection of men living in ILA in the first observation

From the sample of 2,808 men, in the first sub-sample we include only men who had an ILA (were co-residing with an older generation) in their first observation t_1. As a result, our first sub-sample consists of 551 men, who had 4,926 observations over 1994-2015 with 3-6% of men' observations presented in each wave. Those men not only experienced at least one change in their health status over the period of their participation (based on the fixed-effect approach), but also had a time-varying ILA status. This strategy means that in the first sub-sample any observation in which a man is not living in an ILA is because they no longer live in an ILA during the period of observation. In other words, the difference in *ILAit* for the first sub-sample of men will represent a transition from living in ILA to not living in ILA or a continuation of the same ILA status. Overall, 64% of 551 men were continuously experiencing an ILA.

If we explore men's ILA together with co-residing older generation's health as a four-categorical variable (see more details in the Variable section), we find that 42% among men with a continuous ILA status experienced at some point of time co-residing with an older generation in poor health (or 27% among 551 men). This share of men continuously co-residing with unhealthy parents and/or grandparents can indicate a high prevalence of an older generation who are in a potential need of care in Russia. However, we need to be careful in the interpretation of the direction of causation between ILA and health when analysing health of men experiencing a continuous ILA. Financial insecurity and unaffordable housing of adult children in Russia may explain their continuous co-residence with parents, which can be detrimental for parental health over time due to the burden of economic provision for their adult children. Hence, there could be an unobserved effect of ILA on parental health prior to the negative effect of parental poor health on co-residing adult children's health.

Once accounting for ILA together with older generation's health, the transition pathways of men's ILA status are expanded, where men can remain in an ILA in all of their observed waves starting from t_1, but older generation's health can change between three categories (poor, fine or missing health) over the period of men's participation and a joined co-residence. The ILA pathways are complex, because men can also experience multiple transitions out of and back into an ILA with a different health status of an older generation at the time of each transition. Because the attrition in RLMS was found to be associated with being a male, unhealthy, single, having a high SES and living alone (see Chapter 3), we would expect an overestimation of men living with an older generation and/or a partner. This can also mean a potentially higher level of selection of healthy men into ILA. On the other hand, having around one-fifth of men experiencing an ILA in the first sub-sample is in line with the national statistics of a household structure in Russia.

In the first sub-sample of 551 men who were living with an older generation in the beginning of their first participation, there was a total number of 1,237 events of changes in their binary SRH. Over 1994-2015, 53% of those transitions occurred as changes from good to poor health status; this distribution remained similar to the original sample of 2,808 men. 73% of observations of the first sub-sample of men reported fine health status ('average', 'good' or 'very good'). Although the first sub-sample of men contributed only 19% to the total number of changes in SRH (6,498) in the original sample (2,808 men), there was a higher share of transitions in the ILA status (58%) in comparison to the second sub-sample of men (see the next sub-section). The first sub-sample included 366 events of changes in the binary ILA status (non-ILA/ILA). Cross-tabulation between the changes in SRH and ILA statuses shows, that both changes were observed 68 times over 1994-2015, which contributed 35% to the total number of joint events (196) in the original sample of 2,808 men who had at least one change in SRH.

Pre-selection of men not living in ILA in the first observation

Among men having at least one change in their health status over time (2,808 men), we construct the second sub-sample of men who were not co-residing with an older generation in their first observation. This leaves us with a second sub-sample of 2,257 men with 20,112 observations between 1994-2015 (80.4% out of 2,808 men). The percentage of all men who fit within this sub-sample varies between 4 and 6% across the waves. Likewise, any observation in which a man is living in an ILA in the second sub-sample is due to an ILA formed during the period of observation. Unlike in the first sub-sample, the second sub-sample shows a smaller number of transitions from a non-ILA to ILA over the analytical period. Among the 2,257 men of the second sub-sample, 97% remained without an ILA over the whole time of participation. Those men could have deceased older generations or need to start to live together with them, but we have no access to any information on respondents' relatives living outside of a household a man lives in. Overall, 67% of observations in the second sub-sample reported being in fine health, which is 6% points lower than in the first sub-sample (men, who had an ILA in the first observation).

The selection mechanisms for adult children starting to live together with an older generation can differ depending on the needs of each generation. We would expect those men living outside of ILA transitioning into an ILA to be more financially independent and healthier (at least prior to their transition into an ILA); hence, we would expect to have a smaller selection effect of men in poor health to have a transition into an ILA. Among men from the second sub-sample who experienced a transition to an ILA at least once (598 observations or 3%), 47% were living with an older generation in poor health overall between 1994-2015. This can indicate a potential intergenerational desire to provide care to unhealthy (grand)parents in a shared household. Likewise, adult children could start to co-reside with an older generation in good health to get financial and/or emotional support. However, a complexity of the ILA transition pathways in our study allows us to capture the effect of older generation's health on adult children's health even if the health status of an older generation changes from fine to poor health or vice versa since they started to live together with adult children.

5.5 Variables

5.5.1 Health outcome: self-rated health status

The question about men's self-rated health status (SRH) was asked consistently in all observed waves as "How would you evaluate your health today?" (very good, good, average, bad, very bad). Many studies recognise SRH as a reliable health measure because of its high level of

mortality prediction (Idler and Benyamini, 1997; Jylhä, 2009). In this study, we rely on SRH as the only measure of men's overall health condition and use it as a dependent variable in all statistical models presented in the Results section.

There was a general improvement in the SRH of Russian men across 1994-2015, where the share of men reporting 'good' health status increased from 26% in 1994 to 37% in 2015. However, there was a low share of men in 'very bad' and 'very good' categories (less than 2% in each category). In addition, there were only 85 observations (0.11%) of men with a missing value of SRH over 1994-2015. Due to low counts in those categories of original SRH, our main outcome is a dichotomised version of the five-categorical SRH: 1) 'poor' (very bad or bad) health, and 2) 'fine' (average, good or very good) health. Overall, 88% of men's observations from the main study sample had their health status reported as fine (average/good/very good).

We dichotomise the health outcome because the Brant test indicates that responses to this question are not of an ordinal nature in the RLMS. SRH was often used as a binary measure of health in the previous studies based on RLMS (Carlson, 2005). Other studies confirm that the limitation of dichotomising SRH by shrinking the information does not bias the results (Manor et al., 2000). However, some health research still practices use of SRH as a continuous variable (Manderbacka et al 1998; Perruccio et al 2010; Rohlfsen & Kronenfeld 2014). We considered this limitation by applying linear regression models for the five-categorical SRH and confirmed the robustness of our results.

5.5.2 Main independent variable of ILA and older generation's health

Our main independent variable indicates whether a respondent lives with a parent/grandparent/parent-in-law (henceforth "older generation") and whether this older generation is in fine or poor health (a dichotomised self-rated health outcome). The reason to combine parents, grandparents and parent-in-laws into one category of an older generation was to simplify the results due to the similar direction of the association between men's health and each type of an older generation when we include them as three separate binary covariates (living with a parent or not; living with a grandparent or not; living with a parent-in-law or not). In 2015, 24% of men were living with an older generation, which is in line with the 2010 Census in Russia, as well as its increase by 5% since 1994. This means that our study can capture an increased sample of men living in an ILA between 1994 and 2015.

A set of preliminary regression models of the relationship between men's health status and a binary ILA variable (whether living with an older generation or not) did not reveal a significant association, whereas distinguishing between an older generation's health did lead to a significant

association. Hence, we uncovered a joint effect of ILA and (grand)parental health on men's health. We therefore have our extended ILA variable categorised as:

1) not co-residing with an older generation,
2) co-residing with an older generation who reported poor health (6%),
3) co-residing with an older generation who reported fine health (16%).

To account for any systematic differences due to non-response about health, our regression models include the fourth category of the new ILA status of 'living with an older generation with missing health status', which consists of 0.6% of men's observations in the main study sample (we show this category only in the fully-presented results in Table C.5 – Table C.8 in Appendix C).

We include men with older generation's missing health in the fourth category of the new ILA variable to be able to account for any systematic differences and avoid under-representativeness of men living in an ILA. In cases where more than one member of an older generation was co-residing, we categorized the older generation as 'being in poor health' if at least one of those co-residents reported poor health status or as 'being in fine health' if all reported fine health status. It is important to note that we are only able to identify an older generation's health status when they are sharing the same household with a man observed in our study sample; hence, we do not explore the effect of parental health on men's health solely from their co-residential status. We believe that the relationship between older and younger generations' health can be better explained once their shared environment is accounted for in this study.

5.5.3 Other covariates

We adjust our findings for a set of covariates indicating the characteristics of men, including age, partnership status and two measures of socio-economic status (educational level and economic activity). In each statistical model, we allow these covariates to vary over time. Only the measures of socio-economic status included observations with missing values, which were excluded from the analysis due to low values (less than 0.2% over 1994-2015). Table C.3 in Appendix C presents simple descriptive statistics of the covariates for the full sample of men.

The *age* indicator was provided in the original RLMS dataset as a number of full years since birth for each respondent who answered the Individual Questionnaire. To assess the difference in men's health across the age, we divided men by four age groups (25-34, 35-44, 55-64, 65 years old and older). In the full sample, the observations of 11,546 men aged 25 years old or older were evenly distributed across those four age groups varying between 15 – 25% of observations in each age group. On average, 25% of men were aged between 25-34 years old. However, across 1994-

2015, the share of men aged 34-45 years old was greatest during 1994 – 2001 and 2015 (1-6% higher than the 25-34 age group).

Partnership status indicates whether a man was living with a partner in the same household in each wave as a binary variable (living with a partner or not) based on the household roster. Partnership status accounts for both registered marriages and cohabiting couples; we were unable to distinguish those types of relationships due to inconsistency in the categories of marital and cohabitation statuses across the RLMS waves. On average, 83% of men were living with a partner over 1994-2015.

Educational level was provided in all RLMS waves as an information on completed education and originally consisted of six categories: 1) 0-6 grades of comprehensive school; 2) unfinished secondary education (SE) [7-8 grades of school]; 3) unfinished SE [7-8 grades of school] plus something else; 4) Secondary School (SS) Diploma; 5) vocational secondary education (SE); 6) higher education and more. The missing category originally consisted of 158 observations (0.2%) over 1994-2015 and was excluded from the analysis to avoid low values. For the same reason, we also merged the first three categories into 'incomplete SS' consisting in total of 21% of men's observations over 1994-2015; a similar share of men is observed in the education category of 'vocational SE' and 'higher education' leaving almost 40% of men's observations with reports of 'complete SS' as the most frequent educational level in general over 1994-2015. Across 1994-2015, there was an increase in the share of men with the 'higher education' level by 6%.

Economic activity presents the current work status of a male respondent based on the Individual Questionnaire annually and originally consisted of five answers: 1) currently working; 2) on paid leave (paternity leave or taking care of a child under 3 years of age); 3) on another kind of paid leave; 4) on unpaid leave; 5) not working. Because the missing category of the economic activity variable consisted only of 39 observations (0.05%) over 1994-2015, we excluded those observations. For the same reason of low counts of observations of men in the second, third and fourth categories, we dichotomised the variable of current work status as 'currently working' (65%) or 'being on a leave/not working' to indicate men's current economic activity on the labour market. In the full study sample, the biggest decrease in the share of 'currently working' men can be noticed across 1996 – 1998, which can be related to the first financial crisis experienced in post-Soviet Russia at those time-points; however, a decrease to the level of 2009 (the second financial crisis in Russia) can also be observed in 2015, which could mean a new wave of unemployment among men in contemporary Russia.

5.6 Results

5.6.1 Descriptive statistics

Tables C.3 and C.4 in Appendix C show descriptive statistics of the variables based on 78,123 observations of 11,546 men in the full cross-sectional model, as well as for the reduced samples of men analysed in subsequent models. In the full sample over 1994-2015, a substantial proportion of men reported fine health status, were young, had no older generation in a household, but were living with a partner, had a completed secondary school (SS) educational level and were economically active. Overall, descriptive statistics by men's health status (binary outcome) shows that men not living in ILA were more likely to report poor health than men living in all other categories of ILA. In addition, men were more likely to report poor health if they were older, living without a partner, had incomplete SS and were currently not working or on (un)paid leave. Chi-square test confirmed the significant bivariate association between self-rated health status and each independent variable (p-value<0.001).

The analytical sample was limited to men who had at least one change in health status over 1994-2015 (2,808 men with 25,038 observations) due to constraints set by the logistic fixed-effect model. We can observe an increase in the share of men reporting poor health status in the analytical sample (32% against 12% in the full sample), which we would expect due to the exclusion of men never transitioning to this health category over the study period. Overall, men having at least one change in their health status were more likely to be older, live without an older generation and be economically inactive.

In the analytical sample, 20% were living with an older generation in the first wave of participation (first sub-sample), and the remaining 80% were not living with an older generation in their first wave of participation (second sub-sample). There are different patterns in the univariate distributions of the variables between these two sub-samples. In the first sub-sample (551 men with 4,926 observations), only 36% of men eventually stopped living with an older generation over 1994-2015. In contrast, among men from the second sub-sample (2,257 men with 20,112 observations), 97% remained living without an older generation in a household over the analytical period. Men from the first sub-sample were more likely to live with an older generation in fine health (35%) than in poor health (27%), but the difference with the second sub-sample of men was only about 10%. As expected, men living with an older generation at the start of participation (the first sub-sample) were more likely to be younger and live without a partner than men already living separately from an older generation in the beginning of their participation (the second sub-sample); however, men from the first sub-sample were less likely to report poor

health status, be economically inactive and have 'incomplete secondary school' education in comparison to men from the second sub-sample.

5.6.2 Cross-sectional analysis: men's health and ILA across time

Model 1 (Table 5.1) presents the most basic modelling approach that best approximates past research (Takeda et al., 2004; Turagabeci et al., 2007). Men's health was positively associated with ILA when living with an older generation in fine health: their odds of reporting fine health were 47% (OR=1.47, CI 1.24-1.74) higher in comparison to men not living with an older generation. In contrast, living with an older generation in poor health was negatively associated with men's health: these men had a 28% lower odds of reporting fine health (OR=0.72, CI 0.61-0.85) in comparison to men who did not live with an older generation. We observe a statistically significant association between ILA and men's health that confirms previous findings on both a positive and negative relationship (*ibid*). We uncover that the direction of the association between ILA and health of adult children depends on the health status of the co-residing older generation. However, we still cannot claim that this relationship is causal as we do not eliminate any potential selection of men into and out of ILA in the modelling approach.

Table 5.1 Cross-sectional logistic regression of men's odds of being in fine health (Model 1)

Variables	**OR**	**Robust SE**
Intergenerational living arrangements		
Not living with an older generation	1.000	
Living with older generation in POOR health	0.718***	0.062
Living with older generation in FINE health	1.471***	0.127
Age groups		
25-34 (ref)	1.000	
35-44	0.587***	0.044
45-54	0.305***	0.023
55-64	0.230***	0.018
65+	0.136***	0.011
Living with a partner		
without partner (ref)	1.000	
with partner	1.247***	0.072
Education		
incomplete SS (ref)	1.000	
complete SS	1.325***	0.073
vocational SE	1.376***	0.094
higher education	1.629***	0.113
Economic activity		
currently working (ref)	1.000	
not working or (un)paid leave	0.218***	0.010

Note: Pseudo R^2 = 0.21; N of observations (person-years) = 78,123; N of men = 11,546; * p<0.05, **p<0.01, ***p<0.001

5.6.3 Isolation of causal effect: changes in men's health and ILA over time

In Model 2 (Table 5.2), we use fixed-effects modelling to account for unobserved heterogeneity. Unlike in the cross-sectional results (Table 5.1), there is no significant effect of living with an older generation in poor health on men's health (OR=0.98, CI 0.80 - 1.20). The positive health effect of living with an older generation in fine health is significant in the fixed-effects model. Men were two times more likely to report a change from poor to fine health if they were living with an healthy older generation (OR=1.97, CI 1.56-2.48) in comparison to those living without an older generation. Net of all stable characteristics, co-residence with an older generation was relevant to the health of those who changed health status over their period of observation. Although the fixed-effects model did not confirm the detrimental effect of poor health in an intergenerational household for men, the results support the 'health protection' hypothesis in the ILA setting. A combination of shared genetics, environment and health habits (e.g. exercise or diet) with parents might have a positive effect on adult children's health, as well as parental support and control of health behaviours.

Table 5.2. Fixed-effects logistic regression of men's odds of being in fine health (Model 2)

Variables	**OR**	**Robust SE**
Intergenerational living arrangements		
Not living with an older generation	1.000	
Living with older generation in POOR health	0.980	0.101
Living with older generation in FINE health	1.966***	0.233
Age groups		
25-34 (ref)	1.000	
35-44	0.984	0.105
45-54	0.646**	0.083
55-64	0.427***	0.061
65+	0.190***	0.030
Living with a partner		
without partner (ref)	1.000	
with partner	1.898***	0.166
Education		
incomplete SS (ref)	1.000	
complete SS	1.329***	0.098
vocational SE	1.506**	0.180
higher education	1.447*	0.257
Economic activity		
currently working (ref)	1.000	
not working or (un)paid leave	0.325***	0.017

Note: Likelihood Ratio χ^2 (12) = 1105.84; N of observations (person-years) = 25,038; N of men = 2,808; * p<0.05, **p<0.01, ***p<0.001

5.6.4 Men transitioning out of ILA and their health changes over time

After controlling for the selection effect of time-constant factors and focussing only on health of men experiencing at least one change over time, we still cannot state whether an ILA exerts a positive effect on men's health or whether men who are healthier are the ones who are more likely to co-reside with an older generation in fine health. In other words, the selection of men into and out of ILA can bias the effect of ILA on men's health. The next modelling approach further addresses this issue.

First, we include only men who were living with an older generation in the beginning of participation. For this sub-group of men, we run a fixed-effect logistic regression model, reducing the sample only to those men who had at least one change in their health status since the first wave of participation (551 men). In Model 3 (Table 5.3), some of men could remain in an ILA over their period of participation; among those men, some of them can experience a change in the health status of a co-residing older generation. We will focus our attention on the health influence of living without an older generation for men who have stopped having an ILA during the period of observation since their first observation of being in an ILA. In this model, the reference category (OR=1) of the ILA status will be co-residence with an older generation in fine health since men's first observation (either continuously or after the older generation's health improved).

Table 5.3. Fixed-effects logistic regression of odds of being in fine health of men who were living with an older generation during their first participation in RLMS (Model 3)

Variables	**OR**	**Robust SE**
Intergenerational living arrangements		
Not living with an older generation	0.371***	0.057
Living with older generation in POOR health	0.487***	0.063
Living with older generation in FINE health	1.000	
Living with older generation, missing health	0.752	0.231
Age groups		
25-34 (ref)	1.000	
35-44	1.298	0.200
45-54	0.875	0.182
55-64	0.625	0.173
65+	0.386**	0.140
Living with a partner		
without partner (ref)	1.000	
with partner	1.256	0.249

Continuation of Table 5.3 is on the next page

Continuation of Table 5.3

Variables	OR	Robust SE
Education		
incomplete SS (ref)	1.000	
complete SS	1.473*	0.241
vocational SE	2.313**	0.644
higher education	1.221	0.465
Economic activity		
currently working (ref)	1.000	
not working or (un)paid leave	0.334***	0.037

Note: Likelihood Ratio χ^2 (12) = 247.28; N of observations (person-years) = 4,926; N of men = 551; * p<0.05, **p<0.01, ***p<0.001

Model 3 (Table 5.3) revealed that stopping to live with an older generation in fine health decreases the odds of reporting a change from poor to fine health by 63% (OR=0.37, CI 0.28-0.50) and continuing to live with an older generation in poor health (relative to fine health) decreases the odds by half (OR=0.49, CI 0.38-0.63). These results confirm the importance of older generation's health for explaining the direction of the ILA effect on health of adult children. The protective effect of living in healthy intergenerational households for health of men remains significant.

The increased likelihood of poor health after stopping living with an older generation is unexpected. One potential explanation is that the ILA ended due to a sudden illness of the older generation (who had previously been in fine health), which resulted in their death or hospitalization/ institutionalization. Adding a time-varying covariate for death of the older generation did not alter the strong negative relationship, but we were not able to assess hospitalization-related exits of an ILA.

5.6.5 Men transitioning into ILA and their health changes over time

In the final specification, we address selection effects related to entering an ILA for health reasons. By applying a fixed-effects approach (focussing only on men with changes in health) to a sub-sample of men not living in an ILA at the start of participation, we end up with 2,257 men. Among those who eventually began to live in an ILA after their first observation, we allow the odds of reporting fine health (Table 5.4) to vary by older generation's health status (in comparison to those continuously living with no older generation).

Table 5.4. Fixed-effects logistic regression of odds of being in fine health of men who did not live with an older generation during their first participation in RLMS (Model 4)

Variables	OR	Robust SE
Intergenerational living arrangements		
Not living with an older generation	1.000	
Living with older generation in POOR health	0.642*	0.123
Living with older generation in FINE health	1.250	0.280
Living with older generation, missing health	0.997	0.629
Age groups		
25-34 (ref)	1.000	
35-44	0.833	0.125
45-54	0.568**	0.098
55-64	0.378***	0.070
65+	0.164***	0.033
Living with a partner		
without partner (ref)	1.000	
with partner	2.092***	0.205
Education		
incomplete SS (ref)	1.000	
complete SS	1.293**	0.106
vocational SE	1.371*	0.182
higher education	1.540*	0.310
Economic activity		
currently working (ref)	1.000	
not working or (un)paid leave	0.323***	0.020

Note: Likelihood Ratio χ^2 (12) = 889.62; N of observations (person-years) = 20,112; N of men = 2,257; * p<0.05, **p<0.01, ***p<0.001

Model 4 (Table 5.4) shows that shifting from living with no older generation to living with an older generation in poor health decreased the risk of reporting fine health by 36% (OR=0.64, CI 0.44-0.93). However, it did not make a difference for men's health when beginning to live with an older generation in fine health (OR=1.25, CI 0.81-1.94). These results confirm a significantly negative effect of ILA on men's health when the older generation is in poor health. Model 4 expands the previous findings of this study, showing that this negative effect can depend on whether men are continuously living in an ILA or started for various reasons, where one of them could be a need for care of an unhealthy older generation.

5.6.6 Regression results: other covariates

The adjusted covariates of age, partnership status and socio-economic status (education and economic activity) of men were significantly related to their SRH in all four regression models. In

general, men who were older, living without a partner, with low educational level and economically inactive were more likely to report poor health status.

For age, all regression models confirm a decrease in men's likelihood of reporting fine health status with age. Cross-sectional results (Model 1) show that men aged 35 years old or older (age groups of 35-44, 45-54, 55-64, 65+ years old) had significantly lower odds ratios of reporting fine health status in comparison to men aged 25-34 years old. Fixed-effects results (Model 2) indicate a significantly higher risk of falling into poor health after the age of 45 years old or older. The same pattern can be observed among men who did not co-reside with an older generation in the first wave of participation and had at least one change in their health status over time (Model 3). However, among men living with an older generation at the start of their participation, Model 4 shows an increase in odds ratios of reporting fine health by 30% status if a man was aged between 35-44 years old in comparison to younger men aged 25-34 years old; moreover, there was no health difference between men aged 25-34 and 45-54 years old.

Partnership status: all four regression models reveal a positive relationship between men's health and being partnered. In the cross-sectional model, partnered men had 24% higher odds of reporting fine health status than unpartnered men (Model 1). Once accounting for a variation in men's partnership status over time, odds of reporting a change from poor to fine health status were twice higher for men living with a partner (Model 2), particularly if they did not live with an older generation in the first wave of participation (Model 3). However, the fixed-effect model for the sample of men living with an older generation at the start of participation did not reveal a significant relationship between the changes in their health status and changes in partnership status over time (Model 4).

Socio-economic status (SES): all four regression models show a positive relationship between men's SRH and SES (the educational level and economic activity). Whether having any change in health status over the survey period or not, both cross-sectional and fixed-effects models show that men had significantly increased odds of reporting fine health status if they had a higher than incomplete Secondary School (SS) level of education and were currently active on the labour market (Models 1 – 3 for education and Models 1 – 4 for economic activity). However, the sample of men living with an older generation at the start of their participation had an exception: Model 3 shows no significant difference in the odds of reporting fine health status between men with incomplete SS and higher education if they had at least one change in their health status over time.

5.6.7 Sensitivity analyses

We conducted multiple sensitivity analyses to ensure the relationships we observed are robust. Modelling men's health status as a continuous outcome revealed similar directions and significance levels of its relationship with men's ILA in comparison to the logistic regressions. In all four logistic regression models, the size and significance of the ILA odds ratios did not change substantially when we accounted for period effects, the number of adults in the household, number of minors younger than 16 years old, or partner's health status (in addition to an interaction of partner's health and ILA). We also found no mediating effect of household economic well-being indicators (income quintiles; self-assessment of a financial well-being on a poverty ladder; self-assessment of being better off financially in a year; self-assessment of the necessities risk in a year), whether accounting for those indicators separately or in combination. The results were robust when we limited the sample to men aged 45 years old or younger, although there were a few differences in the significance levels of ILA. We also implemented an alternative approach to removing selection effects: our results were similar when controlling for lagged self-rated health.

5.7 Discussion

Relying on the RLMS (1994-2015) and explicitly using the dynamic nature of intergenerational living arrangements (ILA) and self-rated health status, this paper reveals the interlinkage between the health of co-residing adult children and older generations (whether parents, grandparents or parents-in-law). Focussing particularly on men as adult children, we conduct several models to analyse the relationship between adult children's health and ILA, accounting for the time-varying health status of an older generation in a household.

Our results expand previous cross-sectional findings on the significant relationship between ILA and health and help to clarify the direction of the association (Pinquart and Sörensen, 2007; Takeda et al., 2004; Turagabeci et al., 2007). First, we confirm the significance of this relationship and the existence of both negative and positive associations when accounting for older generation's health status. Second, we reveal a statistically significant health effect of ILA over time. Third, we show that the influence of transitions into and out of an ILA on changes in men's health depends on the health status of a co-residing older generation.

To be able to compare our results to previous studies, we conduct a repeated cross-sectional analysis of men's health. We find that men are better off living with a healthy older generation and worse off living with an older generation in poor health in comparison to men not living in an ILA. Using the longitudinal sample of men, we go further and apply a fixed-effect approach, which

reveals only the positive association when measuring the relationship net of fixed-effects (unobserved time-constant characteristics of the individual as well as considering only variation within an individual's observations). A few studies used a fixed-effects approach when accounting for ILA and health (Van Den Berg et al., 2014; Oshio, 2014), but they focussed specifically on the effect of informal care on caregiver's health and missed the potential selection effect of a co-residence with unhealthy parents (Coe and Van Houtven, 2009). The effect of ILA on health can be biased through the selection of either adult children or older generations into and out of ILA. We suspected one important selection pathway was that an older generation in poor health would only move in with a younger generation in good health, but the fixed-effects results do not support this. However, selection effects may still generate a positive association if those who become ill or can no longer support an older generation exit an ILA or an older generation becomes ill and experience a move out of ILA, which could happen because of older generation's transition to a hospital, care home or death. Our next approach of focussing on the sub-samples of men experiencing transitions from non-ILA into ILA and vice versa (or no transition at all) uncovers important selection effects that need to be addressed when measuring the influence of ILA on health.

Once accounting for the potential effects of transition of men into and out of ILA, the fixed-effect model confirms a negative health effect of living with an unhealthy older generation. This particular form of ILA may entail a burden of informal caregiving or the pressure of financial provision. The effect of informal parental caregiving on health has been widely studied in the health, economic and social sciences; however, less attention has been paid to the health importance of a shared environment between younger and older generations. A systematic review indicated that co-residency is one of the main factors behind the negative relationship between informal caregiving and the caregiver's physical health (Pinquart and Sörensen, 2007). Indeed, stress from multiple social roles — related to providing financial and emotional support and sharing a living space with older kin who have poor health status and possibly require informal care — has been linked to mental health problems and declining health of caregivers (Barnett, 2015; Bauer and Sousa-Poza, 2015; Oshio, 2014; Pinquart and Sörensen, 2007; Ramsay et al., 2013; Vitaliano et al., 2003). At the same time, some population-based studies indicate lower mortality risk among family caregivers compared to non-caregivers (Roth et al., 2015), which could be related to the positive health effect of closer relationships and social support exchange between the generations (Liang et al., 2001). However, selection into co-residency with ill older generation could lead to more stress and poorer health than the benefits of informal care itself, as our findings suggest, whether continuously co-residing or after moving to live together.

Besides the health loss from a shared co-residence with unhealthy older generations, our findings also suggest that no longer living with an older generation who is healthy negatively affects men's health. No longer having older kin so close could lead to diminished parental support, whether emotional or monetary, and contribute to worsening health (Coe and Van Houtven, 2009). In addition, some research has shown that men's health behaviours may be less positive when living alone (Joutsenniemi et al., 2007; Stickley, Koyanagi, Roberts, et al., 2015), and unhealthy behaviour has been strongly linked to men's high risk of cardiovascular diseases and premature mortality in Russia (Britton and McKee, 2000; Cockerham, 2000; McKee and Britton, 1998), especially heavy drinking (Leon et al., 1997, 2007). Because our sensitivity analysis did not confirm any association of men's health with older generation's deaths or household economic well-being, we believe the loss of emotional support or behavioural control may underlie this finding (Mureşan and Hărăguş, 2015). However, this finding should be investigated in further research before drawing firm conclusions.

Focussing on men, we need to be careful when interpreting the negative effect of ILA on their health when co-residing with unhealthy older generations for several reasons. Firstly, men are believed to be the primary caregivers at home only when no other alternative is provided in a family, particularly women who are close-kin (Choi, 2003; Gerstel and Gallagher, 2001; Horowitz, 1985). The association of a caregiving role with the feminine identity could explain possible gender differences in the physical and mental health impact of caregiving (Pinquart and Sörensen, 2006), especially after transition into it or during the continuous caregiving (Coe and Van Houtven, 2009; Marks et al., 2002, 2008). The majority of scholars refer to women as the most disadvantaged group in terms of health effect of parental caregiving at home (Morgan et al., 2016). However, men's health can also be negatively affected by living with an unhealthy older generation indirectly through the psychological pressure of financial provision, observing a parent suffering from poor health, psychological burden from the need for emotional support of a female caregiver or even a combination of those factors leading to the deterioration of relationships with a spouse and other family members (Amirkhanyan and Wolf, 2003; Bauer and Sousa-Poza, 2015; Campbell and Martin-Matthews, 2003; Kruijswijk et al., 2015; Matthews and Heidorn, 1998). In contrast to our expectations, additional analysis revealed no significant interaction effects between a presence of healthy women in a household and ILA on men's health. However, our analysis confirms a positive effect of living with a partner on men's health, particularly when accounting for partner's fine health in the additional analysis. Indeed, studies show that men are more involved in parental caregiving within a household when living together with a partner by creating a 'caring team' as a couple (Henz, 2009). Moreover, women can encourage and support

men during the burden of caregiving and vice versa men themselves can play a supportive function for women who take a main caregiving role in a family (Kruijswijk et al., 2015).

Our results suggest that one pathway to poor health for Russian men is co-residing with an ailing older generation. To prevent this deterioration of health, policies related to health, economic prosperity and ageing might consider support for this family type. The combination of economic conditions, housing policies and cultural expectations of kinship obligations can create a country-specific selection of adult children into and out of ILA (Grum and Temeljotov Salaj, 2016) and have a unique effect on their health. Many factors may contribute to the high prevalence of ILA in general in Russia: financial assistance in a context of high unemployment rates in comparison to Europe (World Bank, 2018c), help with childcare (Heylen et al., 2012), and a cultural familialist preference toward intergenerational support (Mureşan and Hărăguş, 2015). In addition, housing prices and mortgages with high interest rates have increased since the regime collapse in 1991 (Zavisca, 2012). The younger generations face difficulty in affording independent housing (Ahmed and Emigh, 2005; Li and Huang, 2017; Ruggles and Heggeness, 2008), and often have to rely on inheritance (Zavisca, 2012).

Perhaps most pertinent, 95% of Russians aged 60 – 80 years old report having poor health (Gierveld et al., 2012); older people in Russia are, therefore, likely to require help with daily activities, which they could get by moving into ILA or care homes. The choice to live in care homes or receive institutional care is restricted by the availability and affordability of such care in Russia and cultural norms to personally take care of family members (Mureşan and Hărăguş, 2015). Because of low pensions and increased cost of living, older individuals in Russia often continue working for income past the retirement age (Gerber and Radl, 2014; OECD, 2011), which is an option limited by poor health (Goryakin and Suhrcke, 2016; Kolev and Pascal, 2002), leading to an increased likelihood of ILA. All of these factors may compound the stress of having an ailing older generation with the added obligation for the older generation's well-being (Verbakel, 2014).

These pathways into ILA, which may be somewhat specific to contexts such as Russia, highlight the interdependency between generations. Multiple linkages in family systems (Dykstra and Komter, 2012) are important to identify because they bring to light the opportunities and constraints that are shared by individuals given their similar social status and network. Taking this perspective, for example, it becomes clear that the effects of ILA may be compounded by socioeconomic status: Russian men with low socioeconomic status are most likely to end up in ILA with an unhealthy older generation because socioeconomic status is intergenerationally inherited (Gerber, 2000, 2002; Gerber and Hout, 1995) and because health is strongly linked to SES

(Nicholson et al., 2005). Our finding of a causal relationship between ILA and health therefore suggests that there could be a double health penalty for Russian men with low SES.

As one of the RLMS data limitations, we had no prior information to be able to assess the outlined above country-level and life-course indicators. Moreover, the RLMS's panel sample has certain limitations in relation to the follow-up rate of households and individuals (discussed in Chapter 3). Previous studies based on the RLMS found that the attrition rate is higher among older men (Gerry and Papadopoulos, 2015); however, the relationship between attrition and self-perceived health was weak (Denisova, 2010). A sufficient length of panel data over the period of 25 years with time-varying information on living arrangements and health of each household member gave us a unique opportunity to use the advantage of the fixed-effect approach. In the logistic regressions of ILA on men's self-rated health, fixed-effects modelling allowed us to control for their selectivity on time-invariant unobserved characteristics whilst accounting for their selection into and out of ILA by separating men into two groups of those who were living with older generations in the first wave of participation or not. Fixed-effects logistic modelling is widely applied in econometrics to establish the causal effects by looking at the within-person differences and excluding those individuals who have no changes in an outcome within the estimated period. However, fixed-effects models are not supposed to help with the possible bias from time-varying unobserved characteristics, reverse causal relationships (Allison, 2009a) and selection into and out of ILA.

We showed the importance of addressing heterogeneity in the health of older generations when studying the influence of ILA on health, as well as the role of selection into ILA. Exploring further heterogeneity in the degree of parental poor health (Northouse et al., 2012), need and intensity of informal caregiving (Ramsay et al., 2013; Vlachantoni et al., 2016) could further clarify the role of ILA, which is understudied in the Russian context of ageing population and poor health. Other sources of heterogeneity would be worth considering in conjunction with the linked lives of younger and older generations, such as the life-course history and duration of ILA (Pearlin et al., 2005; Piontak, 2016) or quality of both marital and intergenerational relationships (Choi and Marks, 2006; Merz et al., 2010; Umberson, 1992b). Country-level moderators such as normative family context and the supply of employment, pensions, housing, formal care and care institutions should be explicitly considered as they may create a country-specific selection of adult children into and out of ILA (Dykstra and Komter, 2012; Grum and Temeljotov Salaj, 2016) and play a role in the risk of falling into poor health.

Chapter 6 Paper 3: How does dad fare when the kids leave the nest?

6.1 Abstract

Most studies on the transition to adulthood explore determinants and implications of leaving parental home (nest-leaving) for young adults, but to a lesser extent on the experiences of parents. The few studies considering parental experiences suggest that the postponement of nest-leaving can be detrimental for parental well-being, but these findings are cross-sectional and focus mainly on mothers. Fathers are at higher risk of living separately from children than mothers, and it is unknown how fathers react to nest-leaving. We fill this gap by applying multilevel random- and fixed-effect approaches to a panel of Russian fathers (RLMS-HSE 1994-2016) who are at risk of experiencing a life-course event of nest-leaving. Russia provides a unique case study, with high rates of intergenerational co-residence. We address both between- and within-fathers differences in five subjective indicators: life satisfaction, health, and three health behaviours (binge drinkingand heavy smoking). Random-effects models overestimate the importance of nest-leaving for fathers when not fully accounting for the time-constant and unobserved heterogeneity. The poorer outcomes among fathers experiencing nest-leaving are largely due to selection or reversed causality; fathers experiencing nest-leaving are either selected on poorer health and unhealthy behaviours or their poor health and unhealthy behaviours 'push out' adult children from the home. Our study brings a new insight into the health effects of intergenerational co-residence suggesting that nest-leaving could be a symptom, rather than a cause, of fathers' health disadvantage.

6.2 Introduction

Leaving the parental home (nest-leaving) is one of the most important aspects of the dynamics in family support exchange and relationship quality between parents and adult children (Dykstra et al. 2013). Living together with adult children can bring both a joy and struggle to parents at different stages of life (Wethington and Kamp Dush, 2007). While older parents might benefit from sharing household chores and caregiving responsibilities with offspring, middle-aged parents might often feel dissatisfied with their children who 'failed to launch' (Aquilino and Supple, 1991). The departure of adult children may have a number of effects on middle-aged parents, with respect to subjective well-being, health status and health behaviours. Moreover, family studies focus less on fathers (Wethington and Kamp Dush, 2007) and imply that nest-leaving has stronger

effects on mothers (Burazeri et al., 2007), who are expected to be the primary 'kinkeepers' and maintain closer family ties (Lye, 1996). The aim of this paper is to close this gap in the literature by investigating the importance of nest-leaving for fathers and addressing the overlooked selection and causal effects of fathers' life-course transitions into a nest where all adult children left the parental home on their life satisfaction, self-rated health status and health behaviours.

Previous literature provides mixed evidence about the impact of nest-leaving on parents and has mainly focussed on the Asian context (Silverstein, Cong, et al., 2006; Wu et al., 2010), because this culture is associated with closer family ties and stronger cultural expectations of offspring's care for parents than in Europe (Reher, 1998; Takagi and Silverstein, 2006). We base this study in Russia, a country with a high share of intergenerational living arrangements (ILAs) and support flows in Europe (Cox et al., 1997; Dykstra et al., 2016; Iacovou and Skew, 2011), and with a familialistic context relatively similar to Asia (Chen, 2001; Prokofieva, 2007; Ruggles and Heggeness, 2008), but with lower levels of economic security and poorer health outcomes among middle-aged and older adults (Gierveld et al., 2012; Hsieh, 2015; Selivanova and Cramm, 2014). Premature mortality rates among Russian men have been one of the highest in Europe since the collapse of the Soviet Union, main predictors of which have received a particular attention in health research, such as social inequalities and unhealthy lifestyle (Bobak et al., 2003; Bobak and Marmot, 1996; Marmot and Bobak, 2005), but the potential health effects of changes in their ILAs are ignored (Permyakova and Billingsley, 2017). The exposure to nest-leaving in Russia is overlooked in the literature on transitions to adulthood, which has focussed mainly on Europe (Billari et al., 2007). Unlike in Europe, Russian young adults have a narrower gap in years between the major life-course events of nest-leaving, marriage and childbirth, where the median ages of these transitions are significantly lower varying between 22-24 years old (Aassve et al., 2013; Billari and Liefbroer, 2010). Considering these differences, studying men in the Russian context is valuable for understanding the health effects of nest-leaving for parents in their mid-life; hence, this paper focuses only on fathers aged 40-59 years old. We use the Russian Longitudinal Monitoring Survey (RLMS 1994-2016) to address the following research questions in relation to multiple health outcomes:

1) *Does co-residence with adult children matter for fathers' life satisfaction, self-rated health status and health behaviours?*
2) *Does nest-leaving matter for fathers' life satisfaction, self-rated health status and health behaviours?*
3) *When all children leave the nest, do fathers' life satisfaction, self-rated health status and health behaviours change?*

Our first objective is to see whether there is a correlation between a separate co-residence from adult children and fathers' life satisfaction, self-rated health status and two measures of health behaviours (binge drinking and heavy smoking). For this, we follow the most common statistical approach in previous studies and answer the first research question using cross-sectional models for each outcome. Our second objective is to assess possible selection and causation effects of nest-leaving. Most previous studies have not used advanced statistical techniques to examine a possible impact of nest-leaving on parents (Lu et al., 2012), often using only instrumental variables to account for some unobserved differences between the parents (Antman, 2010). By following fathers for at least two consecutive waves and capturing their transitions into a household where all adult children left the 'nest', we apply multilevel and longitudinal approaches to each outcome, specifically random-effect models for the second question and fixed-effects models for the third question. Our additional goal is to study the correlates of nest-leaving in Russia (fathers' demographic, socio-economic and geographic characteristics), and how those correlates could explain the relationship between nest-leaving and fathers' life satisfaction, self-rated health status and health behaviours. We focus only on fathers in a stable partnership union to isolate the health effects of nest-leaving from the potentially detrimental impact of union dissolution on fathers.

6.3 Theoretical Framework

6.3.1 Correlation between nest-leaving and father's well-being, health and health behaviours

Intergenerational living arrangement (ILA) is one of the main indicators of intergenerational solidarity, providing insight into the supportive networks and economic resources of parents, which are important for well-being and health (Kalmijn, 2014). Previous research shows mixed findings on the direction of association between ILAs and the well-being and health of parents, the majority of which have focussed on late-life outcomes. If adult children live with parents to provide care, sharing a living space with offspring is often associated with better parental outcomes of psychological well-being (Wang et al., 2014; Teerawichitchainan et al., 2015), better self-rated health (Turagabeci et al., 2007) and lower risks of unhealthy behaviours (Zhang and Wu, 2015). The opposite is true for parental health if adult children co-reside with them to receive care (Maruyama, 2015), particularly in the case of illness (Kespichayawattana and VanLandingham, 2003), which could be explained by a burden of multiple family roles (Ikeda et al., 2009). At the same time, research on elderly parents during the Great Recession in Europe suggests protective effects of ILAs on their depressive symptoms (Courtin and Avendano, 2016).

Finally, the direction of association between loneliness and ILAs can depend on the country of origin, where individualistic countries like the Netherlands have higher levels of loneliness among parents co-residing with adult children than familialistic countries like Italy (de Jong Gierveld and van Tilburg, 1999).

Unlike mothers, fathers are more likely to have weaker relationships and less frequent contact with children (Cooney and Uhlenberg, 1990). This could explain the insignificant difference between the psychological effects of motherhood and fatherhood in mid-life (Pudrovska, 2008; Ward, 2008). There has been little evidence of a positive association between a separate co-residence from all adult children and father's life satisfaction in mid-life (Dykstra & Keizer 2009), and less attention has been paid to the relationship with fathers' self-rated health and health behaviours. However, the heterogeneity in timing of nest-leaving (Harkins, 1978), cohort effects (Adelmann et al., 1989), and the length of parental marriage (Hiedemann et al., 1998) might highlight the health differences between the fathers living separately from adult child(ren) or still have child(ren) in the household.

6.3.2 The potential positive and negative effects of nest-leaving on fathers

Over the past two decades, research on adult child – parent relationships has provided evidence for the importance of intergenerational exchange of support on parental well-being (Bucx et al., 2012; Umberson, Pudrovska, et al., 2010). Earlier findings suggest that parents have a positive attitude towards adult children leaving home and report better psychological outcomes once offspring left home (Dennerstein et al., 2002; Glenn, 1975; Harkins, 1978). Moreover, studies show that poorer intergenerational relationships are associated with lower levels of parental well-being (Kalmijn and De Graaf, 2012). Nest-leaving might reduce the quality of intergenerational relationships, which could affect parental well-being through strained family relations with adult children (Abas et al., 2013; Ward, 2008). Parental disappointment in children's low achievements in employment or personal life can be particularly detrimental for the quality of their relationships when co-residing together (Aquilino and Supple, 1991). Hence, parents could benefit from living separately from offspring due to the decline in the stress of supporting and caring for a young adult (Moor and Komter, 2014).

On the other hand, parents might enjoy living together with their adult children as long as their relationships are harmonious (Aquilino 1991) and feel lonelier when living separately from them because of a lack of intergenerational support (Wu et al., 2010). Studies of parents 'left behind' when adult children migrate for work indicate that parental health deteriorates, as found in rural-urban migration in China (Ao et al., 2015), emigration from post-soviet Albania (Burazeri et al.,

2007) and migration from Mexico to the US (Antman, 2010). Living with an adult child could protect a widowed parent against ill-health through the positive effects of caregiving and emotional support (Zunzunegui et al., 2001). Moreover, middle-aged parents experiencing a mid-life 'crisis' could recognise that they are getting older and miss the times when their children were in the 'nest'. Decreased levels of contacts and household help among parents whose children left the parental home could explain their worse outcomes of subjective well-being and self-rated health.

Less is known about how fathers' health behaviours might change after all children leave home. We could expect little impact of nest-leaving on fathers, because men tend to have weaker family ties and exchange less support with children than women (Pudrovska, 2009; Silverstein, Gans, et al., 2006; Simon, 1992). Most previous studies focussed on motherhood and found that the transition into a separate co-residence from adult children had a negative impact on mothers' well-being (Adelmann et al., 1989; Borland, 1982), but a few found less traumatic experiences or no effect of nest-leaving for fathers (Axelson, 1960; Pudrovska, 2009). At the same time, men have a higher risk of sliding into negative health behaviours such as excessive smoking and binge drinking after negative life-course changes, such as experiencing an economic crisis or transition to unemployment (de Goeij et al., 2015; Keenan et al., 2015). For example, Russian men who became unemployed after the regime collapse were more likely to consume alcohol at the levels associated with a burden of cardiovascular diseases and alcohol poisoning in the 1990s (Shkolnikov et al., 2001). Moreover, Pudrovska (2009) found that the death of a child had a worse effect on father's mental health than on mothers. These findings on the vulnerability of men to negative life-course events could imply that fathers experiencing nest-leaving would also have worse well-being and health behaviours, similar to the health effects of other stressful events. However, other studies suggest that parental experience of a life-course event of nest-leaving by all adult children is a less stressful event for parents than their transition to unemployment (Crowley et al., 2003), union dissolution or bereavement (Dare, 2011), especially for fathers (Pudrovska, 2009); hence, we control for these factors to isolate the health effects of nest-leaving.

Although fathers could suffer from nest-leaving, spousal support might protect fathers against the negative effect of nest-leaving, particularly when they experience a high quality of marital relationships (Davis et al., 2016; White and Edwards, 1990). Partnered fathers tend to have higher self-rated health status than unpartnered fathers (Dykstra and Keizer 2009) due to the positive influence of spousal instrumental support and control of health behaviours (Umberson et al., 1996). From the social network perspective, having a spouse might be even more important for parental well-being than having an adult child in the household (Buber and Engelhardt, 2008). Moreover, the health effects of marital relationships might differ by living arrangements (Dykstra

and Keizer 2009), where the departure of all adult children from the parental home can either improve or deteriorate the relationship between marriage and health of fathers. To reduce the complexity of studying both life-course events simultaneously, we eliminate the confounding effects of union dissolution by focussing only on partnered fathers.

6.3.3 Selection effects

The health effects of nest-leaving might be complicated by the possibility that fathers living separately from adult children are unique. The concept of selection could explain the apparent association between nest-leaving and parental health, where the health of parents would be associated with their likelihood of adult children leaving the nest (Henretta et al., 1997; Manor et al., 2003). Nest-leaving would appear to negatively affect parental life satisfaction, self-rated health and health behaviours, if parents who are dissatisfied with life, unhealthy, binge drinkers or heavy smokers are more likely to be a burden to their adult children and encourage them to leave the nest to avoid stress. At the same time, a positive association would appear if it is parents who are satisfied with life, healthy and avoiding unhealthy behaviours who are more likely to take care of themselves (Maruyama, 2015; Sereny, 2011) and support their adult children in maintaining independence and moving out to their own homes. If there are selection effects of nest-leaving on parental well-being and heath at work, this could mean that the 'empty-nest crisis' among middle-aged parents might be a 'myth', as it was suggested in the earlier literature from psychology (Dennerstein et al., 2002; Krystal and Chiriboga, 1979; Radloff, 1980) and sociology (Glenn, 1975; Rogers and Markides, 1989; White and Edwards, 1990). Previous studies on the transition to adulthood have focussed on parental and children's characteristics as possible determinants of nest-leaving (Aassve et al., 2001, 2002), but little is known about their importance for the well-being and health from the parents' perspective.

Researchers show that the likelihood of nest-leaving depends on the demographic and socio-economic factors of adult children, where offspring who are male, unmarried, less educated, unemployed or with low income are less likely to leave the nest (Iacovou, 2010; Umberson, Pudrovska, et al., 2010). Parental characteristics such as family structure, household composition, marital status, income and settlement type can influence adult children's decision to leave the nest as well (de Valk and Billari 2007; Iacovou 2010; Mitchell et al. 1989). On the one hand, studies show that young adults from disadvantaged families are more likely to leave the nest when living with a parent who is divorced or re-partnered, from a low social class or rural area (Aquilino 1991b; Cooney and Mortimer 1999; Goldscheider and Goldscheider 1998; Mitchell 1994). Epidemiologists often find that low well-being, poor health and unhealthy behaviours among middle-aged adults are correlated with low socio-economic status, union dissolution and

living in a rural area (Hu et al., 2016; Nicholson et al., 2005). These findings could imply that disadvantaged parents might be more likely to be unhealthy and have their adult children moving out. On the other hand, unaffordable housing could explain a low likelihood of nest-leaving among the financially struggling families. The correlation between housing market and nest-leaving was established in earlier findings in Europe (Aassve et al., 2001, 2013; de Valk and Billari, 2007). This could mean that economically-advantaged parents might be more likely to be healthy and help their offspring to purchase a property and move out.

Another argument about the selection effects of nest-leaving on father's health revolves around the theory of intergenerational transmission of socio-economic status. 'Transferrable' material resources from parents to children (e.g. income, property, father's job, etc.) lie at the root of adult child – parent relationships, and is interlinked with well-being of both parents and children (Aassve et al., 2001; Monden and de Graaf, 2013). Researchers point to the importance of father's employment, income and education for the transition of young adults to adulthood and moving out from the parental home (Aassve et al., 2001). This could imply that the offspring of unhealthy and low social class fathers might be at a higher risk of having those characteristics 'transmitted', hence determining their risk of nest-leaving. In other words, father's health could be poor not because of the event of nest-leaving itself, but because of father's socio-economic characteristics (Manor et al., 2003). Therefore, in this study, we control for fathers' education, economic activity and income.

6.3.4 The Russian Context

Over the past two decades since the collapse of the Soviet Union, the Russian population has been undergoing a significant social and economic transformation; nonetheless, widespread ILA has remained high (Permyakova and Billingsley, 2017). According to RLMS, 40% of fathers aged 59 years old were still living with their adult child(ren) in 1994-2016, where more than a half of them were sharing a living space with grandchildren (a 'sandwich' household) and/or adult children's partners (children-in-law). Furthermore, most nest-leaving events in the second half of fathers' mid-life (50-59) happened together with the leaving of fathers' children-in-law and grandchildren, meaning that adult children in Russia tend to start their own family 'inside' the parental nest before moving out to live independently from their parents.

Several mechanisms might explain the prevalence of postponed nest-leaving in Russia, which in turn might predict the deterioration of father's health. Many young adults still struggle to afford their own home due to continuing wealth inequality, high unemployment rates, high housing prices and 'insecure' mortgages (Zavisca, 2012). To avoid high rent payments and following

financial difficulties, Russians are more likely to rely on family networks and postpone nest-leaving. However, Russians tend to marry and give birth at a younger age and have limited fertility at higher parities (Perelli-Harris, 2006) due to the negative effect of employment and a lack of material resources (Mikucka, 2016). Russia is distinct from other European countries due to closer timing of nest-leaving, partnership formation and childbirth (Aassve et al., 2013; Billari and Liefbroer, 2010). Sharing household resources, caring for grandchildren and the psychological realisation that the offspring failed to 'launch' can bring emotional strain and financial burden on fathers. Therefore, it could increase their levels of stress and lead to worse subjective well-being, poorer self-rated health and unhealthier behaviours. At the same time, intergenerational support was found to have a positive effect on parental well-being and health (Moor and Komter, 2014), meaning that Russian fathers could be better off living with their younger generations.

Considering the high prevalence of 'sandwich' households in Russia, exclusion of fathers living together with children-in-law and/or grandchildren beside having a partner and adult child(ren) in the household could result in a selection bias and hide the 'true' health effect of transitioning into a 'nest' where all adult children left the parental home in our study. Findings based on the European surveys show that household resources such as income and housing are important determinants of the departure of adult children from the parental home and their union formation (Aassve et al., 2001; de Valk and Billari, 2007). Therefore, we could expect economically-advantaged middle-aged adults to live outside of an ILA separately from their older parents and married offspring. This potential selection of parents into ILAs in Russia could be associated with their lower subjective well-being, poorer health and unhealthier health behaviours when living in ILA.

Fathers in Russia could be particularly disadvantaged in terms of the health effects of postponed nest-leaving. After the collapse of the Soviet Union, Russian men had a significant increase in their mortality rates between 1991 and 1994 (Cockerham, 2000); to date, they still have one of the lowest life expectancies in Europe (World Bank, 2018b). Excessive stress from high unemployment rates and a failure to provide their families led to low well-being, poor health, risky health behaviours and premature deaths among Russian men (Bobak et al., 2004; Cockerham et al., 2006; Keenan et al., 2015; Leon and Shkolnikov, 1998; Malyutina et al., 2002; Pietilä and Rytkönen, 2008b; Saburova et al., 2011). Therefore, middle-aged fathers in Russia might be particularly vulnerable when coping with 'failed to launch' offspring and postponed nest-leaving under the social pressure and cultural expectation to be the primary family providers (Ashwin and Lytkina, 2004). This makes Russia a unique case for studying the importance of nest-leaving for parental well-being and health.

6.4 Study samples

We use the harmonised datasets of individuals and households from the Russian Longitudinal Monitoring Survey (RLMS) collected annually between 1994 and 2016. Chapter 3 provides information on the survey and steps conducted to create the total sample of men who ever participated in 1994-2016 (108,223 observations of 19,968 men aged 16 years old or older). For this study, we derive two separate samples of men: 1) men observed at least once in RLMS between 2004 and 2016 for cross-sectional analysis; 2) observations of men recorded any consecutive years between 1994-2016 for longitudinal analysis. In both samples, we focus only on middle-aged men aged 40-59 years old.

6.4.1 Cross-sectional sample, 2004-2016

First, we aim to establish whether there are associations between nest-leaving and each indicator of fathers' well-being and health. For this purpose, we compare men living with children to men whose children have left the parental home across cohorts and periods. We only select men who have had children, which we obtain from the self-reported fertility history. Because respondents' fertility histories are unavailable before 2004, we focus only on the waves conducted in 2004-2016. In 2004-2016, annual Individual Questionnaires contained three questions on the respondent's fertility: "Do you have children, either your own or officially adopted?", "How many children in total do you have?", and "How many of them are younger than 18?". From these three questions, we constructed a variable indicating whether a man had any child 18 years old or older regardless of their household structure, which we used for the sample selection. We then modified miscoding in the fertility histories of men who self-reported having no children or having only children younger than 18 years old by looking at their household structures and the ages of their household members within each wave. However, we had to rely on men's self-reports of having both minor and/or adult children in their lives regardless of their household roster due to a possibility of having other biological children outside their households.

Table D.1 in Appendix D shows all the steps taken to create the cross-sectional sample. From the original sample of men participating between 2004 and 2016, we first derived 5,720 men aged 40-59 years old with 25,699 observations (Step 1). Next, we used the constructed fertility variable to identify men in each wave who reported that they had either their own (biological) or officially adopted child(ren). By focussing only on observations of men who had at least one biological/adopted child in their lives that year in Step 2, we kept 23,061 observations (10% loss from Step 1) of 5,189 men. Further, we were interested only in men who either already potentially had their adult children moved out from the parental home. On Step 3, we shifted our

focus only to observations of men who self-reported that they had at least one biological/adopted child aged 18 years old or older (adult children) either in life or in a household, which was 82% of observations from the Step 2 sample (18,839 observations of 4,398 men).

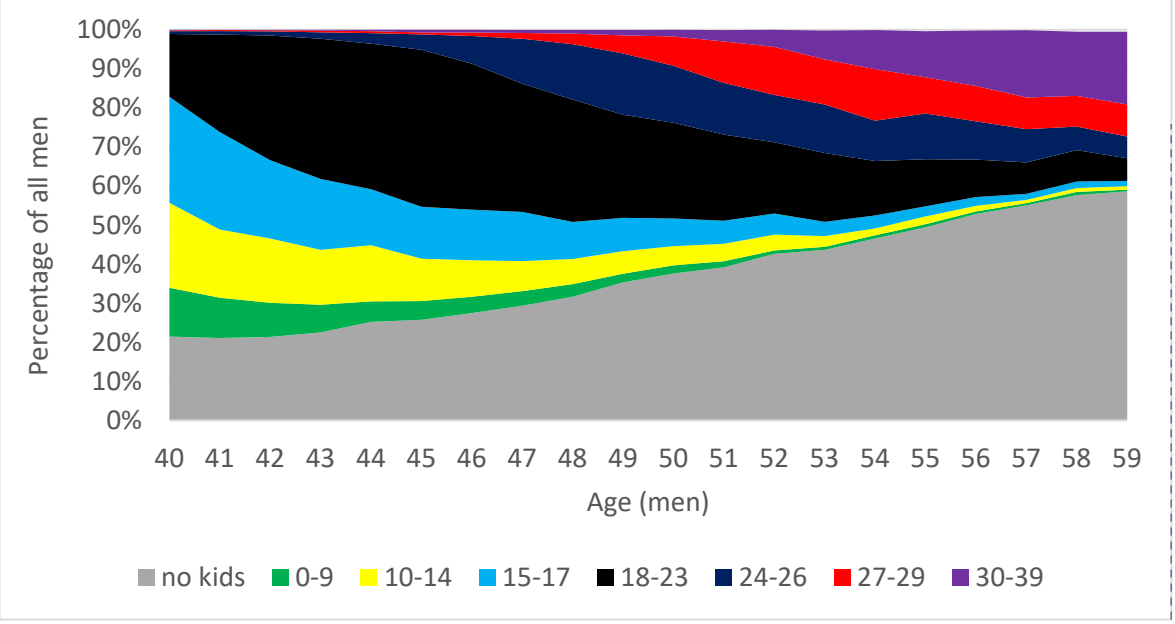
In the sample of men participating between 2004 and 2016 and having at least one adult child (regardless of having minors), only 9.5% of observations were living without a partner. To avoid a possible selection effect related to union dissolution, we excluded 1,782 observations of men who had no partner in a household that year. Finally, we excluded 0.1% of observations (Step 4) with missing values in education and economic activity. Our final cross-sectional sample consisted of 17,040 observations nested within 3,932 middle-aged men living with a partner (here forth, partnered) and had at least one adult child in their lives at a time of participation between 2004 and 2016, where almost a third had at least one child in a household (5,396 observations of 1,607 men).

6.4.2 Longitudinal sample, 1994-2016

To assess the health effects of children moving out from the parental home for Russian fathers, we derive a longitudinal sample of men from all the available waves of RLMS over 1994-2016 to capture their health and living arrangements changes over time in multilevel random- and fixed-effects models. Table D.2 of Appendix D presents all steps we took in order to select men into our longitudinal sample, also showing how many observations and men we lost at each step.

In order to follow men who were likely to have children leaving home, we focussed on observations of men aged between 40 and 59 years old, because the starting age of men's retirement in Russia in 1994-2016 was 60 years old (Step 1). Our sample of men aged 40-59 years old (here forth, middle-aged men) in 1994-2016 was 35,795 observations nested within 7,344 men (63% of the original sample of 19,968 men aged 16 years old or older). Using the household rosters across waves, Figure 6.1 shows that around 20% of men aged 40 years old had no children in a household (regardless of their fertility history), where the share of such men increased with age up to 60% at age of 59 years old. Almost a third of men by their retirement age co-residing with at least one adult child is a distinguishing feature of Russia in comparison to the West. Russian men aged 45 years old were most likely to live with the oldest child(ren) aged 18-23 years old, indicating that on average men were most likely to have the first child at age of 22-27 years old.

Figure 6.1 Distribution of observations of middle-aged men by the age of their oldest child in a household, RLMS 1994-2016 *



* Regardless of men's fertility histories due to their unavailability in RLMS 1994-2003.

Although we did not know men's fertility histories before 2004, we were still able to rely on their annual household rosters to assess a change in their living arrangements from living with at least one adult child to a household with no children (here forth, nest-leaving) and examine any change in their reports on health. To do this, we first keep observations of men whom we ever observed co-residing with at least one child (whether biological/adopted or a stepchild) over 1994-2016, which left us with 78% of the previous sample of middle-aged men on Step 2 (leading to 27,919 observations nested within 5,195 men). To get as close to men's fertility histories as possible, we focussed on 4,245 men ever observed co-residing only with biological/adopted[12] child(ren) on Step 3 (we lost 18% of men from Step 2). Finally, we are interested in observing men living with adult children, where children could leave the parental home for their next life-course stage related to education, work or marriage, rather than because of father's union dissolution. Therefore, on Step 4 we focussed only on 3,336 men ever observed co-residing with at least one adult child (aged 18 years old older) or at least one child who was one year before officially reaching 'adulthood' (aged 17 years old). Among the 909 men dropped from the sample (21% from the Step 3 sample), we could not observe whether they had any adult child in a household ever due to men's attrition/the end of survey, or because their children did not reach adulthood yet due to no available fertility history before 2004.[13]

[12] The RLMS did not distinguish between biological and adopted children in both Household- and individual Questionnaires.

[13] Sensitivity analysis of the sample of men in 2004-2016 took into account self-reported fertility histories and revealed similar results to the longitudinal sample in 1994-2016.

In the remaining sample of 3,336 men (20,144 observations) over 1994-2016, around 20% of those middle-aged men were temporarily absent together with their household from the survey at least once during their participation (Table D.3 of Appendix D). Most of those absent men had in total two spells of participation (15% from the total sample of 3,336 men). Table D.4 (in Appendix D) also shows that 18% of these 3,336 men participated consecutively in one wave (regardless of the number of spells) and only 45% of men participated in at least four consecutive waves. In order to maximise the number of men followed-up over time, we chose the minimum number of *two* consecutive waves required as a criteria to enter our study sample. However, before excluding men participating consecutively only in one wave over the survey, we conducted several steps of censoring of men's observations (Steps 5-8), where we also shifted our focus on men living with a partner in the first wave of our follow-up in order to avoid possible negative effects of being single on health.

Because we were interested in between- and within-person comparison of fathers experiencing a transition to a nest with all children left and fathers still co-residing with children, we dropped men's observations before their oldest child turned 17 years old. In other words, we started to follow-up our sample of 3,336 middle-aged men only from the wave where RLMS first ever recorded them living with the oldest child aged 17 years old or older during their participation. This Step 5 of left-censoring resulted in 13% less observations of 3,336 fathers. Among men who experienced the departure of all adult children from the parental home (886 men, or 27%), we stop following them after the wave with the first observed transition to nest-leaving during their participation in the survey (18.5% of observations of 3,336 men excluded on Step 6). On Step 7, we restricted this sample of 886 men living separately from adult children only to those fathers who experienced the life-course event of transitioning to a nest with all children left at least in the second consecutive wave of their participation. In other words, we dropped 68 observations, where a nest with all children left was recorded after father's temporary attrition (68 men), which led to a decrease in the number of nest-leaving events in our sample by 68 events (8%) with a remaining sample of 3,336 men. Finally, we focussed only on those observations when fathers were living with a partner in a household. Among the remaining 3,336 men, 5% were living without a partner at the start of our follow-up. Our right-censoring of fathers having no partner in a household at Step 8 led to a 4% decrease in the number of observations and a new total number of 3,171 men with 749 nest-leaving events (92% of events remained from Step 7).[14]

[14] Note that we assess men's partnership status only using the household grid and do not rely on men's marital and cohabitation self-reported statuses due to unavailability of the cohabitation status in the survey in 1994-2009.

In the final four steps of our sampling selection, we dropped any observations with missing values and kept the longest spell of participation if we never observed the nest-leaving event over man's participation or only the spell where the event occurred. On Step 9, we excluded 17 observations containing missing values in two covariates (education and economic activity), which led to the exclusion of 11 men from our study sample (due to their participation only in one wave), but no decrease in the number of nest-leaving events in the sample. Because of the earlier noted issue of Russian middle-aged men being temporary absent or completely attrited from the survey, we shifted our focus only on one of the spells per father. First, we reduced the number of observations in the sub-sample of fathers living separately from adult children by 192 observations due to the exclusion of any previous spells before the spell with the observed event of our interest (Step 10). Second, we reduced the number of observations in the sub-sample of fathers continuously co-residing with their children during our follow-up by 542 observations, because we kept only the observations occurring during their longest spell (Step 11). To be able to compare fathers' health before and after the event of nest-leaving, we follow them for at least two consecutive waves. This final step resulted in a 5% decrease in the number of observations and 22% decrease in the number of men (Step 12), but did not change the number of observed nest-leaving events.

Our final longitudinal sample is comprised of men aged 40-59 years old who lived with a partner and participated in at least two consecutive waves over 1994-2016 in RLMS. The sample size is 12,137 observations nested within 2,479 men, among whom 30% of men experienced the departure of all adult children from the parental home (749 events). As mentioned earlier in this section, the participation patterns of middle-aged fathers in RLMS were characterised with around 15% chance of a temporary attrition and a sharp decrease after four waves of their participation. These patterns are in conjunction with Chapter 3, which suggests that fathers' attrition in our study is likely to be non-random. Fathers at later middle-life, low educated and in poor health could be more likely to drop out from our panel sample. Although we eliminate the potential negative effect of partnership dissolution on men's health by excluding any observations of men once they stop living with a partner, we need to be aware of the possible selection effect of healthier men into a long-term co-residence with a partner (Meadows, 2009). Moreover, studies show that adult children living with both parents are less likely to leave parental home earlier (de Valk and Billari, 2007), which could potentially lead to a lower number of nest-leaving events than expected in our study sample. Nevertheless, our comparison between all middle-aged men ever participating in RLMS showed that men whom the survey never recorded living with a child in a household were almost two times more likely to participate only in one wave in comparison to men co-residing with a child at least in one wave. Higher participation rates among

fathers living with children suggest that there might be a low effect of attrition bias on the results of this study. Moreover, focussing on partnered men in our study could also increase men's participation rates, whereas single men are more likely to attrite.

6.5 Variables

6.5.1 Dependent variables

We analyse several outcomes of subjective well-being and health, and two measures of health behaviours: life satisfaction, self-rated health, binge drinking and heavy smoking statuses. Focussing on multiple outcomes allows our study to capture various dimensions of health and distinguish possible effects of nest-leaving on them. We derive these variables from the individual-level RLMS information on health, where all the questions were consistent across 1994-2016, with an exception in the construction of the binge drinking status. Table 6.1 presents the distribution of fathers by the outcomes and covariates separately by cross-sectional (2004-2016) and longitudinal (1994-2016) samples, including any missing values in each outcome. In each outcome, the share of missing values did not exceed more than 1%.

Life satisfaction was derived from the question "To what extent are you satisfied with your life in general at the present time?", which was based on a 5-point Likert scale with answers from 'fully satisfied' (=1) to 'not at all satisfied' (=5). We kept the original structure of the question and used it as a continuous outcome in our analyses to assess the subjective well-being of fathers. The mean value of father's life satisfaction was 2.84 (SD=1.09) in the cross-sectional sample, whereas fathers from the longitudinal sample tended to report slightly worse life satisfaction with a mean of 3.05 (SD=1.14). In both samples, the percentage of observations with missing life satisfaction did not exceed 0.75% (Table 6.1).

Self-rated health (SRH) status was based on a question "How would you evaluate your health?" assessing men's subjective health on a 5-point Likert scale from 'very good' to 'very bad'. We used this health measure as a binary outcome due to low counts in the first and the fifth categories (<1%) and because of the uneven distribution, with more than 60% of fathers reporting 'average' SRH (See Table D.5 in Appendix D for a full distribution). Therefore, we merged 'very good/good' categories into a 'good health' (=0) and 'average/bad/very bad' categories into a 'fair/bad health' (=1). By converting the original variable of SRH status into a binary outcome, we had 71% and 70% of men in the cross-sectional and longitudinal samples, respectively, in fair/bad health. In both samples, the percentage of observations with the missing health status did not exceed 0.70%.

Table 6.1 Distribution of variables, unweighted samples, RLMS

Variables' names	Variables' categories	Cross-sectional sample (2004-2016)		Longitudinal sample (1994-2016)	
		N	% / mean (sd)	N	% / mean (sd)
Life satisfaction	range [0;5]	16,913	2.84 (1.09)	12,053	3.05 (1.14)
	missing	127	0.75	84	0.69
Self-rated health status	Good health	4,843	28.42	3,580	29.50
	Fair/bad health	12,077	70.87	8,483	69.89
	missing	120	0.70	74	0.61
Binge drinking	Not (binge) drinker	9,580	56.22	6,598	54.36
	Yes, binge drinker	7,385	43.34	5,491	45.24
	missing	75	0.44	48	0.40
Heavy smoking	Not (heavy) smoker	10,581	62.10	7,791	64.19
	Yes, heavy smoker	6,448	37.84	4,332	35.69
	missing	11	0.06	14	0.12
Age groups	40-44	2,804	16.46	2,902	23.91
	45-49	4,457	26.16	3,796	31.28
	50-54	5,051	29.64	3,173	26.14
	55-59	4,728	27.75	2,266	18.67
Co-residing children?	No	11,644	68.33	11,388	93.83
	Yes	5,396	31.67	749	6.17
Older gen-n in hh?	No	14,986	87.95	10,596	87.30
	Yes	2,054	12.05	1,541	12.70
Other younger gen-n hh?	No	14,405	84.54	9,729	80.16
	Yes	2,635	15.46	2,408	19.84
Death/inst-n in HH?	No	16,639	97.65	11,909	98.12
	Yes	401	2.35	228	1.88
Education	Incomplete SS	2,225	13.06	1,781	14.67
	Complete SS	8,116	47.63	5,480	45.15
	Vocational SE	3,456	20.28	2,448	20.17
	Higher edu (HE)	3,243	19.03	2,428	20.00
Economic activity	Economically active	13,093	76.84	9,551	78.69
	Economically inactive	3,947	23.16	2,586	21.31
HH income quintile	First quintile	3,252	19.08	2,283	18.81
	Second quintile	3,219	18.89	2,370	19.53
	Third quintile	3,224	18.92	2,309	19.02
	Fourth quintile	3,233	18.97	2,269	18.69
	Fifth quintile	3,201	18.79	2,211	18.22
	missing income	911	5.35	695	5.73
Region of Russia	Moscow & St.Petersburg	1,492	8.76	1,040	8.57
	Central/North/North-West	4,115	24.15	2,693	22.19
	Volga & Ural	5,769	33.86	4,149	34.18
	North Caucasus	2,407	14.13	2,076	17.10
	Siberia & Far East	3,257	19.11	2,179	17.95
Settlement type	urban	10,589	62.14	7,712	63.54
	pgt/rural	6,451	37.86	4,425	36.46
Year		[2004; 2016]	2010.46 (3.52)	[1994; 2016]	2006.85 (6.17)
Total N (observations)		**17,040**	**100**	**12,137**	**100**
Total N (men)		***3932***	**-**	***2479***	**-**

Binge drinking status was derived from men's reports on heavy episodic spirit consumptions. As frequently used in the previous studies on Russian men's alcohol drinking based on RLMS (Malyutina et al., 2002; Perlman, 2010), we define a man as a heavy episodic drinker if he reported 80 grams or more of ethanol consumed on a single occasion. To get this measure, we derive men's responses on how many grams of each alcohol beverage they have consumed per occasion. Figure D.1 (in Appendix D) presents the full scheme of questions related to men's alcohol consumption in RLMS 1994-2016 and Table D.6 (in Appendix D) shows which types of alcohol beverages were asked in each wave of the survey. To calculate the highest amount of grams of pure ethanol consumed on a single occasion by each man, we multiply the reported amount of grams for each beverage as follows: beer*0.054, wine*0.142, fortified wine*0.18, samogon*0.39, vodka*0.44 and other*0.20 (Malyutina et al., 2002; Perlman, 2010). In addition, we matched men's reports on their status of alcohol consumption in the last 30 days (yes/no)[15] with the availability of their reports on the grams of any type of beverage consumed. Around 5% of observations of men reported to be non-drinkers or had a missing record of their drinking status, but had a reported amount of grams consumed of at least one type of alcohol beverages. For these men, we re-coded their drinking status to 'yes, consumed in the last 30 days' and included them in the study analysis. There were less than 0.45% of missing values in men's binge drinking status in both samples of our study, where 45% of men (observations) had at least one episode of binge drinking.

Heavy smoking status has been overlooked in Russian health research, which focused mainly on one's current smoking status (Carlson, 2001; Cockerham, 2000). However, empirical findings show that the intensiveness of smoking is associated with cardiac diseases and higher levels of blood pressure (Groppelli et al., 1992; Hayano et al., 1990; Zvolensky et al., 2003). Moreover, Russian men have relatively high rates of smoking and related mortality (Christopoulou et al., 2011; McKee et al., 1998; Perlman et al., 2015), and we might expect a variation in the intensiveness of smoking among fathers experiencing a life-course change in the family, such as nest-leaving. In this study, the variable of heavy smoking was derived from three nested questions: 'Do you smoke', 'In the last 7 days have you smoked anything?', and 'About how many individual cigarettes do you usually smoke in a day?'. The third question provided a continuous outcome of the number of cigarettes smoked per day within a week. Using this question, we constructed a

[15] This question was asked in all waves of the survey; however, there was an additional question preceding this one in 2006-2016 ('Do you consume alcoholic beverages, including beer, at least sometimes?'). The general drinking status of men was coded according to the reports from the available questions (in 1994-2005, a man was a current drinker if he reported 'yes, consumed in the last 30 days'; in 2006-2016, a man was a current drinker if he reported both 'yes, consuming at least sometimes' and 'yes, consumed in the last 30 days').

dichotomous outcome of heavy smoking status, where we referred to '20 cigarettes' as a 'pack' of cigarettes,[16] and divided men by those smoking less than a pack per day (=0), including never smoking men, or smoked a pack or more per day (=1). In total, only 11 observations (0.06%) in the cross-sectional sample and 14 observations (0.12%) in the longitudinal sample had a missing report on the number of cigarettes smoked per day (if they were smokers in the last 7 days).

6.5.2 Main independent variable: nest-leaving

In the cross-sectional sample (2004-2016), we defined a father living separately from adult children if he reported having at least one child aged 18 years old or older (adult child), but had no children living in his household. We derived fertility self-reports (including official adoptions) from the harmonised individual-level file, while we could access the relationship types between all household members at the time of the survey from the harmonised household-level file.

In the longitudinal sample (1994-2016), we defined a father as one experiencing a nest-leaving event if he was living with at least one child in wave *t* and had no children of any age left in a household in wave *t+1*. We derived information on father's transition to nest-leaving from the harmonised household-level file by comparing household rosters between two consecutive waves *t* and *t+1* and assessing whether the child(ren) who were co-residing with a father in wave *t* were recorded as 'absent' in wave *t+1*. RLMS defines a household member as 'absent' if he/she either moved to another address, started to live in a separate household at the same address, studied in another population centre, left for a business trip, moved to an institution or died since the last wave of participation.[17]

Important feature of RLMS is that this survey defines a household as a group of people sharing income and expenditures regardless of their address. In other words, several households could exist at the same address.[18] This could mean that, when leaving the parental home, an adult child might stay at the same address, but 'move' to another household or create a new household due to their income and expenditures being unrelated to their previous (parental) household. In the Russian case, we would expect this to happen in rural areas, where parents could share a land with their adult child(ren), potentially with separate houses for each household, but distinguish

[16] On average, 20 cigarettes is equal to one pack of cigarettes produced by tobacco firms. The distribution of men by the number of cigarettes smoked per day indicated that the majority of men tended to report a round number, such as 10 or 20 cigarettes smoked per day, which was equal to 'half a pack' or 'a pack' of cigarettes per day, respectively.

[17] In the RLMS, the head of a household reports the reason for absence of each hh member.

[18] The RLMS follows-up all households living at the same address only if they resulted in a split-up from the same household earlier in the survey.

their income and expenditures from adult child(ren)'s households. Taking these differences between the survey's definitions of a household and an address (often referred as a dwelling in RLMS) into account, we here forth refer to the parental household as a 'nest' with a nest-leaving event if all their children moved to another household(s) regardless of the address.

6.5.3 Other covariates

Father's socio-demographic characteristics: we control for father's age, year of observation, economic activity and educational level. We divided age into four 5-years groups (40-44, 45-49, 50-54, 55-59). The distribution of fathers' observations was similar between the age groups. Father's economic activity and education are both important predictors of nest-leaving (Aassve et al., 2001; Billari et al., 2007) and health. We derived a binary variable of men's economic activity from a single question, which indicated whether a man was currently working ('economically active'=0), not working or on (un)paid leave ('economically inactive'=1). We constructed four main variables of education: Incomplete secondary school (SS), complete SS, vocational training and/or secondary education ('vocational/SE'), and a higher education (HE).[19] In both samples, around 77-79% of men's observations reported being economically active at the time of participation in the survey, and almost half of each sample had the highest education of a complete SS.

Other categories of intergenerational living arrangements (ILA): in both cross-sectional and longitudinal samples of our study, intergenerational living arrangements (ILAs) with older and/or younger generations were common. 12-13% of men were living with at least one parent, parent-in-law or grandparent (here forth, older generations) in the same household, with the highest share among 40-49 years old men. At the same time, Russian young adults tend to get married and have a child before moving out from the parental home, meaning that middle-aged parents often co-reside together with their grandchildren and offspring's partners (children-in-law). Percentage of men living not only with adult child(ren), but also with at least one child-in-law and/or grandchild (other younger generations) dramatically increased with age from 24% among 45-49 year old men up to 40% among 55-59 year old men. To cover the full picture of intergenerational co-residence of middle-aged fathers in Russia when assessing the health effect of the departure of adult children from the parental home, we adjusted our analyses for both

[19] We imputed any missing values in education by using men's reports from other waves, because we assumed that men selected into our study samples had their education completed by the age of 40, with a low chance of further increase in their educational level. We imputed men's reports on education at the start of any sampling selection, when we derived all middle-aged men for both cross-sectional and longitudinal samples (Step 1).

types of ILAs as two dichotomous covariates. Finally, because negative life-course events like bereavement could deteriorate fathers' health more than nest-leaving (Dare, 2011), we accounted for any death or institutionalisation (absent due to hospitalisation or in prison) of one of the household members occurring between *t-1* and *t*.

Household's socio-economic and residential characteristics: to control for income inequality and the differences in the housing market within Russia, we included household's income quintile, settlement type and geographic region. We derived household income from one question on the 'total income of the entire family in the last 30 days' (included wages, pension, etc.). We used the OECD-modified scale[20] to construct the variable consisting of five income quintiles (fifth=highest quintile), where we also included the sixth category as 'missing' (5%). RLMS originally included three types of settlement: urban, PGT (*poselok gorodskogo tipa*, a small town between the size of a village and town) and rural. We re-coded the variable of settlement type into a dichotomous variable by collapsing PGT with rural areas (36-38% in both samples) due to a low count in the former. We grouped the original 38 primary sample units (PSU) into five main geographic parts of Russia, which were 'Moscow & St. Petersburg' (9%), 'Central/North/North-West' (22-24%), 'Volga & Ural' (34%), 'North Caucasus' (14-17%), and 'Siberia & Far East' (18-19%).

6.6 Methodology

In this study, we used three approaches: 1) cross-sectional (using the cross-sectional sample), 2) multilevel random-effects, and 3) multilevel fixed-effects (both using the longitudinal sample). Each approach has advantages and disadvantages. The cross-sectional models help to assess whether there is an association between living separately from adult children and each indicator of father's well-being and health. This approach is important for clarifying cross-sectional findings in the previous studies and establishing the overlooked correlation between nest-living and father's health in the Russian context. However, cross-sectional models do not control for unobserved heterogeneity at both levels (individuals and their measurement occasions), therefore being unable to account for any possible effects of self-selection. To overcome this limitation of a cross-sectional approach, we applied two multilevel approaches, random-effects and fixed-effects, where we use our longitudinal study sample to investigate the relationship between a transition to a nest-leaving event and father's health indicators reported in both *t-1*

[20] The OECD (Organisation for Economic Co-operation and Development)-modified scale calculates the family income per capita by dividing the sample in quintiles according to Hagenaars et al. (1996). The household head (in our study, the father) is assigned with a value of 1, whereas any additional family member – with a value of 0.5, and each minor aged younger than 14 years old – a value of 0.3.

and *t*. These approaches allow us to control for fathers' unobserved characteristics when analysing this association by observing and comparing father's outcomes and covariates before and after the departure of adult children from the nest.

The random-effect models assess whether this relationship is explained by fathers' characteristics or by the differences between those fathers. However, the random-effects approach could still not fully account for the potential selection bias. The fixed-effects approach focuses only on the within-person estimation to minimise this selection bias and clarify the studied relationship by comparing father's health before and after his experience of a nest-leaving event. However, this approach has several limitations. First, it does not provide estimates of time-invariant characteristics, meaning that the variables of fathers' education, settlement type and region of Russia will be omitted in the fixed-effects models of this study. Second, this approach requires a sufficient sample size of fathers experiencing changes in their health indicators. Finally, when focussing on a binary outcome, fixed-effects approach reduces the sample size by omitting those fathers who had no change in the outcome over the period of observation in our study.

6.6.1 Cross-sectional approach

Using our cross-sectional study sample (2004-2016), a simple regression model estimates the direction of the relationship between the binary covariate of a nest where all children left the parental home and fathers' health indicators. For the continuous outcome of life satisfaction (Y_t), we model its linear relationship with this type of a living arrangement separately from adult children ('E_t') and '*k*' set of other covariates ('X_t') of '*j*' fathers at each '*t*' wave by estimating a vector of coefficients (*ß*) for each covariate (E_t and X_{kt}), which creates the next equation for the latent variable Y^*_{jt}:

$$Y^*_{jt} = \alpha_j + ß_E E_{tj} + ß_k X_{tjk} + \varepsilon_{tj} \quad (1)$$

In this ordinary least squares (OLS) model (1), the intercept 'α' is the total time-constant effect of E_j and other covariates X_k on father's life satisfaction (*Y*), varying across fathers (*j*). A vector of residuals ε_{tj} comes from the difference between the observed *Y* and estimated Y^* for each father (time-variant, unobserved and independent from E_j and X_{jk}, but dependent on *Y)*. Because higher values indicate lower levels of father's satisfaction with life in our continuous outcome, a positive coefficient $ß_E$ would mean that fathers living separately from adult children are more likely to report lower levels of life satisfaction (due to higher values of life satisfaction) than men still living with child(ren) in a household, and vice versa. Cross-sectional logistic regression modelling of the relationship between a separate co-residence from adult children (E_{tj}) and each binary outcome (Y_i) of our study (SRH, binge drinking and heavy smoking) would allow us to estimate at the 5%

level the significance of father's probability to have Y_i=1 (poor health, be a binge drinker or heavy smoker) if a father was living separately from adult children. In each cross-sectional model of this study, we adjusted standard errors for a hierarchical structure of observations nested within fathers over time.

6.6.2 Multilevel random-effects approach

The random-effects approach introduces a residual variance at each level with an aim to separate the dependency between individuals and repeated measures. Random-effect models allow our intercept α_j to be random (by adding a random variable u_{0j}) and fitting a 'within-fathers' residual variance in a 2-level model (observations nested within fathers) instead of ε_{jt} in a 1-level model. In other words, the intercept α becomes β_{0j} as an equation of $[\beta_0 + u_{0j}]$, with the restriction that the higher-level (u_{0j}) residual vector is to be normally distributed (Goldstein 2011, p.18):

$$\sum (u_{0j}) = 0; \text{var}(u_{0j}) = \partial^2_{u0} \quad (2)$$

With the example of a continuous outcome of life satisfaction (Y), the estimators would be based on the sum of both fixed and random parts using the Generalised Least Squares (GLS) technique as the next equation shows:

$$\sum(y^*_{tj}) = \beta_0 + \beta_E E_{tj} + \beta_k X_{tjk} + (u_{0j} + X_{tjk} + e_{0tj}), \text{ where } \text{var}(e_{0tj}) = \partial^2_{e0} \quad (3)$$

By applying the random and fixed parts of the equation (3), a random-effect model would predict the estimates based on both time-variant and time–constant covariates, which are less likely to be biased from both between- and within-person variation in fathers' characteristics. However, the random-effects assumption of statistical independence between observed covariates and unobserved characteristics of fathers can often be violated and result in heterogeneity bias (Allison, 2009). To overcome this limitation of random-effect models, we separately focussed on the fixed part of the equation (3). By applying a fixed-effects approach, we analysed the effects of a life-course event of nest-leaving and changes in other covariates on the variation of each health indicator of fathers between two consecutive waves, while keeping their time-constant differences 'fixed'.

6.6.3 Multilevel fixed-effects approach

The fixed-effects approach focuses only on within-person variation in fathers' characteristics by estimating the effects of time-variant measures on changes in fathers' health indicators. Instead of calculating residual variances for each level used in a random-effect model, fixed-effect models rely on the higher-level (individual) means derived from the outcome (Y), covariates (X_i) and

residuals (e_{jt}), which is the *mean deviation method* and used in OLS models. This approach of controlling for between-effects at the individual level allows us to overcome heterogeneity bias by omitting the dummy variables of the individual-level subjects themselves (in our case, fathers' ID variable). After applying the mean deviation method, a fixed-effect model can be formulated as the next equation:

$$(y_{tj} - \overline{y_j}) = ß_k (X_{tjk} - \overline{X_j}) + (e_{0tj} - \overline{e_j}) \quad (4)$$

By accounting for time-invariant confounders, fixed-effects models are less susceptible to the bias from unobserved heterogeneity and continuing errors from individuals' reports (Gunasekara et al., 2014; Musick and Bumpass, 2012). Therefore, fixed-effects models help to exclude biases due to health selection effect. However, fixed-effects logistic models account only for those individuals whose outcome changed at least once over time (Allison, 2009b). Hence, we had a significant reduction in the numbers of observations by 32% in the sample of binge drinking, by 44% in the sample of health status, and by 59% in the sample of heavy smoking (Table D.7 in Appendix D).

6.7 Results

6.7.1 Descriptive analyses

Tables D.8 – D.11 in Appendix D show the distributions of fathers' observations in both cross-sectional (2004-2016) and longitudinal (1994-2016) samples with the mean values of life satisfaction, health status, binge drinking and heavy smoking.

Life satisfaction: on average, middle-aged fathers who were older, living separately from adult children, with no older generations, had a household member moved to a hospital/prison or died, economically inactive, in a lower income quintile, living in rural area, and living in Siberia/Far East parts of Russia were more likely to report lower levels of life satisfaction (varying between 2.8-3.0, equal to 'neither satisfied nor unsatisfied'). Mean values of life satisfaction did not differ between the fathers living with or without other young generations in a household (in both samples). Between 1994-2016, life satisfaction of the Russian fathers significantly improved. Fathers had the lowest mean of 4.1 in 1998 (the year of economic crisis), which then has been annually improving down to 2.8 in 2016.

SRH status: in both samples, fathers' self-reported health in mid-life was significantly worse among older, living separately from adult children, with no older generation, with other younger generation, recently experiencing a negative life event in a household, lower educated,

economically inactive, with a lower income quintile, living in urban areas, and in Siberia/Far East men. Fathers' health status significantly improved by 15% points between 1994 and 2016. Once we excluded men with no observed changes in the health status for the fixed-effects models, we had on average 10% lower share of men in fair/poor health than the full longitudinal study sample used in the random-effects models. The distribution of men in fair/poor health by the covariates was similar between the 'fixed-effects' and 'random-effects' samples (except for years, where a small difference was observed).

Binge drinking: fathers in their mid-life were significantly more likely to be binge drinkers if they were younger, living with no older generation, recently had a negative life event in a household, with low educational level, from a low income quintile, economically active (as opposite to life satisfaction and health status), from an urban area, and in Siberia/Far East. The percentage of binger-drinking fathers was almost as twice low in 2016 (34%) as in 1994 (59%). However, binge drinking status did not significantly differ between men living separately from adult children and men still co-residing with them including other younger generations like grandchildren and offspring's partner (overall, 45% were binge drinkers in both samples). After we excluded men with no change in their statuses of binge drinking, the distributions of binge drinkers became equal by their settlement type and co-residence statuses with older generations, other younger generations, and events of death or institutionalisation (with an overall share of 49%).

Heavy smoking: younger middle-aged fathers, living separately from adult children, experiencing a negative life event in a household, with a low level of education and income quintile, living in rural areas, Siberia/Far East and Central/North/North-West parts of Russia were significantly more likely to smoke a pack of cigarettes or more per day. In contrast, there was an equal distribution of heavy-smoking fathers by their co-residential status with older and/or younger generations, as well as by their economic activity. Between 1994 and 2016, the share of heavy-smoking fathers fluctuated between 30 and 40%, with the lowest level observed in 2016. However, this distribution, as well as by other covariates, was on average 10% points higher in the 'fixed-effects' sample, which excluded any men having no observed changes in their heavy smoking status over time. In addition, this sample had a similar distribution of heavy smokers by fathers' statuses of living separately from adult children, with older generations, other younger generations, and in urban/rural areas, but with a significantly higher share of heavy-smokers among economically active fathers.

6.7.2 Who lives separately from adult children?

In the cross-sectional sample (2004-2016), 30% of middle-aged fathers who were living with a partner and had at least one adult child in their lives were living in a 'nest' where all adult children

have already left the parental home at the time of participation (5,314 observations). However, the share of those living separately from adult children was only 10% among 40 years old fathers, which gradually increased with age up to 55% among 59 years old fathers. The highest percentage was 59% among fathers aged 54 years old. Over 2004-2016, the overall share of fathers separately from adult children increased by 10% points, with the highest value of 35% in 2013.

Table 6.2 Distribution of men living separately from adult child(ren) and men still co-residing with them, derived from the cross-sectional sample of the study, RLMS 2004-2016

Variable	Living together with adult child(ren)			Living separately from adult child(ren)			Diff
	Mean	95% CI		Mean	95% CI		[1 - 4]
	1	2	3	4	5	6	7
Life satisfaction	2.817	2.797	2.837	2.889	2.859	2.918	-0.072
N (obs-s), no missing	**11555**	-	-	**5358**	-	-	-
Fair/poor health	0.685	0.676	0.693	0.777	0.766	0.788	-0.092
N (obs-s), no missing	**11567**	-	-	**5353**	-	-	-
Yes, binge drinker	0.430	0.421	0.439	0.446	0.433	0.460	-0.016
N (obs-s), no missing	**11594**	-	-	**5371**	-	-	-
Yes, heavy smoker	0.369	0.361	0.378	0.398	0.385	0.411	-0.029
N (obs-s), no missing	**11635**	-	-	**5394**	-	-	-
Age 40-44	0.214	0.206	0.221	0.059	0.052	0.065	0.155
Age 45-49	0.301	0.293	0.309	0.176	0.166	0.187	0.125
Age 50-54	0.281	0.273	0.290	0.329	0.316	0.341	-0.047
Age 55-59	0.204	0.197	0.211	0.436	0.423	0.449	-0.232
Older gen-n(s)	0.129	0.123	0.135	0.102	0.094	0.110	0.028
Other younger gen-n(s)	0.209	0.201	0.216	0.038	0.033	0.043	0.170
Death/inst-n in hh	0.022	0.019	0.024	0.028	0.023	0.032	-0.006
Incomplete SS	0.127	0.121	0.133	0.138	0.128	0.147	-0.010
Complete SS	0.468	0.459	0.477	0.493	0.480	0.507	-0.025
Vocational SE	0.204	0.197	0.212	0.200	0.189	0.210	0.005
Higher edu (HE)	0.200	0.193	0.207	0.169	0.159	0.179	0.031
Economically inactive	0.212	0.205	0.219	0.274	0.262	0.286	-0.062
First quintile	0.183	0.176	0.190	0.208	0.197	0.219	-0.025
Second quintile	0.183	0.176	0.190	0.202	0.192	0.213	-0.020
Third quintile	0.193	0.185	0.200	0.182	0.172	0.192	0.011
Fourth quintile	0.189	0.182	0.196	0.192	0.181	0.202	-0.003
Fifth quintile	0.191	0.184	0.199	0.180	0.170	0.190	0.011
Missing income	0.061	0.057	0.066	0.036	0.031	0.041	0.025
Moscow & St.Petersburg	0.103	0.097	0.108	0.054	0.048	0.060	0.049
Central/North/North-West	0.227	0.220	0.235	0.272	0.260	0.284	-0.044
Volga & Ural	0.315	0.306	0.323	0.390	0.377	0.403	-0.075
North Caucasus	0.171	0.164	0.178	0.078	0.071	0.085	0.093
Siberia & Far East	0.184	0.177	0.191	0.207	0.196	0.217	-0.023
PGT/rural	0.357	0.349	0.366	0.424	0.411	0.437	-0.067
N (observations)	**11463**	-	-	**5314**	-	-	-

Table 6.2 shows that fathers whose adult children were living in a separate household were significantly less satisfied with life, more likely to smoke heavily and had poorer health at the 5% level. Fathers who were living separately from children were also significantly less likely to live with older and/or other younger generations, have a higher education and more likely to be in the lowest income quintiles at the 5% level, although they were less likely to have a missing report on their household income. Finally, fathers with no adult children in a household were significantly less likely to live in urban areas; their likelihood of living in Moscow & St. Petersburg or North Caucasus was two times lower than among fathers still living with children. Our longitudinal sample of fathers (1994-2016) had a similar distribution of fathers co-residing separately from adult children by the outcomes and covariates. Using this sample, we found that, among 749 events of nest-leaving, 75% had child(ren) moved to another household, 9% went to serve in the army, 8% left to study, and the rest of the nest-leaving reasons were missing (5%) or 'other' (e.g. death or institutionalisation). From the descriptive analysis, it is still unclear whether men living separately from adult children had worse health indicators because of this living arrangement or they were simply more likely to be older and, hence, report worse subjective well-being and health. Cross-sectional regression analysis provides a further investigation of this relationship considering men's socio-demographic and household characteristics.

6.7.3 Cross-sectional models

In Table 6.3-Table 6.6,[21] the first model (M1) shows that fathers co-residing in a separate household from their adult children were significantly more likely to report fair/poor SRH, be binge drinkers and heavy smokers at the 5% level, after adjusting for age. However, fathers living in the nest where all children left the parental home did not have a significantly different subjective well-being from fathers living with children. In all other health indicators, the significant disadvantage of men having no children in a household persisted in M2 and M3 at the 5% level. The measure of fathers' subjective health status used in our study was more suitable for the assessment of fathers' overall feelings about their health, which was not explained by fathers' differences by age, other types of living arrangements, socio-economic and geographic characteristics. In addition, fully-adjusted models confirmed a significant association between a separate co-residence from adult children and fathers' unhealthy behaviours.

Fathers aged 50-59 years old, with low education and in earlier years of the survey were significantly more likely to have lower subjective well-being and fair/poor SRH, despite being

[21] (Standard errors in parentheses, adjusted for clustering of observations within fathers); + p<.10, * p<.05, ** p<.01, *** p<.001

significantly less likely to practice unhealthy behaviours. Economic measures captured a significantly lower life satisfaction and poorer SRH among fathers who were not working (or on leave) and from the lowest income quintile, but these associations were very weak in health behaviours. Living in urban areas was associated with binge drinking, lower life satisfaction and fair/poor SRH. Fathers with the greatest life satisfaction were found in in North Caucasus, whereas fathers from Moscow & St. Petersburg had the lowest likelihood of binge drinking and being in fair/poor health than any another region of Russia. Unlike living with other younger generations, living with older generations was weakly associated with fathers' binge drinking and had a lower likelihood of reporting fair/poor SRH.

Table 6.3 Cross-sectional linear regression models for life satisfaction (from high to low), 16,913 observations, Russian fathers, RLMS 2004-2016

Independent variables	M1	M2	M3
Age groups (ref: 40-44)			
45-49	0.07*	0.07*	0.07*
	(0.03)	(0.03)	(0.03)
50-54	0.13***	0.13***	0.12***
	(0.04)	(0.04)	(0.03)
55-59	0.12**	0.12**	0.07*
	(0.04)	(0.04)	(0.04)
Adult children left hh (ref: not yet)			
Yes	0.05	0.04	0.00
	(0.03)	(0.03)	(0.03)
Living with older generation (ref: no)			
Yes		-0.05	0.00
		(0.04)	(0.04)
Living with other younger generation (ref: no)			
Yes		-0.01	-0.01
		(0.04)	(0.03)
Any HH member dead/institutionalized after last observation? (ref: no)			
Yes		0.20**	0.11+
		(0.07)	(0.06)
Education (ref: incomplete SS)			
Complete SS			-0.08*
			(0.04)
Vocational/SE			-0.20***
			(0.04)
Higher edu (HE)			-0.25***
			(0.04)
Economic activity (ref: economically active)			
Economically inactive			0.51***
			(0.03)
HH income quintile (ref: first quintile)			
Second quintile			-0.20***
			(0.03)
Third quintile			-0.33***
			(0.03)
Fourth quintile			-0.46***
			(0.04)
Fifth quintile			-0.65***
			(0.04)
Missing income			-0.43***
			(0.05)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			-0.00
			(0.05)
Volga & Ural			0.00
			(0.05)
North Caucasus			-0.19***
			(0.06)
Siberia & Far East			0.08
			(0.05)
Settlement type (ref: urban)			
PGT/rural			-0.15***
			(0.03)
Year			-0.04***
			(0.00)

Table 6.4 Cross-sectional logistic regression models for fair/poor self-rated health (SRH) status, 16,920 observations, Russian fathers, RLMS 2004-2016

Independent variables	M1	M2	M3
Age groups (ref: 40-44)			
45-49	0.31***	0.28***	0.28***
	(0.06)	(0.06)	(0.06)
50-54	0.68***	0.63***	0.64***
	(0.07)	(0.07)	(0.07)
55-59	0.96***	0.90***	0.89***
	(0.08)	(0.08)	(0.08)
Adult children left hh (ref: not yet)			
Yes	0.26***	0.29***	0.26***
	(0.06)	(0.07)	(0.07)
Living with older generation (ref: no)			
Yes		-0.17*	-0.10
		(0.09)	(0.09)
Living with other younger generation (ref: no)			
Yes		0.19**	0.22**
		(0.07)	(0.08)
Any family member recorded as dead/institutionalized (ref: no)			
Yes		0.30*	0.21
		(0.13)	(0.13)
Education (ref: incomplete SS)			
Complete SS			-0.10
			(0.08)
Vocational/SE			-0.26**
			(0.10)
Higher edu (HE)			-0.36***
			(0.10)
Economic activity (ref: economically active)			
Economically inactive			0.37***
			(0.07)
HH income quintile (ref: first quintile)			
Second quintile			0.02
			(0.07)
Third quintile			-0.07
			(0.07)
Fourth quintile			-0.05
			(0.08)
Fifth quintile			-0.17*
			(0.08)
Missing income			-0.36**
			(0.11)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.23*
			(0.12)
Volga & Ural			0.16
			(0.11)
North Caucasus			-0.18
			(0.12)
Siberia & Far East			0.44***
			(0.12)
Settlement type (ref: urban)			
PGT/rural			-0.26***
			(0.07)
Year			-0.05***
			(0.01)

Table 6.5 Cross-sectional logistic regression models for binge drinking, 16,965 observations, Russian fathers, RLMS 2004-2016

Independent variables	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.10+	-0.12*	-0.13*
	(0.06)	(0.06)	(0.06)
50-54	-0.21**	-0.23***	-0.22***
	(0.06)	(0.06)	(0.06)
55-59	-0.37***	-0.40***	-0.37***
	(0.07)	(0.07)	(0.07)
Adult children left hh (ref: not yet)			
Yes	0.15**	0.16**	0.14*
	(0.05)	(0.06)	(0.06)
Living with older generation (ref: no)			
Yes		-0.20**	-0.15+
		(0.08)	(0.08)
Living with other younger generation (ref: no)			
Yes		0.06	0.07
		(0.07)	(0.07)
Any family member recorded as dead/institutionalized (ref: no)			
Yes		0.23*	0.18
		(0.11)	(0.11)
Education (ref: incomplete SS)			
Complete SS			-0.04
			(0.07)
Vocational/SE			-0.18*
			(0.09)
Higher edu (HE)			-0.31***
			(0.09)
Economic activity (ref: economically active)			
Economically inactive			-0.05
			(0.06)
HH income quintile (ref: first quintile)			
Second quintile			-0.04
			(0.06)
Third quintile			-0.04
			(0.07)
Fourth quintile			0.07
			(0.07)
Fifth quintile			0.04
			(0.08)
Missing income			-0.22*
			(0.10)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.38***
			(0.10)
Volga & Ural			0.52***
			(0.10)
North Caucasus			0.36**
			(0.11)
Siberia & Far East			0.65***
			(0.11)
Settlement type (ref: urban)			
PGT/rural			-0.18**
			(0.06)
Year			-0.04***
			(0.01)

Table 6.6 Cross-sectional logistic regression models for heavy smoking, 17,029 observations, Russian fathers, RLMS 2004-2016

Independent variables	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.11+	-0.13*	-0.14*
	(0.06)	(0.06)	(0.06)
50-54	-0.19**	-0.23**	-0.23**
	(0.07)	(0.07)	(0.08)
55-59	-0.30***	-0.34***	-0.32***
	(0.08)	(0.08)	(0.09)
Adult children left hh (ref: not yet)			
Yes	0.19**	0.22***	0.18**
	(0.06)	(0.07)	(0.07)
Living with older generation (ref: no)			
Yes		-0.02	-0.01
		(0.09)	(0.09)
Living with other younger generation (ref: no)			
Yes		0.17*	0.12
		(0.08)	(0.08)
Any family member recorded as dead/institutionalized (ref: no)			
Yes		0.24*	0.17
		(0.12)	(0.12)
Education (ref: incomplete SS)			
Complete SS			-0.20*
			(0.08)
Vocational/SE			-0.62***
			(0.10)
Higher edu (HE)			-0.98***
			(0.12)
Economic activity (ref: economically active)			
Economically inactive			0.01
			(0.07)
HH income quintile (ref: first quintile)			
Second quintile			-0.14*
			(0.07)
Third quintile			-0.14+
			(0.07)
Fourth quintile			0.00
			(0.08)
Fifth quintile			-0.08
			(0.09)
Missing income			-0.24*
			(0.11)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.06
			(0.12)
Volga & Ural			-0.13
			(0.12)
North Caucasus			-0.17
			(0.14)
Siberia & Far East			0.10
			(0.13)
Settlement type (ref: urban)			
PGT/rural			-0.02
			(0.08)
Year			-0.03***
			(0.01)

6.7.4 Random-effects models

After the cross-sectional analysis, we applied a multilevel random-effects approach to assess the association between the transitions to a nest where all children left the parental home and fathers' health indicators (using the longitudinal sample 1994-2016). The results are presented in Tables Table 6.7-Table 6.10, which confirm the absence of any association between living separately from adult children and fathers' life satisfaction. Random-effects models also confirmed a significant association between nest-leaving and fair/poor SRH status at the 5% level, which we found earlier in the cross-sectional models. However, fathers who recently experienced a nest-leaving event did not significantly differ from fathers still co-residing with their child(ren) by their binge drinking and heavy smoking statuses in any of the nested models (M1-M3), unlike the cross-sectional results. Elimination of this significant association in the random-effects models suggests that person-level factors confounded a higher likelihood of binge drinking and heavy smoking among fathers whose children left the parental home in all three models (M1-M3). Random-effects results suggest that the selection of fathers into unhealthy behaviours and nest-leaving could explain why living separately from adult children were worse off in terms of binge drinking and heavy smoking.

As for other covariates, older mid-life age was still associated with less satisfaction with life, poorer SRH, lower chances of binge drinking and heavy smoking at the 5% significance level. Living with other younger generations (children-in-law and/or grandchildren) was no longer significantly associated with fathers' SRH, but was significantly associated with a higher likelihood of binge drinking. Differences in unhealthy behaviours disappeared between the income quintiles and settlement types; however, economic activity became significantly associated with healthier behaviours, and education continued to be an important predictor of all four outcomes. Living with older generations continued to be significantly associated with good SRH, and a recent negative life event in a household became significantly associated with fair/poor SRH. Regional differences continued to be insignificant with respect to health behaviours.

Table 6.7 Linear Random-effects regressions of life satisfaction among 2,405 Russian fathers (11,649 observations) with 722 men experiencing nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.05+	-0.05+	0.07**
	(0.03)	(0.03)	(0.03)
50-54	-0.14***	-0.15***	0.10**
	(0.03)	(0.03)	(0.03)
55-59	-0.22***	-0.22***	0.07+
	(0.04)	(0.04)	(0.04)
Adult children left hh (ref: not yet)	-0.00	-0.01	0.04
	(0.04)	(0.04)	(0.04)
Living with other younger generation (ref: no)		-0.01	-0.01
		(0.03)	(0.03)
Living with older generation (ref: no)		-0.07	-0.04
		(0.04)	(0.04)
Any HH member dead/institutionalized (ref: no)		0.11+	0.08
		(0.07)	(0.06)
Education (ref: incomplete SS)			
Complete SS			-0.07*
			(0.03)
Vocational/SE			-0.17***
			(0.04)
Higher edu (HE)			-0.27***
			(0.04)
Economic activity (ref: economically active)			
Economically inactive			0.43***
			(0.03)
HH income quintile (ref: first quintile)			
Second quintile			-0.16***
			(0.03)
Third quintile			-0.22***
			(0.03)
Fourth quintile			-0.33***
			(0.03)
Fifth quintile			-0.46***
			(0.04)
Missing income			-0.23***
			(0.05)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			-0.00
			(0.06)
Volga & Ural			0.09
			(0.06)
North Caucasus			-0.08
			(0.06)
Siberia & Far East			0.18**
			(0.06)
Settlement type (ref: urban)			
PGT/rural			-0.11**
			(0.03)
Year			-0.06***
			(0.00)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.8 Logit Random-effects regressions of self-rated health (SRH) status among 2,416 Russian fathers (11,723 observations) with 729 men experiencing nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	0.39***	0.37***	0.45***
	(0.08)	(0.08)	(0.08)
50-54	0.79***	0.74***	0.89***
	(0.09)	(0.10)	(0.10)
55-59	1.20***	1.13***	1.29***
	(0.11)	(0.12)	(0.12)
Adult children left hh (ref: not yet)	0.38**	0.40**	0.39**
	(0.13)	(0.13)	(0.13)
Living with other younger generation (ref: no)		0.13	0.15
		(0.10)	(0.09)
Living with older generation (ref: no)		-0.40**	-0.30*
		(0.12)	(0.12)
Any HH member dead/institutionalized (ref: no)		0.58*	0.55*
		(0.23)	(0.23)
Education (ref: incomplete SS)			
Complete SS			-0.08
			(0.11)
Vocational/SE			-0.25+
			(0.14)
Higher edu (HE)			-0.45**
			(0.15)
Economic activity (ref: economically active)			
Economically inactive			0.36***
			(0.09)
HH income quintile (ref: first quintile)			
Second quintile			0.05
			(0.10)
Third quintile			-0.13
			(0.10)
Fourth quintile			-0.08
			(0.11)
Fifth quintile			-0.23+
			(0.12)
Missing income			-0.41**
			(0.14)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.32+
			(0.19)
Volga & Ural			0.27
			(0.19)
North Caucasus			-0.55**
			(0.21)
Siberia & Far East			0.46*
			(0.20)
Settlement type (ref: urban)			
PGT/rural			-0.41***
			(0.12)
Year			-0.04***
			(0.01)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.9 Logit Random-effects regressions of binge drinking among 2,479 Russian fathers (11,901 observations) with 749 men experiencing nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.14+	-0.16*	-0.06
	(0.07)	(0.07)	(0.07)
50-54	-0.28***	-0.33***	-0.11
	(0.08)	(0.09)	(0.09)
55-59	-0.55***	-0.61***	-0.31**
	(0.10)	(0.10)	(0.11)
Adult children left hh (ref: not yet)	0.02	0.07	0.09
	(0.10)	(0.11)	(0.11)
Living with other younger generation (ref: no)		0.18*	0.20*
		(0.08)	(0.08)
Living with older generation (ref: no)		-0.09	-0.03
		(0.11)	(0.11)
Any HH member dead/institutionalized (ref: no)		-0.03	-0.06
		(0.18)	(0.18)
Education (ref: incomplete SS)			
Complete SS			0.05
			(0.09)
Vocational/SE			-0.25*
			(0.12)
Higher edu (HE)			-0.26*
			(0.13)
Economic activity (ref: economically active)			
Economically inactive			-0.17*
			(0.08)
HH income quintile (ref: first quintile)			
Second quintile			-0.09
			(0.08)
Third quintile			0.02
			(0.09)
Fourth quintile			0.09
			(0.10)
Fifth quintile			0.01
			(0.10)
Missing income			-0.24+
			(0.13)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.65***
			(0.17)
Volga & Ural			0.74***
			(0.17)
North Caucasus			0.45*
			(0.19)
Siberia & Far East			1.10***
			(0.18)
Settlement type (ref: urban)			
PGT/rural			-0.13
			(0.10)
Year			-0.05***
			(0.01)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.10 Logit Random-effects regressions of heavy smoking among 2,465 Russian fathers (12,051 observations) with 745 men experiencing nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.23*	-0.24*	-0.21*
	(0.10)	(0.10)	(0.10)
50-54	-0.31*	-0.33**	-0.28*
	(0.12)	(0.12)	(0.13)
55-59	-0.57***	-0.61***	-0.51**
	(0.15)	(0.15)	(0.17)
Adult children left hh (ref: not yet)	0.01	0.03	0.04
	(0.14)	(0.14)	(0.14)
Living with other younger generation (ref: no)		0.08	0.08
		(0.12)	(0.12)
Living with older generation (ref: no)		-0.11	-0.09
		(0.17)	(0.17)
Any HH member dead/institutionalized (ref: no)		0.27	0.25
		(0.23)	(0.23)
Education (ref: incomplete SS			
Complete SS			-0.26*
			(0.13)
Vocational/SE			-1.06***
			(0.19)
Higher edu (HE)			-1.68***
			(0.21)
Economic activity (ref: economically active)			
Economically inactive			-0.36***
			(0.10)
HH income quintile (ref: first quintile)			
Second quintile			-0.09
			(0.11)
Third quintile			-0.02
			(0.12)
Fourth quintile			0.04
			(0.13)
Fifth quintile			-0.14
			(0.14)
Missing income			-0.27
			(0.18)
Region of Russia (ref: Moscow and St. Petersburg)			
Central, North, North-West			0.11
			(0.32)
Volga & Ural			-0.33
			(0.31)
North Caucasus			-0.48
			(0.36)
Siberia & Far East			-0.10
			(0.34)
Settlement type (ref: urban)			
PGT/rural			0.05
			(0.19)
Year			-0.01
			(0.01)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

6.7.5 Fixed-effects models

We conducted fixed-effect regression analyses to examine whether the nest-leaving event leads to changes in health and well-being. Table 6.11-Table 6.14 present the nested fixed-effects models for each outcome. We found no significant within-person differences in any of the health indicators when fathers experienced nest-leaving. These results suggest that nest-leaving has no effect on fathers' life satisfaction, SRH and health behaviours. As found in the random-effects models, the negative association between a separate co-residence from adult children and SRH is explained by individual characteristics, which were constant over time, but unobserved in our cross-sectional and random-effects models.

Transitions in other factors, however, were significantly associated with the changes in the outcomes. Being or becoming economically inactive was significantly associated with lower life satisfaction and fair/poor health status. Changing household income quintiles significantly predicted changes in subjective well-being, where higher life satisfaction was associated with higher income quintiles. The year of participation (period-effects) explained the differences by age (cohort-effects) in each outcome. The frequency of smoking did not change over time, but fathers did experience improvements in life satisfaction and a lower likelihood of being a binge drinker over time. However, it was opposite for fathers' SRH: the within-person health inequality over 1994-2016 showed that men's health deteriorated within their observations over time. This result suggests that the cross-sectional health improvements observed over the last 25 years among men in Russia could be primarily due to compositional differences.

Consistent with previous findings (Permyakova and Billingsley, 2017), we found that continuously or starting to live with an older generation is detrimental for fathers' SRH (Table 6.12), even when accounting for their co-residence with adult children, children-in-law and/or grandchildren (M2) and fathers' economic characteristics (M3). The same applied for the negative health effect of experiencing a death or institutionalisation in a household. However, continuously living or transitioning into co-residing with children-in-law and/or grandchildren (other younger generations) was not related to fathers' SRH. In addition, fathers' life satisfaction and health behaviours were not significantly associated with any of the types of intergenerational co-residence included in the models. This suggests that, in a 'sandwich' household together with adult children, only living with elderly parents mattered for men's SRH, whereas having other younger generations had no health effect on men. A negative health effect of the caregiving burden and multiple social roles could explain this finding among middle-aged adults (Barnett, 2015; Legg et al., 2013; Oshio, 2014). Although men are rarely considered as primary caregivers, they are often still involved in a family 'caring team' in parental caregiving, particularly with a

spouse (Bauer and Sousa-Poza, 2015). Moreover, the breadwinner role defines certain expectations from men under the social construction of gender in Russia, therefore making men as primary financial providers of their families (Ashwin and Lytkina, 2004). Therefore, the potential stress from observing an elderly parent struggling in daily activities, emotionally supporting the spouse and other family members involved in caregiving, and financially providing the household may deteriorate middle-aged men's overall health.

Table 6.11 Linear Fixed-effects regressions of life satisfaction among 2,405 Russian fathers (11,649 observations) with 722 men experiencing nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.15***	-0.15***	0.05
	(0.03)	(0.03)	(0.04)
50-54	-0.37***	-0.36***	0.05
	(0.04)	(0.04)	(0.06)
55-59	-0.60***	-0.60***	-0.03
	(0.05)	(0.05)	(0.09)
Adult children left hh (ref: not yet)	-0.01	-0.02	0.02
	(0.04)	(0.04)	(0.04)
Living with other younger generation (ref: no)		-0.04	-0.02
		(0.04)	(0.04)
Living with older generation (ref: no)		-0.09	-0.09
		(0.06)	(0.06)
Any HH member dead/institutionalized (ref: no)		0.04	0.04
		(0.07)	(0.07)
Economic activity (ref: economically active)			
Economically inactive			0.41***
			(0.03)
HH income quintile (ref: first quintile)			
Second quintile			-0.14***
			(0.03)
Third quintile			-0.16***
			(0.04)
Fourth quintile			-0.22***
			(0.04)
Fifth quintile			-0.33***
			(0.04)
Missing income			-0.07
			(0.05)
Year			-0.05***
			(0.01)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.12 Logit Fixed-effects regressions of self-rated health (SRH) status among 1,087 Russian fathers with at least one observed change in outcome (6,489 observations), among whom 289 men experienced nest-leaving (27%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	0.25**	0.24**	-0.12
	(0.09)	(0.09)	(0.12)
50-54	0.49***	0.47***	-0.29
	(0.12)	(0.12)	(0.21)
55-59	0.76***	0.73***	-0.44
	(0.15)	(0.16)	(0.30)
Adult children left hh (ref: not yet)	0.26+	0.25+	0.15
	(0.14)	(0.14)	(0.15)
Living with other younger generation (ref: no)		0.04	-0.03
		(0.12)	(0.12)
Living with older generation (ref: no)		-0.45*	-0.41*
		(0.19)	(0.19)
Any HH member dead/institutionalized (ref: no)		0.59*	0.60*
		(0.25)	(0.25)
Economic activity (ref: economically active)			
Economically inactive			0.21*
			(0.10)
HH income quintile (ref: first quintile)			
Second quintile			-0.05
			(0.11)
Third quintile			-0.18
			(0.12)
Fourth quintile			-0.07
			(0.12)
Fifth quintile			-0.17
			(0.13)
Missing income			-0.19
			(0.16)
Year			0.10***
			(0.02)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.13 Logit Fixed-effects regressions of binge drinking among 1,357 Russian fathers with at least one observed change in outcome (7,763 observations), among whom 410 men experienced nest-leaving (30%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.12	-0.13	0.10
	(0.08)	(0.08)	(0.11)
50-54	-0.33**	-0.34**	0.13
	(0.10)	(0.11)	(0.18)
55-59	-0.65***	-0.67***	0.06
	(0.13)	(0.14)	(0.26)
Adult children left hh (ref: not yet)	-0.14	-0.12	-0.06
	(0.11)	(0.11)	(0.12)
Living with other younger generation (ref: no)		0.08	0.13
		(0.10)	(0.10)
Living with older generation (ref: no)		0.21	0.17
		(0.17)	(0.17)
Any HH member dead/institutionalized (ref: no)		-0.05	-0.05
		(0.19)	(0.19)
Economic activity (ref: economically active)			
Economically inactive			-0.13
			(0.09)
HH income quintile (ref: first quintile)			
Second quintile			-0.11
			(0.09)
Third quintile			-0.05
			(0.10)
Fourth quintile			-0.02
			(0.11)
Fifth quintile			-0.05
			(0.12)
Missing income			-0.11
			(0.14)
Year			-0.06**
			(0.02)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

Table 6.14 Logit Fixed-effects regressions of heavy smoking among 794 Russian fathers with at least one observed change in outcome (4,782 observations), among whom 244 men experienced nest-leaving (31%), RLMS 1994-2016

	M1	M2	M3
Age groups (ref: 40-44)			
45-49	-0.23*	-0.23*	-0.13
	(0.11)	(0.11)	(0.14)
50-54	-0.30*	-0.29*	-0.08
	(0.13)	(0.14)	(0.24)
55-59	-0.52**	-0.52**	-0.17
	(0.17)	(0.18)	(0.34)
Adult children left hh (ref: not yet)	-0.08	-0.11	-0.05
	(0.15)	(0.15)	(0.15)
Living with other younger generation (ref: no)		-0.09	-0.05
		(0.13)	(0.13)
Living with older generation (ref: no)		-0.31	-0.35
		(0.21)	(0.21)
Any HH member dead/institutionalized (ref: no)		0.19	0.20
		(0.23)	(0.23)
Economic activity (ref: economically active)			
Economically inactive			-0.46***
			(0.11)
HH income quintile (ref: first quintile)			
Second quintile			-0.01
			(0.12)
Third quintile			0.04
			(0.13)
Fourth quintile			0.06
			(0.14)
Fifth quintile			-0.13
			(0.15)
Missing income			-0.13
			(0.19)
Year			-0.03
			(0.03)

(Standard errors in parentheses); + p<.10, * p<.05, ** p<.01, *** p<.001

6.8 Discussion

In this study, we explored whether co-residence with adult children and transition to a nest where all children left the parental home matters for middle-aged fathers' well-being and health. The Second Demographic Transition (SDT) is characterised by the prevalence of nuclear families (Sobotka and Toulemon, 2008), where young adults gain independence from parents by leaving the nest before marriage and childbirth (Billari and Liefbroer, 2010). Under the SDT model, middle-aged parents almost universally anticipate and experience nest-leaving. In Russia, we show that living in a nest where all adult children left the parental home can be a unique time in life for parents. In Russia, co-residence with adult children is still extremely common, where only 60% of 59 years old fathers had a separate co-residence from their children. Using RLMS (1994-2016), we analysed a range of dimensions of well-being and health, including life satisfaction, self-rated health (SRH) status, and two indicators of unhealthy behaviours – binge drinking and heavy smoking. Our initial findings, based on a cross-sectional analysis, revealed a significant negative association between living in a nest where all children left the parental home and fathers' SRH status and health behaviours in mid-life. However, our random- and fixed-effects models provided no evidence that the event of nest-leaving in parental mid-life itself had any health implications for fathers. These findings suggest that selection effects could explain why unhealthy fathers are more likely to live without their adult children or that the association between a separate co-residence from adult children and father's health may be due to reverse causality.

The negative association between a living arrangement where all adult children reside separately from parents and father's SRH status and health behaviours (but not life satisfaction) is unexpected. Although we are not able to account for the quality of intergenerational relationships, our cross-sectional findings suggest that fathers living with adult children are more likely to report better SRH status and less frequent binge drinking and smoking, even when living with a partner in a 'sandwich' household with elderly parents and/or young grandchildren. Our sensitivity analyses show the same results once we exclude fathers living in a 'sandwich' household before all children left the nest. The poor health status of middle-aged fathers who live separately from their adult children contradicts our expectations in the Russian context, where living in small dwellings could make fathers feel relieved after all children move out to live independently (Zavisca, 2012). Protective effects of intergenerational support and control of health behaviours could explain why middle-aged fathers living with adult children are healthier.

Once we applied a random-effects approach allowing for between-fathers variance, we discovered that unobserved heterogeneity between the fathers explained the differences in fathers' risks of unhealthy behaviours by their likelihood of experiencing nest-leaving. This finding

suggests that fathers living separately from their adult children in their mid-life were already more likely to practice risky health behaviours before their children left the nest. Nevertheless, the random-effect models still revealed a striking prevalence of worse SRH status among fathers with nest-leaving events compared to fathers still living with children. We speculate that the loss of support from adult children who moved out does not matter for fathers' health behaviours, but it could matter for their overall health. Men's health behaviours might not be affected by children leaving the nest because of the weaker support and control between fathers and children compared with mothers prior to nest-leaving (Simon 1992; Silverstein, Gans and Yang, 2006). However, fathers' SRH could be more sensitive to having all children moving out from their home because of getting less help with daily activities and realising that they are getting older. It could also be because of fathers starting to miss spending more time together with their adult children (and possibly grandchildren) when co-residing in the same household and they feel lonelier after those children move out, although fathers' life satisfaction was not associated with nest-leaving in our study.

To isolate unobserved confounders further, we applied a fixed-effects approach, in which we aimed to observe health changes tied specifically to father's experience of a nest-leaving event in their mid-life. We did not find any statistically significant change in fathers' life satisfaction, SRH, binge drinking and heavy smoking among fathers who experienced their children leaving the nest. The lack of effects may be because having a partner buffered the negative experience of having a child move out (Buber and Engelhardt, 2008), as found in Dykstra and Keizer (2009) for fathers' SRH. However, fathers' selection into a stable union could be another factor biasing our results. The excluded group of single fathers from our study could be particularly vulnerable in terms of their health and well-being, when living separately from adult children, because of the double lack of support from both partner and children.

Our study contradicts previous findings and shows that self-selection could explain why fathers appear to be better off living with adult children. The unobserved characteristics of fathers who are in poor health and experienced a nest-leaving event might be different from the characteristics of those fathers who are in good health and continue to co-reside with their children. Our finding supports some previous findings on the 'myth' of the 'empty-nest crisis' among middle-aged parents (Radloff, 1980; White and Edwards, 1990). If selection effects are behind the poor health of fathers whose children left the parental home, policy makers should target this group of parents to find out what causes this self-selection and prevent a further accumulation of ill-health among those parents.

Socio-economic status (SES) might explain the selection effects of nest-leaving on fathers. It is well known that low SES is associated with risky health behaviours, poor health and premature mortality (Bosma et al., 1999; Mackenbach, 2012; Marmot, 2005). Studies show that parents in low SES are more likely to experience nest-leaving (Aquilino 1991b; Cooney and Mortimer 1999; Goldscheider and Goldscheider 1998; Mitchell 1994). Furthermore, intergenerational transmission of fathers' material resources and social class could also determine adult children's chances of leaving the nest (Aassve et al., 2001). Taking these findings together, we speculate in our study that disadvantaged fathers are more likely to be unhealthy and experience nest-leaving, even if they live with a partner.

Careful interpretation of a causal relationship is important in research on nest-leaving and health, because fixed-effects regression does not account for time-varying unobserved heterogeneity, such as variation in intergenerational relationships, previous living arrangements or past health incidents unaccounted for in the survey. Future studies could reduce the bias from the unknown transitions in the living arrangements by following changes in fathers' health from the moment when their oldest child was 18 years old (we did not conduct such analysis due to low counts). Furthermore, multilevel models cannot distinguish reverse causality, which could be the case if Russian fathers potentially 'push' their children out of a household by having low life satisfaction, poor health or an unhealthy lifestyle. Further research needs to investigate the reverse relationship between the changes in father's health and the risk of nest-leaving. Finally, our focus on yearly health transitions could underestimate a potential short-term effect of nest-leaving, for example in the months directly following the event.

Focussing on the unique post-Soviet context of Russia, we show that the prevalence of poor health and unhealthy behaviours among Russian men over the last two decades did not depend on their co-residence with adult children, even though intergenerational co-residence in general is very common in Russia (a third of households). In fact, it is striking that at age 59, 40% of fathers still live with their adult children, often together with adult children-in-law and young grandchildren. Nest-leaving among middle-aged fathers in Russia is often associated with adult children forming their own families in the parental home before being able to afford a separate apartment. Having younger generations moved out could weaken the intergenerational exchange of support and make Russian fathers feel lonely in their mid-life, particularly when approaching their retirement age (60 years old for men in Russia). By finding that nest-leaving itself does not cause a deterioration in fathers' well-being and health, we suggest that selectivity is likely to play a major role in poor health indicators of fathers experiencing a nest-leaving event. Considering the Russian context of high mortality rates and intergenerational inheritance of SES (Nicholson et al., 2005), our finding of selection effects of nest-leaving suggests that Russian fathers with low

SES and poor health could have a double risk of experiencing a departure of all adult children from the parental home. Future studies should consider reversed causality by assessing the full interplay between the life-course events of parents and children, as well as their impact on a range of parental health measures and children's likelihood of leaving the parental home.

Chapter 7 Conclusion

Individual lives interlink within and between generations. The family is a key source of support and strain for family members. Whether the family hinders or improves health, the direction of its health effect may vary across the life-course. This thesis connects the dimensions of family and health by examining the health importance of living arrangements and family members' characteristics. The aim of this thesis is to understand the health significance of family and the health implications of various life events related to changes in living arrangements.

The conceptual framework which shapes the agenda of this thesis connects the socio-demographic, life-course, and gender theories of health with a particular focus on the support exchange, stress burden, and intergenerational 'linked lives'. While the first empirical paper of the thesis explores the associations between household complexity and adult health across all life stages taken together, the second and third papers examine health inequalities related to family at two specific points in the life-course. Firstly, I focus on the transition into or out of co-residence with parents or parents-in-law experienced by adult children aged 25 years old or over. Secondly, I examine the turning point of all adult children leaving the parental home (a nest-leaving event) experienced by middle-aged parents.

All three empirical papers of the thesis focus on the unique Russian case with its continuing reliance on family networks, as evidenced by co-residence of younger and older generations (Prokofieva, 2007; Zavisca, 2012). Russian men's health is a particularly interesting case to study: men have 10 years lower life expectancy than women, and male mortality remains one of the highest in Europe (World Bank, 2018b). Applying statistical methods to longitudinal data in the Russian context, this thesis reveals complex associations between living arrangements and men's health by looking at three main perspectives of correlation, causation, and selection.

In this concluding chapter, I summarise the main findings of the analytical work conducted in the thesis and assess how they fit with and contribute to the theoretical framework and the major debates surrounding this research. I provide evidence-based suggestions for the development of family and health policies in Russia. I reiterate the strengths and limitations of the studies conducted in this thesis before synthesizing the final thoughts on how this novel research contributes to existing empirical findings and what future studies should further explore in the relationship between family and health.

7.1 Summary of findings

To contribute to the overall research question on the importance of family for health, the three empirical papers of this thesis analyse whether *the health of men differs by living arrangements* and whether *there is a positive or negative effect of living arrangements on men's health*. Throughout the thesis, I demonstrate that living with other family members may either affect or select on adult health depending on the type of living arrangement and co-residing generation.

For the first objective, I disentangle the complex relationship between intergenerational living arrangements (ILAs) and men's health and uncover heterogeneity in this association by men's partnership status (Chapter 4), the health status of their older generations (Chapter 5) and the nest-leaving status of their younger generations (Chapter 6). The results for those living in ILAs show that men are more likely to have good health when living with a partner, at least one healthy member of an older generation, or at least one adult child. Overall, my findings show that men's health and health behaviours differ by family living arrangements.

For the second objective, I uncover selection effects of various living arrangements on men's health but show that some co-residential types, such as living with an older generation, can still have a causal association with men's health. Chapter 4 reveals that individual and family-level socio-demographic factors explain the health disadvantage among Russian men who are unpartnered, particularly those living alone, despite the finding on the significant health differences between men living in ILAs by their partnership status. Furthermore, Chapter 6 provides additional evidence of selectivity into ILAs or potentially reversed causality between ILA and health. The fixed-effects models show that unobserved characteristics of men explain some of the remaining health differences in the random-effects models by the type of their living arrangement with their adult children. Nevertheless, using the fixed-effects approach, Chapter 5 provides evidence for the potential causal link between ILAs and health from the perspective of living with an older generation. More importantly, this chapter also reveals the overlooked 'interlinkage' in the health of family members living in ILAs.

In sum, the statistical analyses of this thesis provide several important findings on correlation, causation, and selection in the dynamic relationship between family and health. Firstly, I find statistically significant *correlation* between men's health (self-rated health status, binge drinking, and heavy smoking) and ILAs, whether living in an ILA with an older generation (parents, grandparents, parents-in-law) or younger generation (adult children, grandchildren, children-in-law). Secondly, when focussing on adult children, I find that men's co-residence with an unhealthy older generation is *causally associated* with worsening of their health. Thirdly, when focussing on fathers, I find that men for whom all younger generations have left the household are more likely

to report poor health due to the *selection effect* of nest-leaving on their self-rated health and health behaviours. The results of this thesis emphasise the importance of using multilevel modelling in understanding whether the relationship between health and living arrangements is potentially causal or a result of selection.

7.2 Theoretical contributions

Overall, the findings of this thesis provide evidence for the significant role that family members play in men's health and reiterate the importance of taking living arrangements into account in the socio-demographic, life-course, and gendered perspectives of health. Employing these perspectives together, the theoretical framework proposed in Chapter 2 aims to improve our understanding of how the context-specific micro-level processes within the family might affect health of younger and older generations among men. By using living arrangements as a proxy for family support and stress, this thesis demonstrates several important findings, which are summarised in the previous section of this concluding chapter. In this section, I review whether these findings are consistent with the theoretical framework of the thesis and draw on what we can learn from them about the health importance of support or stress, 'linked lives', and selectivity.

Family members can benefit or deteriorate each others' health indirectly through social support exchange and control of unhealthy behaviours (Umberson et al, 2010a; Umberson & Montez, 2010). Under this theory, one would expect men living with a partner and other family members to have better health due to receiving spousal and intergenerational support (Antonovics and Town, 2004; Ashwin and Isupova, 2014; Killewald, 2013). The findings of this thesis have two contributions to this ongoing debate on the 'male health premium' (*ibid*). On the one hand, social selection might lie at the root of the health disadvantage among men who are unpartnered and living alone (Goldman, 2015; Hoffmann, Kröger and Geyer, 2018; Lillard and Panis, 1996; Lu, 2008; Waldron et al., 1996). In line with the selection theory (*ibid*), my examination of how men's self-rated health varies by partnership status and between those living alone or with others suggests that both individual- and family-level socio-demographic factors – such as previous marital status, household income, or a place of residence – could be the source of the spurious association between partnership status, living arrangements, and men's health. One of the possibilities could be that shared resources and the geographical setting of the household could allow men to have higher quality living space and better access to health services when co-residing with a partner. On the other hand, a combination of having a partner and living in an ILA as a cultural preference or additional source of support might protect men's health. The interplay between partnership and intergenerational support analysed in the Russian context suggests that the former is a key

mechanism to 'male health premium' in the households with two or more generations. Taken together, these results demonstrate how complex living arrangements can matter to men's health and how simplifying household typologies to only partnership or living alone could hide health inequalities in other living arrangements. The findings provide new grounds for further development of the social support exchange theory by exploring the complexity of living arrangements and its health implications within different socio-demographic contexts.

The principle of 'linked lives' in the life-course theory suggests that there is an interdependency between individuals who share the same family context (household or blood-related) through the exchange of various types of support, such as financial, instrumental, physical or emotional support (Elder, Kirkpatrick Johnson, et al., 2004; Greenfield and Marks, 2006). In line with this theory, Chapter 5 demonstrates the interlinkage between the health of younger and older generations co-residing together by revealing the detrimental effect of living with an unhealthy older generation on men's self-rated health. From the gendered perspective, this finding suggests that men's health is vulnerable when sharing a living space with the older family members in poor health, which could be due to a burden of caregiving or other multiple roles (Buyck et al., 2011; Pearlin et al., 2001). For example, supporting a partner who looks after an ill elderly parent and providing financial support as the 'breadwinner' in the family could be stressful for men and worsen their health over time. From the socio-demographic perspective, the negative health effect attributable to stress from caregiving or overwork among adult children living with their older generations could be particularly strong in the Russian context, which has relatively high unemployment rates and one of the poorest elderly health in Europe (Gierveld et al., 2012). Given the findings of this thesis, both the socio-demographic and gendered perspectives of health should be used in tandem with the life-course theory of intergenerational linkages by addressing heterogeneity in the well-being and health of the family members co-residing together. In turn, the 'linked lives' approach needs to be expanded by considering the social and cultural contexts, socio-economic opportunities, and gendered roles within the family that can affect the multiple linkages between generations tightly connected to their health.

Finally, the results contribute to the life-course theory by providing evidence that the nature of the relationship between family and health varies across different stages and turning points of life. Chapter 5 reveals a causal association between co-residence with older generations and health when focussing on men aged 25 or older, who would be expected to move out of the parental home in the Russian context. However, Chapter 6 presents a contrasting result for men at their mid-life stage who were fathers living with at least one adult child and exposed to nest-leaving. The results show that the experience of a nest-leaving event does not affect any of father's health outcomes and reveal the presence of unobserved selectivity or potentially

reversed causality in the hypothesised health effect of ILA among middle-aged fathers. This finding demonstrates that the 'linked lives' expectation of the health implications from the life-course processes within an ILA is not consistent across the stages and turning points of life. This theory should be applied with consideration of selectivity, as the results suggest that fathers in their mid-life stage who are in poor health, binge drinkers, or heavy smokers might be a burden to their offspring and 'push' their children out of the nest. However, this finding may be specific to the context of Russia with a high prevalence of ILAs and postponed nest-leaving until after first birth (Zavisca, 2012). Russian middle-aged parents often live with their adult children who have already formed their own family (when co-residing adult children also live with a partner and young children) and might experience nest-leaving only at a later life-stage, when adult children can afford to live separately. This thesis finds that the health implications of living with parents or parents-in-law in need of care are unlike the health implications of living with adult children, which suggests that the upward flow of support is more important than the downward for men's health in the Russian context.

7.3 Policy implications

Besides the theoretical contributions, this thesis provides several suggestions for policies aiming to improve men's health in Russia. The poor health of working-age men is a continued issue for the economy in Russia (Goryakin and Suhrcke, 2016). It is in the interest of the Russian government to integrate new family and health policies to make positive changes in men's health behaviours and prevent further deterioration of their health in order to expand the labour supply and stimulate economic growth. The detailed account of how men's living arrangements interplay with their health and health behaviours in this thesis could be utilised by the Russian government to identify and target the more vulnerable groups of men based on their family characteristics and life-course stages.

The results of this thesis point to intergenerational co-residency among working-age men as an important risk factor to address in the future health interventions of Russia. Particular attention should be paid to men in their mid-life, because they are the most likely to co-reside with both younger and older generations and experience premature mortality due to the negative health effects of stress and unhealthy behaviours (Cockerham, 1997; Leon et al., 2009; Perlman and Bobak, 2008a). Potential policies could include funding or incentives to hold workshops on managing work-life balance within workplaces, after-school clubs to enable men to spend more time with their partners, and awareness campaigns for the risks of unhealthy behaviours.

Along with health-promoting campaigns for men, the economic prosperity of the family and the health of elderly parents should be key targets in social policies developed in Russia. Acknowledging and taking action in response to the negative health effect of living with unhealthy elderly parents is important in the cultural context of Russia where there is a persistent gendered expectation that men are the main providers for their households, while women are expected to provide care to both younger and older generations (Ashwin, 2005, 2006; Kay, 2006). Supplementary jobs are more common among Russian men, whereas women tend to seek help within the family networks, particularly during the peaks of economic instability (Lokshin and Yemtsov, 2001, 2004). Therefore, policy-makers need to pay more attention to the work-family balance in men's lives. Long-term unemployment or overwork among Russian men due to low income or a fear to fail their 'breadwinner' role in the family could be harmful for their family relationships and health (Ashwin and Lytkina, 2004), particularly when taking into account relatively high unemployment rates in Russia (Gerber and Hout, 1998). Taxation and welfare policies should compensate for the high level of pressure on those male workers and fathers who are struggling with employment and family issues related to health, particularly unpartnered men lacking spousal support in ILAs. To prevent the negative health effect of stress, healthcare providers should aim to reduce the psychological burden placed on Russian working-age men by also targeting health promotion and well-being programmes towards older generations in poor health, and towards informal caregivers with multiple roles in the households of men living in ILAs. Another avenue would be to provide greater levels of formal care for the elderly, in order to relieve the care demand on men and their partners.

When focussing on working-age men who are middle-aged fathers of at least one adult child, health practitioners need to acknowledge that nest-leaving as a turning point in the life-course has no health implications for those fathers who have already experienced the departure of their adult children; in fact, middle-aged fathers' poor health and unhealthy behaviours may 'drive' their children out of the parental home. This finding means that promoting the co-residence with adult children would be ineffective for improving the health status and health behaviours of Russian fathers in their mid-life, because of unobserved selection effects. The analyses of this thesis show that father's socio-demographic and residential characteristics do not explain this spurious association between co-residency with younger generations and their health outcomes and behaviours. The statistical approach applied in those analyses suggests that the hidden mechanisms of this relationship are constant over time, but require further investigation before drawing firm conclusions on the policy implications of this finding.

7.4 Strengths and limitations

The strength of this thesis lies in widening theoretical boundaries in the understanding of the relationship between living arrangements and men's health. Extant theories have largely overlooked the potential for selection effects to bias statistical findings, and that the health of co-residing older generations may have important effects on men's health. These issues are addressed through the application of advanced statistical methods which help to separate causal associations from the unobserved selection mechanisms constant over time. For example, I uncovered evidence of both causal and selection effects (and potentially reverse causality) depending on the co-residing generation when living in an ILA. The implications of these findings for theories and policies are clearly outlined in the previous sections.

A further strength of this thesis is centred on the measurement of complex living arrangements and family members' characteristics within the households over time. Significant effort was spent to manipulate over 20 years of panel data covering a period of socio-economic and demographic changes in Russia (Chapter 3). The shape of the resulting data allows for the relationship between living arrangements, co-residing members' characteristics, and men's health to be dynamic over time, reinforcing the validity of links between the three in this thesis.

The findings of this thesis must be considered within the limitations of the data used. The RLMS survey provides only self-reports on all of the health outcomes and does not allow any access to the medical records of the respondents. As mentioned in Chapter 2, cultural perceptions of well-being could skew individual evaluations of health and misrepresent its distribution on the population level, particularly in the Russian context with little individual agency over own health (Abbott et al., 2006). However, self-rated health was found to be strongly predictive of male mortality in Russia (Perlman and Bobak, 2008b). This PhD research focussed only on men's health and families and therefore one should not infer the findings of this thesis to women. Gender differences in coping mechanisms for significant life-course events could mean that changes in living arrangements could have different implications for women's health than for men.

Follow-up attrition is another important limitation of the survey. For the majority of male respondents, I was able to follow them only for three to four consecutive waves due to their high rates of either permanent or temporary drop-out from the survey. This led to fewer men entering my longitudinal study samples, which is associated with the risk of having low counts when stratifying men by the specific types of their transitions in health and living arrangements and controlling for multiple covariates in the multilevel models. In addition, previous studies argue that attrition in RLMS is non-random and more likely to appear among adults who are young, males, urban residents, and in poor health (Gerry and Papadopoulos, 2015). Nevertheless,

additional analyses outlined in the empirical papers of this thesis confirmed the robustness of the results to attrition, and potential implications of attrition for the findings are discussed in the papers.

The use of a one-year lag between living arrangements and men's health in Chapters 5 and 6 may not be the most appropriate measure of changes in men's health. We might expect changes in living arrangements to have short-term effects on men's health through receiving additional or lesser support from co-residents. There may be an adjustment effect, wherein men no longer experience the detrimental effect of a loss of support when an adult child leaves the home after several months. In the same manner, men may experience stress in the months preceding the nest-leaving as an anticipatory effect. However, the survey is conducted yearly and does not capture the month of changes in living arrangements. Over time, the adjustment effect may manifest in men's health returning to its previous level after several years of living with an unhealthy older generation, similar to the short-term effect of marital dissolution on well-being (Kalmijn, 2017). The one-year approach was necessary to maximize statistical power to detect effects in this thesis due to high rates of drop-out after three or four waves of the survey which would have reduced sample sizes in multiple-year lagged models.

Finally, I was unable to account for the characteristics of family members living outside the observed households and determine residential relocations of men and their generations moving in or out. Under the social support theory, we could expect the health effects of the changes in living arrangements to differ by whether it is adult children who move into or out of the parental home, or if it is an older generation who change their place of residence. Inability to recognise the residential type of men's transition in their living arrangement may have affected the results of Chapter 5 and Chapter 6 due to the dependency of starting or stopping an ILA on the support and privacy needs of both generations (Smits et al., 2010). The data did not provide information on the provision of informal caregiving between the family members either, therefore leaving this limitation open to discussion. Nevertheless, the absence of an improvement in health from starting to live with an older generation in good health suggests that the direction of the support flow when an ILA is created does not appear to be relevant to adult children's health, unless the older generation is in poor health. A concluding note to consider on the limitation of this thesis is a inability to

7.5 Contributions to the literature and future research

The majority of previous studies have explored the association between living arrangements and health at a single point of time, which is not a realistic representation of this relationship. Unlike

past research, this thesis links together over twenty years of changes in living arrangements and health using rich Russian data in order to reveal a causal pathway between these two phenomena. Using the Russian context of the lowest male life expectancy and highest intergenerational co-residence culture in Europe, this thesis contributes to previous literature by demonstrating how 'linked lives' and shared resources between co-residing generations can determine or select on each other's health over the life-course.

Two major projects, FamiliesAndSocieties and FAMHEALTH, explored the determinants of an ILA and its effect on adult health across Europe by using the advantages of cross-national data (GGS, ESS and SHARE) with information on informal caregiving and subjective well-being. Although to some extent this thesis reveals similar findings to those projects, this research closes several gaps in the previous studies. First, earlier research focussed mainly on the effects of ILAs on mental health and subjective well-being (van den Broek and Grundy, 2018; Dykstra et al., 2013; Tosi and Grundy, 2018); this thesis shows that having ageing parents in ill-health nearby is detrimental to the offspring's overall state of health as well. Second, unlike the previous studies focussing mainly on women as daughters or widows (Grundy and Murphy, 2018), this thesis shifts the attention within this body of literature to men's health across different life-stages and expands the examination of health outcomes to their health behaviours of binge drinking and heavy smoking. Finally, the findings of this thesis are particularly valuable for the post-communist context of Eastern Europe where there are cultural expectations of intergenerational support and relatively high rates of ILAs similar to Russia (Dykstra et al., 2013; Iacovou and Skew, 2011).

Although the two projects have already started exploring the unique family patterns of Eastern Europe, the applied cross-national surveys either did not allow the possibility of a longitudinal analysis to account for unobserved selectivity (ESS), allowed only two panel waves with no health information on other family members (GGS), or did not observe Russia (SHARE). The RLMS survey allowed this thesis to overcome those data limitations and uncover the overlooked selection effects of fathers' experience of a nest-leaving event on their self-rated health and health behaviours in mid-life. Further research is required to explore the potential reverse causality in the relationship between transition to a nest where all children left the parental home and fathers' poor health outcomes. To understand whether the Russian case fits in the broader expectations of the health effects of family interrelationships based on the findings within Europe, cross-national comparison is required using the contextual factors and novel longitudinal surveys with comprehensive coverage of the dimensions related to health outcomes and family relations, both inside and outside of households. Current panel studies in Germany (SOEP) and the UK (BHPS/US) offer a unique opportunity to extend the research of this thesis beyond Russia and compare those three countries between each other using the advantages of their similar surveys

and different cultural contexts (Platts, 2015). These datasets could be useful to uncover other types of transitions in the living arrangements and investigate their possible causal or selection effects on health of younger and older generations, such as changes in the 'sandwich' households consisting of three or more generations.

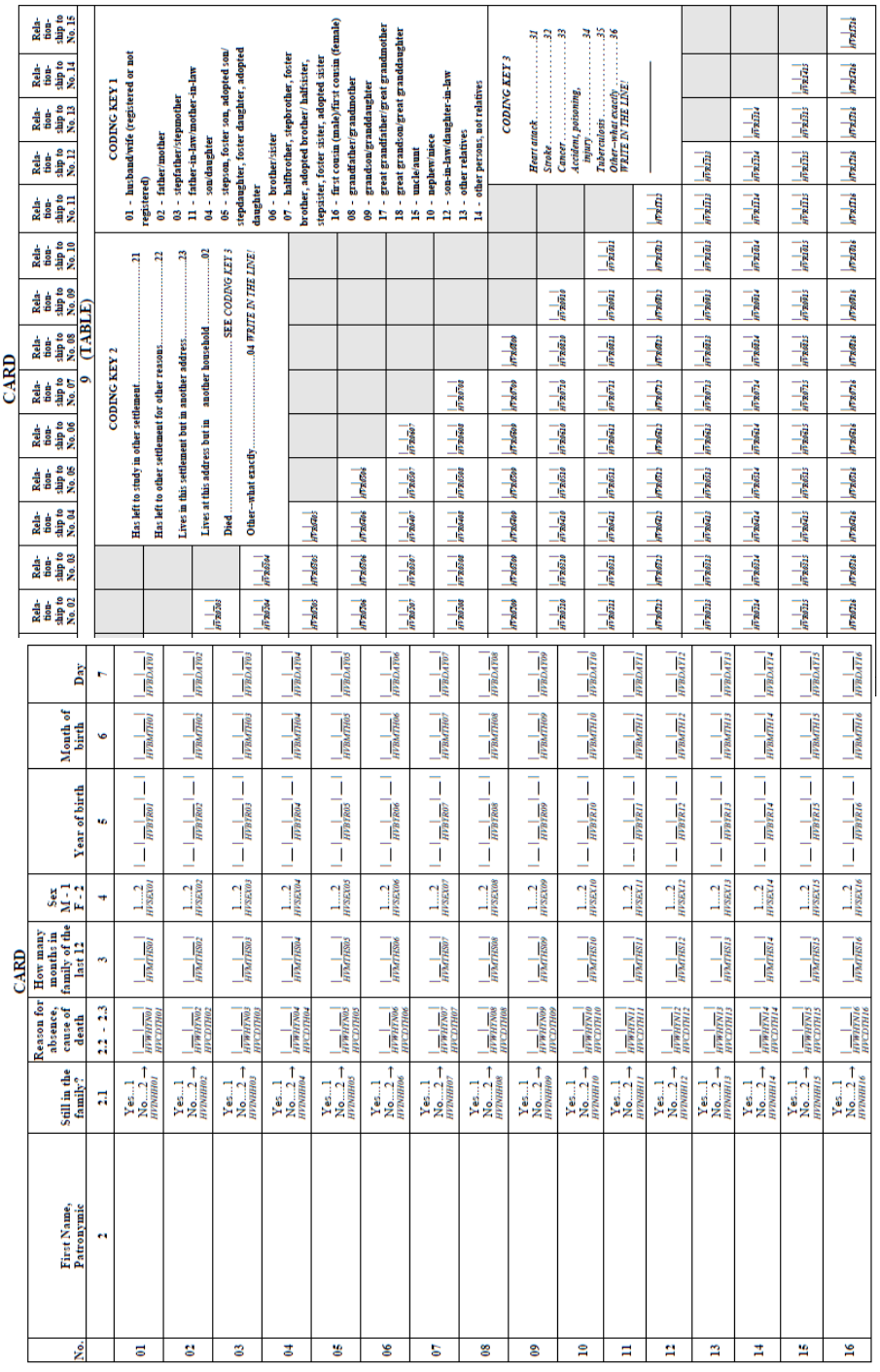
To improve men's health, it is important to analyse the social phenomena of their disadvantage from both socio-demographic and gender perspectives. Past socialist norms of masculine and feminine behaviours could still impact the life-course experiences and health practices of younger men within their families (Keenan et al., 2015). Future research should pay more attention to narrative accounts of men on their masculine identity, understanding of health, and personal feelings about the interplay between their daily practices and family relationships across different life-course stages and living arrangements. In the Russian context, it would be particularly important to explore the life-course implications of high divorce rates on men's health by focussing on the underrepresented group of single fathers. Qualitative research could also advance our knowledge on the complexity of reasons for and decisions on multiple transitions in the living arrangements and their impact on the family well-being, whether shared between younger and older generations, partners, siblings, or other members of the family or household.

7.6 Final thoughts

In sum, this thesis offers insight into the complex interlinkage between family and health. The original evidence presented in the three empirical papers of this thesis makes a clear case that living arrangements like intergenerational living play an important role in men's health changes over the life-course. Based on the panel data from Russia, this research design shows not only a continued need for a life-course perspective in this body of literature, but also the need to incorporate socio-demographic and gendered theories to account for the context-specific typologies of families and their gendered relationships on the micro-level. The results presented in this thesis could apply to other 'familialistic' contexts from Eastern Europe or Asia, where intergenerational living and informal caregiving are also prevalent.

Appendix A Data manipulation for the Russian Longitudinal Monitoring Survey (RLMS)

A.1 Household 'card' with information on family members and their relationships, RLMS



Source: Higher School of Economics et al (1992 – present)

A.2 The Stata syntax for creating a matrix of relationships to retrieve information on each household member for each individual from the household-level harmonised RLMS file across 1994-2016

```
*round-specific hh identifiers change from letters to numbers:
	local i 5
		foreach round in a b c d e f g h i j k l m n o p q r s t u {
		capture noisily rename `round'id_h id_h`i'
		local i=`i'+1
		}

***create 'self' relationships variables (e.g. hr0101, 0202,...)
	forvalues i=1/9 {
	gen hr0`i'0`i'=.
	}
	forvalues i=10/24 {
	gen hr`i'`i'=.
	}

*** rename relationship variables (different from my old coding!)
forvalues i=2/9 {
	forvalues j=1/8 {
		capture noisily rename b`i'_9_`j' hr0`i'0`j'
	}
}
forvalues i=10/24 {
	forvalues j=1/9 {
		capture noisily rename b`i'_9_`j' hr`i'0`j'
	}
}
forvalues i=10/16 {
	forvalues j=10/15 {
		capture noisily rename b`i'9_`j' hr`i'`j'
	}
}
forvalues i=17/24 {
	forvalues j=10/23 {
		capture noisily rename b`i'_9`j' hr`i'`j'
	}
}
*
***rename other variables
forvalues i=1/24 {
capture noisily rename b`i'_1 hindq`i'
capture noisily rename b`i'_2_1 hinhh`i'
capture noisily rename b`i'_2_2 absent_why`i'
capture noisily rename b`i'_1_23 absent_cause_1_`i'
capture noisily rename b`i'1_23 absent_cause_1_`i'
capture noisily rename b`i'_2_23 absent_cause_2_`i'
capture noisily rename b`i'2_23 absent_cause_2_`i'
capture noisily rename b`i'_3 monthin`i'
capture noisily rename b`i'_4 hsex`i'
capture noisily rename b`i'_5 hbyr`i'
capture noisily rename b`i'_8 hmarst`i'
}
rename a3 hfamily
rename a3_3 hfamily_pre
rename a4_1 hintday
rename a4_2 hintmonth
rename a8 hroster_n
rename status urban
```

```
*
save "C:\Local\STATA_new\RLMS Harmonised
database\updated_harmon_data_Nov_2017\HH_matrix_1994_2016_wide_format_bdate", replace

****THEN steps from creating a matrix and reshape [the same from my old coding]:

**for numbers with all zero (01-09):
forval j=1/8 {
	forval x=1/8 {
	local i=`j'+`x'
		if `i'<=9 {
		capture noisily gen hr0`j'0`i'=.
			replace hr0`j'0`i'=1 if hr0`i'0`j'==1
			replace hr0`j'0`i'=2 if hr0`i'0`j'==4
			replace hr0`j'0`i'=4 if hr0`i'0`j'==2
			replace hr0`j'0`i'=3 if hr0`i'0`j'==5
			replace hr0`j'0`i'=5 if hr0`i'0`j'==3
			replace hr0`j'0`i'=11 if hr0`i'0`j'==12
			replace hr0`j'0`i'=12 if hr0`i'0`j'==11
			replace hr0`j'0`i'=6 if hr0`i'0`j'==6
			replace hr0`j'0`i'=7 if hr0`i'0`j'==7
			replace hr0`j'0`i'=8 if hr0`i'0`j'==9
			replace hr0`j'0`i'=9 if hr0`i'0`j'==8
			replace hr0`j'0`i'=17 if hr0`i'0`j'==18
			replace hr0`j'0`i'=18 if hr0`i'0`j'==17
			replace hr0`j'0`i'=10 if hr0`i'0`j'==15
			replace hr0`j'0`i'=15 if hr0`i'0`j'==10
			replace hr0`j'0`i'=16 if hr0`i'0`j'==16
			replace hr0`j'0`i'=13 if hr0`i'0`j'==13
			replace hr0`j'0`i'=14 if hr0`i'0`j'==14
		}
	}
}

***for first two numbers with zero (01-09) and two other numbers 10-24:
forval j=1/9 {
	forval i=10/24 {
		gen hr0`j'`i'=.
			replace hr0`j'`i'=1 if hr`i'0`j'==1
			replace hr0`j'`i'=2 if hr`i'0`j'==4
			replace hr0`j'`i'=4 if hr`i'0`j'==2
			replace hr0`j'`i'=3 if hr`i'0`j'==5
			replace hr0`j'`i'=5 if hr`i'0`j'==3
			replace hr0`j'`i'=11 if hr`i'0`j'==12
			replace hr0`j'`i'=12 if hr`i'0`j'==11
			replace hr0`j'`i'=6 if hr`i'0`j'==6
			replace hr0`j'`i'=7 if hr`i'0`j'==7
			replace hr0`j'`i'=8 if hr`i'0`j'==9
			replace hr0`j'`i'=9 if hr`i'0`j'==8
			replace hr0`j'`i'=17 if hr`i'0`j'==18
			replace hr0`j'`i'=18 if hr`i'0`j'==17
			replace hr0`j'`i'=10 if hr`i'0`j'==15
			replace hr0`j'`i'=15 if hr`i'0`j'==10
			replace hr0`j'`i'=16 if hr`i'0`j'==16
			replace hr0`j'`i'=13 if hr`i'0`j'==13
			replace hr0`j'`i'=14 if hr`i'0`j'==14
	}
}

******for numbers 10-24 on both sides:
forval j=10/23 {
	forval x=1/20 {
	local i=`j'+`x'
		if `i'<=24 {
		gen hr`j'`i'=.
			replace hr`j'`i'=1 if hr`i'`j'==1
```

```
                        replace hr`j'`i'=2 if hr`i'`j'==4
                        replace hr`j'`i'=4 if hr`i'`j'==2
                        replace hr`j'`i'=3 if hr`i'`j'==5
                        replace hr`j'`i'=5 if hr`i'`j'==3
                        replace hr`j'`i'=11 if hr`i'`j'==12
                        replace hr`j'`i'=12 if hr`i'`j'==11
                        replace hr`j'`i'=6 if hr`i'`j'==6
                        replace hr`j'`i'=7 if hr`i'`j'==7
                        replace hr`j'`i'=8 if hr`i'`j'==9
                        replace hr`j'`i'=9 if hr`i'`j'==8
                        replace hr`j'`i'=17 if hr`i'`j'==18
                        replace hr`j'`i'=18 if hr`i'`j'==17
                        replace hr`j'`i'=10 if hr`i'`j'==15
                        replace hr`j'`i'=15 if hr`i'`j'==10
                        replace hr`j'`i'=16 if hr`i'`j'==16
                        replace hr`j'`i'=13 if hr`i'`j'==13
                        replace hr`j'`i'=14 if hr`i'`j'==14
                }
        }
}
*
*** delete zero in the second half of numbers for hr**** (relationships), whereas hr** - will be a root now for re-shaping

forvalues i=1/9 {
                forvalues j=1/9 {
                        rename hr0`i'0`j' hr0`i'`j'
                }
        }
        forvalues i=10/24 {
                forvalues j=1/9 {
                        rename hr`i'0`j' hr`i'`j'
                }
        }

*finally, reshape:

reshape long idind hsex hbyr h2byr hbmth hbday hmarst hinhh hindq absent_why absent_cause_1_ absent_cause_2_ monthin hr01 hr02 hr03 hr04 hr05 hr06 hr07 hr08 hr09 hr10 hr11 hr12 hr13 hr14 hr15 hr16 hr17 hr18 hr19 hr20 hr21 hr22 hr23 hr24, i(id_h id_w) j(hperson)

***missing variables in the original dataset:
*hmarst11-24 not found
*absent_why20-24 not found
*absent_cause_2_21 - 24 not found


gen year=.
local i 5
foreach x of numlist 1994/1996 1998 2000/2016 {
replace year=`x' if id_w==`i'
local i=`i'+1
}

rename absent_cause_1_ abs_1
rename absent_cause_2_ abs_2

gen abs=.
replace abs=absent_why if absent_why!=.
replace abs=abs_1 if abs_1!=.
replace abs=abs_2 if abs_2!=.
```

A.3 The Stata syntax for correcting the misreports found in the household-level harmonised RLMS file across 1994-2016

```
****** mistakes in the reports of idind ******

replace idind=10708 if id_h==1412543 & year==2010 & idind==30084
replace idind=10709 if id_h==1412543 & year==2010 & idind==30083
replace idind=10710 if id_h==1412543 & year==2010 & idind==30085
replace idind=21218 if id_h==1383977 & year==2010 & idind==39987
replace idind=23948 if id_h==1383977 & year==2010 & idind==39988
replace idind=28597 if id_h==1383977 & year==2010 & idind==39989
replace idind=30017 if id_h==1383977 & year==2010 & idind==39990
replace idind=54157 if id_h==1350364 & year==2010 & idind==38649
replace idind=54158 if id_h==1350364 & year==2010 & idind==38650
*found them after merging, but need to fix them before merging:
replace idind=10710 if id_h==1412543 & year==2010 & hperson==1 & idind==10709
replace idind=10709 if id_h==1412543 & year==2010 & hperson==2 & idind==10708
replace idind=10708 if id_h==1412543 & year==2010 & hperson==3 & idind==10710

*2 people in a hh of the same age have reversed gender either in hh or ind file
*in 2010 in hh_id=1412543, 3 people were assigned wrong idind, but hperson and hh info is correct (if to swop back their correct idind)
*idind 10708 10709 10710 - they swoped places even in hh roster, but forgot to change their own idind in HH file
*10708 person is actually 1938 yob, not 1968


****** mistakes in the reports of year of birth (YoB) from the household (HH) roster ******

*were not missing, but misreported (need to change in advance to have consistent idind later)

replace hbyr=1922 if idind==27000 & hperson==1 & year==2006
replace hbyr=2003 if idind==21935 & hperson==8 & year==2007
foreach num of numlist 2013 2014 {
        replace hbyr=2003 if idind==21935 & hperson==8 & year==`num'
}
foreach num of numlist 2006 2007 {
        replace hbyr=2002 if idind==25222 & hperson==5 & year==`num'
}
replace hbyr=1934 if idind==29913 & hperson==1 & year==2007
foreach num of numlist 2011 2013 {
        replace hbyr=1987 if idind==618 & hperson==3 & year==`num'
}
replace hbyr=1979 if idind==11129 & hperson==4 & year==2010
replace hbyr=1932 if idind==11147 & hperson==2 & year==2010
foreach num of numlist 2007 2008 2009 2010 {
replace hbyr=1964 if idind==29654 & hperson==5 & year==`num'
}
replace hbyr=1955 if idind==40072 & hperson==1 & year==2010

replace hbyr=1941 if id_h==120903 & year==2001 & hperson==2
replace hbyr=1950 if id_h==1380705 & year==1998 & hperson==5
replace hbyr=1949 if id_h==2402530 & year==2001 & hperson==3
replace hbyr=1916 if id_h==1570008 & year==1996 & hperson==3

*missing and participated only once - have to code as missing
replace hbyr=. if id_h==135065 & year==1994 & hperson==1
replace hbyr=. if id_h==720111 & year==2003 & hperson==5
```

A.4 The Stata syntax for preparing the individual-level harmonised RLMS file and its merging with the household-level file with re-shaped matrices of relationships within each household across 1994-2016

```
foreach var of varlist *{
rename `var' `var', l
}

***all idind, but only variables I need:

keep id_w year idind redid_i id_i id_h origsm inwgt region psu status popul int_y adult child marst educ diplom
diplom_1 site h3 h4 h4_1 h4_1_y h5 h6 h7_1 h7_2 age i4 j1 m3 j61 j62 j65 j66 j322 j324 j325m j325y j323m j323y
j60_4c1 j60_5 j60_5a j66 j66_1 j1_1_5 m131 m139 m146 m132  l5 l5_1 l7 l58 l26_1 m20_7 m20_8 m63 m65 m43 m46
m59 m58 m62 m62_1 m62_3 m20_61-m20_67 j72_171-j72_173 m71 m72 m73 m74 m75 m149 m150 m76 m77 m78
m147 m148_a m148_b m79 m80 m80_0 m80_1 m80_2 m81 m82_1 m82_2 m82_3 m83_1 m83_2 m83_3 m83_4
m83_5 m84_1a m84_1b m84_1d m84_11a m84_11b m84_11d m84111a m84111b m84111d m84112a m84112b
m84112d m84_12a m84_12b m84_12d m84_8a m84_8b m84_8d m84_2a m84_2b m84_2d m84_21a m84_21b
m84_21d m84_3a m84_3b m84_3d m84_31a m84_31b m84_31d m84_4a m84_4b m84_4d m84_5a m84_5b m84_5d
m84_9a m84_9b m84_9d m84_7a m84_7b m84_7d m84_6a m84_6b m84_6d


rename status iurban
rename h5 igender
rename h3 ifamily
rename h4 iperson
rename m3 ievalhl
rename h6 ibirthy
rename h7_1 iintday
rename h7_2 iintmon
rename i4 ination
rename j1 iwork

rename l5 h_problem_30d
rename j65 s_life
rename m71 smokes
rename m73 smoked_7d
rename m75 n_cigar_d
rename m77 smoked_ever
rename m80 alco_30d
rename m81 alco_freq_30d
rename m43 diabetes
rename m46 heart_attack
rename m62 anemia_12m
rename m131 depress_1v
rename m139 depress_2v
rename m146 depress_3v

rename j60_4c1 livcond_satisf
rename j60_5 livstandard5yago
rename j60_5a hh_finances_12m
rename j61 hh_better_12m
rename j62 hh_ec_ladder
rename j66 necessities
rename j66_1 eccond_satisf
rename j322 marit_st
rename j323m marry_m
rename j323y marry_y
rename j324 cohabit_st
rename j325m cohabit_m
rename j325y cohabit_y

rename j72_171 ikids
```

```
rename j72_172 ikids_n
rename j72_173 ikids_n18

rename id_h id_h_ind

foreach var of varlist origsm region psu popul site age {
rename `var' i`var'
}
*
save IND_1994_2016_rename_keep.dta, replace


******* combine HH file with individual file ******

use HH_matrix_1994_2016_bdate.dta, clear

*find people who changed HH and their idind appears twice as duplicates

sort id_w idind
duplicates report idind id_w if idind!=.
*there should be 354,660 unique people
*but of course not everyone would participate in IND file

*need to drop hh members who are absent/do not exist/did not participate in IND file

duplicates tag idind id_w if idind!=., generate(dup)
keep if idind!=. & hindq!=.
duplicates report idind id_w if idind!=.
*17 people still have duplicates

duplicates tag idind id_w if idind!=., generate(dup1)
*those 17 people had a second record as absent from hh
drop if dup1!=0 & hinhh==2
*(17 observations deleted)

drop if hinhh==2
*(19 observations deleted)

drop dup dup1

save HH_matrix_1994_2016_bdate_no_dup.dta, replace

* merge *
sort id_w idind
merge 1:1 id_w idind using IND_1994_2016_rename_keep.dta

    Result                      # of obs.
    -----------------------------------------
    not matched                         0
    matched                       316,640  (_merge==3)
    -----------------------------------------
rename _merge _hh_ind

xtset idind id_w
tsspell, f(L.id_w == .)
```

A.5 The Stata syntax for retrieving information on each household member and identifying the types of their relationships and living arrangements in the longitudinal file based on the household- and individual-levels harmonised RLMS datasets across 1994-2016

```
********** create information on each household member for each row (another household member) within the household ********

foreach var of varlist hinhh hindq monthin hsex h2byr hbmth hbday abs {
forval i=1/24 {
egen `var'`i'=total(`var') if hperson==`i', by(id_h id_w)
}
forval i=1/24 {
egen `var'_rel`i'=total(`var'`i'), by(id_h id_w)
}
}

***************////types of relationships //// ****************

forval i=1/18 {
egen count`i' = anycount(rel1-rel24), v(`i')
}
*

*parents *bio/step
egen count2_3=rowtotal(count2 count3)
***any parents bio/step + grandparents
egen count2_3_8=rowtotal(count2 count3 count8)
*any parents bio/step + grandparents including parent-in-law
egen count2_3_8_11=rowtotal(count2 count3 count8 count11)
*any parents *bio/step or parents in law
egen count2_3_11=rowtotal(count2 count3 count11)

*children bio/step
egen count4_5=rowtotal(count4 count5)
*children bio/step + grandchildren
egen count4_5_9=rowtotal(count4 count5 count9)
*children bio/step + children_in_law
egen count4_5_12=rowtotal(count4 count5 count12)
*children bio/step + children_in_law + grandchildren
egen count4_5_9_12=rowtotal(count4 count5 count9 count12)
```

A.6 The Stata syntax for correcting the misreports found in the longitudinal file based on the household- and individual-levels harmonised RLMS datasets across 1994-2016

```
*** Fix the misreported IND-file YoB***

replace ibirthy=1969 if idind==12872 & year==2001
replace ibirthy=1963 if idind==5126 & year==2002
replace ibirthy=2003 if idind==21935 & year==2013
replace ibirthy=2003 if idind==21935 & year==2014
replace ibirthy=2002 if idind==25222 & year==2006
replace ibirthy=2002 if idind==25222 & year==2007
replace ibirthy=1966 if idind==52950 & year==2007
replace ibirthy=1934 if idind==29913 & year==2007
replace ibirthy=1934 if idind==29913 & year==2008
replace ibirthy=1987 if idind==618 & year==2010
replace ibirthy=1987 if idind==618 & year==2011
replace ibirthy=1987 if idind==618 & year==2013
replace ibirthy=1994 if idind==5009 & year==2010
replace ibirthy=1946 if idind==5410 & year==2010
foreach num of numlist 2007 2008 2009 {
replace ibirthy=1964 if idind==29654 & year==`num'
}
replace ibirthy=1981 if idind==26065 & year==2012
replace ibirthy=1999 if idind==44907 & year==2012
replace ibirthy=1978 if idind==46050 & year==2012

* Order number as a hh member in a household
*2 individuals from the same HH id_h=770042 in 2010 - fix them in IPERSON
replace iperson=10 if hperson==10 & idind==15284 & year==2010
replace iperson=13 if hperson==13 & idind==29334 & year==2010



**********checking mismatches and outliers**********


* year of birth matches over time?
sort idind id_w
gen iyob_wrong=.
replace iyob_wrong=1 if ibirthy!=ibirthy[_n+1] & idind==idind[_n+1]
*2878 mismatches over time
xttab iyob_wrong
*1802 people have in total 2878 mismatches

*calculate the difference in the reported YoB over time

gen iyob_diff=ibirthy-ibirthy[_n-1] if ibirthy!=ibirthy[_n-1] & idind==idind[_n-1]
bysort idind: egen iyob_wrong_ever=total(iyob_wrong)
by idind: egen iyob_wrong_max=max(iyob_diff)
replace iyob_wrong_max=0 if iyob_wrong_max==.

gen yob_new=.
replace yob_new=ibirthy if iyob_wrong_ever==0

***some very strange huge differences between the reported years of birth:
                replace idind=404671 if year==2016 & idind==40467
                replace yob_new=ibirthy if idind==404671
                replace idind_rel4=404671 if idind==404671

        replace idind=158621 if idind==15862 & year==1998
        replace idind_rel1=158611 if idind==158621 & year==1998
```

```
replace idind_rel2=158621 if idind==158621 & year==1998

replace idind=158611 if idind==15861 & year==1998
replace idind_rel1=158611 if idind==158611 & year==1998
replace idind_rel2=158621 if idind==158611 & year==1998

replace idind=158621 if idind==15862 & year==2001
replace idind_rel1=158611 if idind==158621 & year==2001
replace idind_rel2=158621 if idind==158621 & year==2001

replace idind=158611 if idind==15861 & year==2001
replace idind_rel1=158611 if idind==158611 & year==2001
replace idind_rel2=158621 if idind==158611 & year==2001

replace idind=198041 if idind==19804 & year==2012
replace idind_rel1=198041 if idind==198041 & year==2012
replace idind_rel2=198041 if idind==47536 & year==2012

replace idind=335931 if idind==33593 & year==2010
replace idind_rel1=335921 if idind==335931 & year==2010
replace idind_rel2=335931 if idind==335931 & year==2010

replace idind=335921 if idind==33592 & year==2010
replace idind_rel1=335921 if idind==335921 & year==2010
replace idind_rel2=335931 if idind==335921 & year==2010

replace hbyr_rel3=1982 if id_h==920526 & year==2013
replace ibirthy=1982 if idind==45900 & year==2013
replace hbyr=1982 if idind==45900 & year==2013



********** household roster misreports**********

*let hr** be equal zero if it is the observed individual him/herself in hh roster
forval y=1/24 {
replace hr`y'=0 if hperson==`y'
}
*
*now we will calculate if there are any mismatches within hh
forval x=1/4 {
gen mis`x'=.
}
forval y=1/24 {
replace mis1=1 if hr`y'!=. & idind_rel`y'==0
replace mis2=1 if hr`y'==. & idind_rel`y'!=0
replace mis3=1 if hr`y'!=. & idind_rel`y'!=0 & abs_rel`y'!=0
replace mis4=1 if hr`y'==. & idind_rel`y'==0 & abs_rel`y'!=0
}
*
gen mis2_abs=.
forval y=1/24 {
replace mis2_abs=1 if hr`y'==. & idind_rel`y'!=0 & abs_rel`y'!=0
}
*
gen mis2_indq=.
forval y=1/24 {
replace mis2_indq=1 if hr`y'==. & idind_rel`y'!=0 & hindq_rel`y'==0
}
*
gen mis1_abs=.
forval y=1/24 {
replace mis1_abs=1 if hr`y'!=. & idind_rel`y'==0 & abs_rel`y'!=0
}
*
gen mis1_indq=.
```

```
forval y=1/24 {
replace mis1_indq=1 if hr`y'!=. & idind_rel`y'==0 & hindq_rel`y'==0
}
*



*******check if rel-p type was missing when the hh member was in hh *******

forval y=1/24 {
gen mis_hr`y'=.
replace mis_hr`y'=1 if hr`y'==. & hinhh_rel`y'==1
replace mis_hr`y'=2 if hr`y'==. & monthin_rel`y'!=0
replace mis_hr`y'=3 if hr`y'==. & hsex_rel`y'!=0
replace mis_hr`y'=4 if hr`y'==. & hbyr_rel`y'!=0
}
*

*here are those who had absence reported as well:

*1
*fix mistake (7882 is recorded as absent by accident, has even an ind_q)
replace abs_rel4=. if id_h==1130053 & year==2002
replace hr4=13 if idind==17495 & id_h==1130053 & year==2002
replace hr4=15 if idind==17496 & id_h==1130053 & year==2002
replace hr6=13 if idind==7882 & id_h==1130053 & year==2002
replace hr7=10 if idind==7882 & id_h==1130053 & year==2002

*2
*looks like they indicated the sex by accident, other variables are missing
replace hsex_rel10=0 if id_h==1360204 & year==2003



****those, who have no absence, but no hr** neither:
*we need to find them in t-1 or t+1 and fill in the relationship type to each observation

egen mis_hr_n=anycount(mis_hr1-mis_hr24), v(1/4)

forval y=1/24 {
gen fill_hr`y'=.
}
*takes very long time and shows too many lines of "N real changes made".....
forval y=1/24 {
forval i=1/25 {
bys idind: replace fill_hr`y'=hr`y'[_n-`i'] if hr`y'[_n-`i']!=. & mis_hr`y'!=. & abs_rel`y'==0 & abs_rel`y'[_n-`i']==0 &
hbyr_rel`y'==hbyr_rel`y'[_n-`i']
bys idind: replace fill_hr`y'=hr`y'[_n+`i'] if hr`y'[_n+`i']!=. & mis_hr`y'!=. & abs_rel`y'==0 & abs_rel`y'[_n+`i']==0 &
hbyr_rel`y'==hbyr_rel`y'[_n+`i']
}
}
egen fill_hr_n=anycount(fill_hr1-fill_hr24), v(1/18)

 replace hr4=6 if idind==2333 & id_h==46095 & year==1994
 replace hr5=6 if idind==2334 & id_h==46095 & year==1994

 replace hr8=16 if hperson==3 & id_h==100409 & year==2003
 replace hr1=14 if hperson==7 & id_h==100409
 replace hr1=14 if hperson==8 & id_h==100409
  replace hr3=16 if hperson==7 & id_h==100409 & year==2003
 replace hr3=16 if hperson==8 & id_h==100409 & year==2003
  replace hr7=14 if hperson==5 & id_h==100409 & year==2003
 replace hr5=14 if hperson==7 & id_h==100409
 replace hr5=14 if hperson==8 & id_h==100409
  replace hr8=6 if hperson==7 & id_h==100409 & year==2003
 replace hr7=6 if hperson==8 & id_h==100409 & year==2003
```

```
replace hr1=2 if id_h==141061 & year==1994 & hperson==2
replace hr1=11 if id_h==141061 & year==1994 & hperson==3
replace hr2=4 if id_h==141061 & year==1994 & hperson==1
replace hr3=12 if id_h==141061 & year==1994 & hperson==1

replace hr8=13 if id_h==460459 & hperson==5
replace hr5=13 if id_h==460459 & hperson==8

replace hr6=15 if hperson==3 & id_h==880008 & year==1995
replace hr6=15 if hperson==4 & id_h==880008 & year==1995
replace hr6=15 if hperson==5 & id_h==880008 & year==1995
replace hr3=10 if hperson==6 & id_h==880008 & year==1995
replace hr4=10 if hperson==6 & id_h==880008 & year==1995
replace hr5=10 if hperson==6 & id_h==880008 & year==1995

replace hr8=14 if hperson==3 & id_h==920410 & year==2001
replace hr3=14 if hperson==8 & id_h==920410 & year==2001
replace hr9=14 if hperson==8 & id_h==920410 & year==2001
replace hr8=14 if hperson==9 & id_h==920410 & year==2001

*person idind=6459 was in this hh a year ago (in 1995) and then absent
*coded for one of the hh members by mistake? it was someones parent
*but the reason for absence is not recorded...because hh did not participate in t+1
replace hr4=. if hperson==1 & id_h==920701 & year==1996

*I will have to go to other rel then
replace hr4=13 if hperson==1 & id_h==920711 & year==1995
replace hr4=13 if hperson==2 & id_h==920711 & year==1995
replace hr4=13 if hperson==3 & id_h==920711 & year==1995
replace hr1=13 if hperson==4 & id_h==920711 & year==1995
replace hr2=13 if hperson==4 & id_h==920711 & year==1995
replace hr3=13 if hperson==4 & id_h==920711 & year==1995

*it was some misreport, because idind is missing
replace hinhh_rel11=. if id_h==930106
replace abs_rel11=. if id_h==930106

*this grandchild participated only once
replace hr4=8 if hperson==5 & id_h==1060702 & year==1996
replace hr5=9 if hperson==4 & id_h==1060702 & year==1996

*before that there was hr16 a partner, also only for one wave
*looks like they accidentally shifted the coding of the relationships, because there is no hr16 in the wave where hr17 is
replace hr14=5 if hperson==17 & id_h==1290031 & year==2004
replace hr15=13 if hperson==17 & id_h==1290031 & year==2004
replace hr16=. if hperson==17 & id_h==1290031 & year==2004
replace hr17=3 if hperson==14 & id_h==1290031 & year==2004
replace hr17=13 if hperson==15 & id_h==1290031 & year==2004

replace hr16=1 if hperson==17 & id_h==1382368 & year==2010
replace hr17=1 if hperson==16 & id_h==1382368 & year==2010

*have to keep missing and declair as an outlier
replace hr2=. if hperson==1 & id_h==1391406 & year==1995
replace hr3=. if hperson==2 & id_h==1391406 & year==1995
replace hr3=. if hperson==3 & id_h==1391406 & year==1995

*******drop the outlier
drop if id_h==1391406 & year==1995

replace hr4=13 if hperson==2 & id_h==2402511 & year==2004
replace hr4=13 if hperson==3 & id_h==2402511 & year==2004

replace hr5=13 if hperson==2 & id_h==2402511 & year==2004
replace hr5=13 if hperson==3 & id_h==2402511 & year==2004
replace hr5=13 if hperson==4 & id_h==2402511 & year==2004
```

```
replace hr6=13 if hperson==2 & id_h==2402511 & year==2004
replace hr6=13 if hperson==3 & id_h==2402511 & year==2004
replace hr6=13 if hperson==4 & id_h==2402511 & year==2004
replace hr6=13 if hperson==5 & id_h==2402511 & year==2004

replace hr2=13 if hperson==4 & id_h==2402511 & year==2004
replace hr2=13 if hperson==5 & id_h==2402511 & year==2004
replace hr2=13 if hperson==6 & id_h==2402511 & year==2004

replace hr3=13 if hperson==4 & id_h==2402511 & year==2004
replace hr3=13 if hperson==5 & id_h==2402511 & year==2004
replace hr3=13 if hperson==6 & id_h==2402511 & year==2004

replace hr4=13 if hperson==5 & id_h==2402511 & year==2004
replace hr4=13 if hperson==6 & id_h==2402511 & year==2004

replace hr5=13 if hperson==6 & id_h==2402511 & year==2004

replace hr18=13 if hperson==19 & id_h==13915052 & year==2006
replace hr19=13 if hperson==18 & id_h==13915052 & year==2006


*********************************************************************************


*misreports when have hr** and idind_rel*, but have an absent reason too!
forval y=1/24 {
gen hr_abs`y'=.
replace hr_abs`y'=1 if hr`y'!=. & hinhh_rel`y'==1 & abs_rel`y'!=.
replace hr_abs`y'=2 if hr`y'!=. & monthin_rel`y'!=0 & abs_rel`y'!=.
replace hr_abs`y'=3 if hr`y'!=. & hsex_rel`y'!=0 & abs_rel`y'!=.
replace hr_abs`y'=4 if hr`y'!=. & hbyr_rel`y'!=0 & abs_rel`y'!=.
}

*little misreports:
replace abs_rel5=. if id_h==1060751 & year==1998
replace abs_rel14=. if id_h==9301052 & year==2006


*misreports when say N of months present but no YoB and vice versa:
forval y=1/24 {
gen hr_yob_miss`y'=.
replace hr_yob_miss`y'=0 if hr`y'!=. | fill_hr`y' !=.
replace hr_yob_miss`y'=1 if hr_yob_miss`y'==0 & monthin_rel`y'!=0
replace hr_yob_miss`y'=2 if hr_yob_miss`y'==1 & hbyr_rel`y'!=0
replace hr_yob_miss`y'=3 if hr_yob_miss`y'==2 & hsex_rel`y'!=0
}
egen hr_yob_miss_n=anycount(hr_yob_miss1-hr_yob_miss24), v(0)
*806 times the relationship is indicated/filled, but not N of months/yob/sex in hh of that member


*check when HH members are present or fake by looking at their absence

forval y=1/24 {
gen hr_here_or_abs`y'=.
replace hr_here_or_abs`y'=0 if hr_yob_miss`y'==0 & abs_rel`y'!=.
replace hr_here_or_abs`y'=1 if hr_yob_miss`y'==0 & abs_rel`y'==.
replace hr_here_or_abs`y'=2 if hr_yob_miss`y'==3 & abs_rel`y'!=.
replace hr_here_or_abs`y'=3 if hr_yob_miss`y'==3 & abs_rel`y'==.
}
egen hr_here_or_abs_0=anycount(hr_here_or_abs1-hr_here_or_abs24), v(0)
egen hr_here_or_abs_1=anycount(hr_here_or_abs1-hr_here_or_abs24), v(1)
*no observations have hr_here_or_abs`y'==2
egen hr_here_or_abs_3=anycount(hr_here_or_abs1-hr_here_or_abs24), v(3)
```

```
*21 individuals have 1-2 hh members fake relationships included (those hh members are absent!)
*need to exclude those hh members from being in hh roster (hence, their rel-ps hr** need to be missing, otherwise it is
missleading)


*sex and YoB always reported both even if N of months is missing?*
forval y=1/24 {
gen hr_yob_sex`y'=.

replace hr_yob_sex`y'=0 if fill_hr`y'!=. & hbyr_rel`y'==0 & hsex_rel`y'==0
replace hr_yob_sex`y'=0 if fill_hr`y'==. & hr`y'!=. & hbyr_rel`y'==0 & hsex_rel`y'==0

replace hr_yob_sex`y'=1 if fill_hr`y'!=. & hbyr_rel`y'==0 & hsex_rel`y'!=0
replace hr_yob_sex`y'=1 if fill_hr`y'==. & hr`y'!=. & hbyr_rel`y'==0 & hsex_rel`y'!=0

replace hr_yob_sex`y'=2 if fill_hr`y'!=. & hbyr_rel`y'!=0 & hsex_rel`y'==0
replace hr_yob_sex`y'=2 if fill_hr`y'==. & hr`y'!=. & hbyr_rel`y'!=0 & hsex_rel`y'==0

replace hr_yob_sex`y'=3 if fill_hr`y'!=. & hbyr_rel`y'!=0 & hsex_rel`y'!=0
replace hr_yob_sex`y'=3 if fill_hr`y'==. & hr`y'!=. & hbyr_rel`y'!=0 & hsex_rel`y'!=0
}
*
egen hr_yob_sex_0=anycount(hr_yob_sex1-hr_yob_sex24), v(0)
egen hr_yob_sex_1=anycount(hr_yob_sex1-hr_yob_sex24), v(1)
egen hr_yob_sex_2=anycount(hr_yob_sex1-hr_yob_sex24), v(2)
egen hr_yob_sex_3=anycount(hr_yob_sex1-hr_yob_sex24), v(3)



******** remember to drop outliers: ******

drop if id_h==1391406 & year==1995
*this hh in this year had no reported rel-ps between three hh members at all!!!
*they all participated in that address only once and were replaced with other people in 1996
drop if idind==12702 | idind==12703 | idind==12704



************ saving a file without outliers and with the updated types of the relationships *******

*I decided that I will still count HH members with reported YoB present, even if N months of living in a household = 0

**** final types of relationships will be indicated only for HH members who were present in HH

forval y=1/24 {
gen rel`y'=.
}
forval y=1/24 {
replace rel`y'=fill_hr`y' if fill_hr`y'!=. & hbyr_rel`y'!=0
replace rel`y'=hr`y' if rel`y'==. & hr`y'!=. & hbyr_rel`y'!=0
replace rel`y'=. if hr_here_or_abs`y'==0
}
*
*******info about the age of HH members for each IDIND ******
forval i=1/24 {
gen age_rel`i'=.
replace age_rel`i'=year-hbyr_rel`i' if hbyr_rel`i'!=0
}
*

**********calculate own age using the mode or random reported year of birth**************

*by this stage, I know that yob reported between hh and ind files is the same for each observation

***calculate a mode
bysort idind: egen mode_yob=mode(ibirthy) if iyob_wrong_ever!=0
```

```
**choose the most obvious one depending on the first year of observation ever
bysort idind: egen min_yob=min(ibirthy) if iyob_wrong_ever!=0
bysort idind: egen max_yob=max(ibirthy) if iyob_wrong_ever!=0

bysort idind: gen least_yob=min_yob if year>=min_yob & year<=max_yob & _seq==1 & _spell==1
bysort idind: egen least_yob1=max(least_yob)

***or, choose randomly, if there is more than one mode
. bys idind: egen max_seq=max(_seq)
. bys idind: gen random=floor((max_seq-1+1)*runiform()+1) if iyob_wrong_max!=0 & mode_yob==.
. bys idind: gen random1=random if _seq==1 & _spell==1 & iyob_wrong_max!=0 & mode_yob==.
. bys idind: egen random1_max=max(random1)
. bys idind: gen random_yob=ibirthy if _n==random1_max
. bys idind: egen random_yob1=max(random_yob)

. replace yob_new= mode_yob if mode_yob!=.
. replace yob_new= random_yob1 if iyob_wrong_ever!=0 & mode_yob==.
. replace yob_new= least_yob1 if iyob_wrong_ever!=0 & least_yob1!=.


gen age=(int_y-yob_new)
tab age, m

******another outlier*****
*no age

*1 person, male, refused to answer the YoB in both hh and ind files
*idind=53288
*but he participated only in one wave in 2016
drop if idind==53288




**********now, I want to have consistent info on YoB of each HH member**********

*when they were in ind questionnaire
forval i=1/24 {
egen yob_new`i'=total(yob_new) if hperson==`i', by(id_h year)
}
forval i=1/24 {
egen yob_new_rel`i'=total(yob_new`i'), by(id_h year)
}
*

*when they are in hh, but not in ind questionnaire (and even no idind)
forval i=1/24 {
gen yob_hh_rel`i'=0
replace yob_hh_rel`i'=hbyr_rel`i' if hbyr_rel`i'!=0 & yob_new_rel`i'==0 & rel`i'!=.
}
*

*now, calculate the actual age of each relative...

forval i=1/24 {
gen age_new_rel`i'=.
replace age_new_rel`i'=year-yob_new_rel`i' if yob_new_rel`i'!=0 & yob_hh_rel`i'==0 & rel`i'!=.
replace age_new_rel`i'=year-yob_hh_rel`i' if yob_hh_rel`i'!=0 & yob_new_rel`i'==0 & rel`i'!=.
}
forval i=1/24 {
gen age_m`i'=.
replace age_m`i'=1 if age_new_rel`i'<0 & rel`i'!=.
replace age_m`i'=2 if age_new_rel`i'<0 & rel`i'!=.
}
forval i=1/24 {
```

```
bysort idind: replace age_new_rel`i'=age_new_rel`i'[_n+1] if age_m`i'!=. & age_m`i'[_n+1]==. & rel`i'==rel`i'[_n+1]
bysort idind: replace age_new_rel`i'=age_new_rel`i'[_n-1] if age_m`i'!=. & age_m`i'[_n-1]==. & rel`i'==rel`i'[_n-1]
}
forval i=1/24 {
gen age_m_kid`i'=.
replace age_m_kid`i'=1 if age_new_rel`i'<0 & rel`i'==4
replace age_m_kid`i'=2 if age_new_rel`i'<0 & rel`i'==5
}
egen age_m_kid=rowmax(age_m_kid*)

***for now code as missing age - all which are missing
forval i=1/24 {
replace age_new_rel`i'=. if age_new_rel`i'<0
}
```

Appendix B Additional information for Chapter 4 (Paper 1)

Table B.1 Cross-tabulation between marital and cohabitation statuses for those adult men who were coded in the household roster as "living with a spouse/partner"

Marital status \ cohabitation status	living with a partner, as husband & wife	living with a partner, but not as husband & wife	no, don't live with a partner	other	missing	Total	Total without misreports
Never married	416	31	2	3	1	453	447
First Marriage	0	0	0	0	3,717	3,717	4,309
Second Marriage	0	0	0	0	592	592	-
Divorced	379	35	6	0	1	421	414
Widower	54	3	0	0	0	57	57
married, but don't live together	12	0	0	0	0	12	12
missing	21	1	0	0	263	285	-
Total	882	70	8	3	4,574	5,537	5,239 *

* Hence, 298 adult men (5,537 – 5,239) were recognised as outliers in this study

Table B.2 Cross-tabulation between marital and cohabitation statuses for those adult men who were coded in the household roster as "living without any spouse/partner"

Marital status \ cohabitation status	living with a partner, as husband & wife	living with a partner, but not as husband & wife	no, don't live with a partner	other	missing	Total	Total without misreports
Never married	16	31	1,223	1	13	1,284	1,223
First Marriage	0	0	0	0	41	41	-
Second Marriage	0	0	0	0	8	8	-
Divorced	7	8	310	0	0	325	310
Widower	2	2	189	0	0	193	189
married, but don't live together	0	0	25	0	1	26	25
missing	0	0	0	0	111	111	-
Total	25	41	1,747	1	174	1,988	1,747 *

* Hence, 241 adult men (1,988 – 1,747) were recognised as outliers in this study

Appendix B

Note: in total, 539 adult men were recognised as outliers

Figure B.1 Distribution of self-rated health status by age groups, unweighted sample of 6,985 men aged 18 years old and over (including 85 men with missing values), RLMS 2013-2014

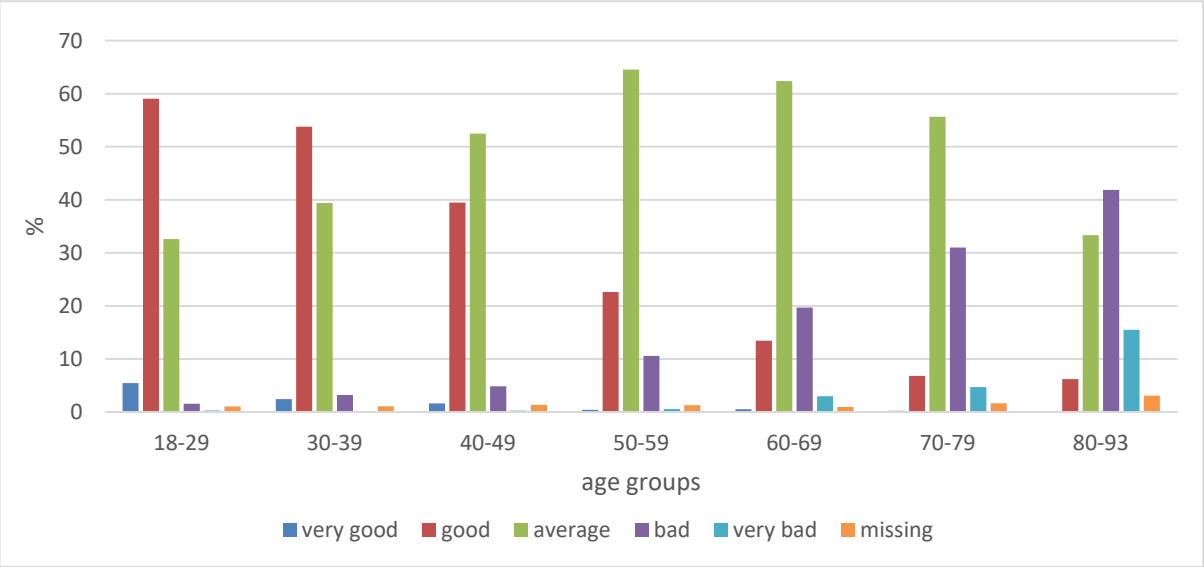


Table B.3 Akaike's information criterion and Bayesian information criterion for ordinal ('olog') and multinomial ('mlog') logistic regression models based on 5- and 3-categorical self-rated health status of men aged 18 years and older, RLMS 2013-2014, weighted

Model	Obs	ll(null)	ll(model)	df	AIC	BIC
olog5	5,168	-6106.705	-5485.998	11	10994	11066.05
olog3	5,168	-5365.129	-4755.801	9	9529.601	9588.553
mlog5	5,168	-6106.705	-5457.329	32	10978.66	11188.26
mlog3b	5,168	-5365.129	-4736.521	16	9505.042	9609.845

Table B.4 Test of the parallel regression assumption based on the calculation of a simple ordinal logistic regression of the 3-categorical self-rated health status of 6,900 men aged 18 years and older, RLMS 2013-2014, clustered within households unweighted sample

	Chi2	df	P>Chi2
Wolfe Gould	39.41	7	0.000
Brant	38.91	7	0.000
score	39.65	7	0.000
likelihood ratio	39.13	7	0.000
Wald	39.36	7	0.000

Note: If p-value for Brant test is <0.05, then ordinal model does not fit the data

Table B.5 Original and merged structure and distribution of dependent and independent variables, RLMS 2013-2014, unweighted sample of 6,900 men aged 18 years or over

Old variable	N / [min; max]	% / (mean; SD)	New variable	N / [min; max]	% / (mean; SD)
Dependent variable: Self-Rated Health Status					
Very bad	79	1.14	Very bad / bad	675	9.78
Bad	596	8.64			
Average	3,330	48.26	Average	3,330	48.26
Good	2,734	39.62	Good / Very good	2895	41.96
Very good	161	2.33			
Independent variables (excluding living arrangements):					
1. Men's demographic characteristics:					
1.1. Age					
Original 'age' variable - continuous variable	[18; 93]	(43.5; 16.4)	*as life-stages [sensitivity analysis only]:*		
			18-39	3,245	47.03
			40-59	2,382	34.52
			60-93	1,273	18.45
1.2. Nationality					
41 nationalities	6835	99.06	Russian	5,814	84.26
			Another nationality	1,021	14.8
missing	65	0.94	missing	65	0.94
1.3. Have been previously married? (based on marital status)					
Never married	1,649	23.9	Never previously married	5,320	77.10
First Marriage	3,671	53.2			
Second Marriage	585	8.48	Previously married	1,580	22.90
Divorced	716	10.38			
Widower	242	3.51			
married, but not living together	37	0.54			
2. Men's socio-economic characteristics:					
2.1. Education					
General or Incomplete Secondary School (SS)	561	8.13	General education or incomplete SS	561	8.13
Complete Secondary School (SS)	942	13.65	Complete SS	942	13.65
Professional Courses of driving, tractor driving, accounting, typing etc.	784	11.36	Professional Courses	784	11.36
Vocational training school (VTS) without Secondary Education (SE)	450	6.52	VTS with or without SE / TTS	1,771	25.67
VTS with SE, Technical Trade School (TTS)	1,321	19.14			
Technical Community College, Medical, Music, Pedagogical, Art Training School	1,279	18.54	College or Training School	1,279	18.54
Institute, University, Academy including Specialist Diploma	1,403	20.33	Higher Education	1,537	22.28
Institute, University, Academy including Bachelor's Degree	45	0.65			
Institute, University, Academy including Master's Degree	37	0.54			
Post-Graduate Course, Residency	20	0.29			
PhD Degree	28	0.41			
Doctoral Degree	4	0.06			
missing	26	0.38	missing	26	0.38

Appendix B

Old variable	N / [min; max]	% / (mean; SD)	New variable	N / [min; max]	% / (mean; SD)
2.2. Economic activity					
You are currently working	4,549	65.93	currently working	4,549	65.93
You are on paid leave (maternity leave or taking care of a child under 3 years of age)	3	0.04	currently not working or (un)paid leave	2,346	34.00
You are on another kind of paid leave	14	0.2			
You are on unpaid leave	5	0.07			
You are not working	2,324	33.68			
missing	5	0.07	missing	5	0.07
2.3. Army service use					
Have been in mandatory army service	4,140	60	no changes		
Have never been in mandatory army service	2,696	39.07			
missing	64	0.93			
3. Family characteristics:					
3.1. Geographical Regions (by the Russian Federal districts)					
Moscow and St. Petersburg (regional codes 138 139 141 238 239 240 241)	707	10.25	Moscow and St. Petersburg	707	10.25
Northern and North Western (regional codes 1 89 105)	408	5.91	Central, North, North-West	1,640	23.77
Central and Central Black-Earth (regional codes 14 33 67 72 135 136 142)	1,232	17.86			
Volga-Vaytski and Volga Basin (regional codes 39 45 48 70 100 116 117)	1,220	17.68	Volga & Ural	2,216	32.12
Ural (regional codes 10 12 46 47 106 107)	996	14.43			
North Caucasian (regional codes 9 52 77 129 137)	1,019	14.77	North Caucasus	1,019	14.77
Western Siberian (regional codes 58 71 84 161)	644	9.33	Siberia & Far East	1,318	19.1
Eastern Siberian and Far Eastern (regional codes 66 73 92 93)	674	9.77			
3.2. Settlement type					
Urban	4,606	66.75	no changes		
PGT ('*Poselok Gorodskogo Tipa*')	437	6.33			
Rural	1,857	26.91			
3.3. Family wealth quintiles (based on the OECD-modified scale)					
Original 'income' variable - continuous variable ("What is the total amount of money that you personally received in the last 30 days. Please include everything: wages, retirement pensions, premiums, profits, material aid, incidental earnings, and other receipts, including foreign currency, but convert the currency into rubles.")	[0; 2265000]	(21767.33; 35475.42)	1st quintile (lowest)	1,353	19.61
			2nd quintile	1,345	19.49
			3rd quintile	1,294	18.75
			4th quintile	1,320	19.13
			5th quintile (highest)	1,328	19.25
missing	260	3.77	missing	260	3.77
3.4. Number of minors (<=16) in household					

Old variable	N / [min; max]	% / (mean; SD)	New variable	N / [min; max]	% / (mean; SD)
Manually created categorical variable based on the household roster (summarised number of household members aged 16 years old or younger)			no minors <=16 in hh	3,824	55.42
			1 minor <=16	1,914	27.74
			2 or more minors <=16	1,162	16.84
3.5. Physical household size (household size divided by number of living rooms)					
3.5.1. Household size (derived from the household roster)			*a. Physical household size as a continuous variable*	[0.17; 7]	(1.54; 0.82)
1 person in household	333	4.83	missing	5	0.07
2 persons in household	1,793	25.99	*b. Physical household size as a categorical variable*		
3 persons in household	1,955	28.33	Undercrowded/normal (<=1)	1,082	15.68
4 persons in household	1,448	20.99	Overcrowded (>1)	5,813	84.25
5 persons in household	663	9.61	missing	5	0.07
6 persons in household	388	5.62			
7 persons in household	168	2.43			
8 persons in household	70	1.01			
9 persons in household	33	0.48			
10 persons in household	22	0.32			
11 persons in household	16	0.23			
12 persons in household	4	0.06			
13 persons in household	7	0.1			
3.5.2. Number of living rooms (excluding kitchen, bathroom, etc)					
1 living room	1,116	16.17			
2 living rooms	2,446	35.45			
3 living rooms	2,380	34.49			
4 living rooms	654	9.48			
5 living rooms	157	2.28			
6 living rooms	78	1.13			
7 living rooms	22	0.32			
8 living rooms	32	0.46			
9 living rooms	6	0.09			
10 living rooms	4	0.06			
missing	5	0.07			
Total	6,900	100	**Total**	6,900	100

Appendix B

Table B.6 Descriptive statistics of SRH status by independent variables, RLMS 2013-2014, unweighted (6,900 men) & weighted (5,168 men) samples

Variables	Self-rated health (SRH) status						Total		
	Very bad/bad		Average		Good/very good				
	%, un-weighted (row)	%, weighted (row)	%, un-weighted (row)	%, weighted (row)	%, un-weighted (row)	%, weighted (row)	N, un-weighted	%, un-weighted (row)	%, weighted (row)
Settlement type								100%	100%
urban	10.1	10.4	49.4	48.5	40.5	41.1	**4,606**	66.8	67.3
pgt	11.0	10.2	39.4	37.8	49.7	52.0	**437**	6.3	6.3
rural	8.6	8.3	47.5	48.0	43.9	43.8	**1,857**	26.9	26.5
Geographical region								100%	100%
Moscow & St.Petersburg	10.8	11.0	47.2	46.6	42.0	42.4	**707**	10.3	10.8
Central, North, North-West	10.2	10.1	52.5	52.5	37.3	37.5	**1,640**	23.8	24.2
Volga & Ural	10.2	10.8	47.6	47.6	42.2	41.6	**2,216**	32.1	30.3
North Caucasus	7.4	6.6	40.0	38.2	52.6	55.2	**1,019**	14.8	16.2
Siberia & Far East	9.9	10.1	51.0	50.6	39.2	39.3	**1,318**	19.1	18.5
Nationality								100%	100%
Russian	9.8	9.8	49.4	49.3	40.8	40.9	**5,814**	84.3	83.9
another nationality	10.0	9.8	41.1	38.7	48.9	51.5	**1,021**	14.8	15.1
missing	7.7	9.1	55.4	52.3	36.9	38.6	**65**	0.9	1.0
Educational level								100%	100%
General edu/incomplete SS	17.7	17.9	38.0	37.5	44.4	44.7	**561**	8.1	8.0
Complete SS	5.1	5.4	42.4	39.8	52.6	54.7	**942**	13.7	14.5
Professional Courses	12.4	12.2	50.8	52.5	36.9	35.3	**784**	11.4	11.1
VTS with or without SE / TTS	11.0	11.2	53.1	53.5	35.9	35.4	**1,771**	25.7	25.5
College or Training School	9.5	9.5	48.6	48.1	42.0	42.4	**1,279**	18.5	18.5
Higher Education	7.4	7.3	48.5	47.2	44.1	45.5	**1,537**	22.3	22.0
missing	11.5	14.1	46.2	51.2	42.3	34.7	**26**	0.4	0.4
Economic activity								100%	100%
currently working	3.2	3.5	48.5	48.1	48.3	48.4	**4,549**	65.9	65.0
not working or (un)paid leave	22.6	21.6	47.7	47.0	29.8	31.4	**2,346**	34.0	34.9
missing	0.0	0.0	100.0	100.0	0.0	0.0	**5**	0.1	0.1
Army service use								100%	100%
have been	10.3	10.5	51.5	51.3	38.3	38.2	**4,140**	60.0	59.2
have not been	8.9	8.8	43.6	42.6	47.4	48.6	**2,696**	39.1	39.7
missing	14.1	12.9	37.5	39.5	48.4	47.6	**64**	0.9	1.1
Previously married or not								100%	100%
yes	14.6	15.4	56.7	55.6	28.8	29.0	**1,580**	22.9	21.5
no	8.4	8.3	45.8	45.6	45.9	46.1	**5,320**	77.1	78.5
Number of minors (<=16) in HH								100%	100%
none	13.7	13.1	52.0	51.1	34.3	35.8	**3,824**	55.4	58.0
1 minor <=16	5.9	6.1	45.4	44.2	48.8	49.7	**1,914**	27.7	26.7
2 or more minors <=16	3.4	3.7	40.7	40.9	55.9	55.3	**1,162**	16.8	15.3
Family wealth quintiles								100%	100%
1 (lowest)	10.4	10.1	45.2	43.8	44.4	46.1	**1,353**	19.6	21.0
2	13.3	12.3	48.6	49.1	38.1	38.6	**1,345**	19.5	20.2
3	13.8	14.2	49.7	49.7	36.5	36.1	**1,294**	18.8	18.7
4	7.8	8.1	49.0	47.1	43.2	44.9	**1,320**	19.1	18.2
5 (highest)	4.5	4.9	48.4	49.1	47.1	46.0	**1,328**	19.3	18.1
missing	5.0	5.3	50.8	49.2	44.2	45.6	**260**	3.8	3.9
Physical HH size (household size/rooms)								100%	100%
undercrowded or normal	15.1	14.8	54.8	54.0	30.1	31.2	**1,082**	15.7	16.5
overcrowded	8.8	8.8	47.1	46.5	44.1	44.7	**5,813**	84.3	83.4
missing	20.0	25.6	0.0	0.0	80.0	74.4	**5**	0.1	0.1

Note: based on the Chi-squared test, all of the independent variables were significantly associated with the self-rated health status of adult men at the 95% significance level.

Figure B.2 Distribution of three-categorical and overall self-rated health (SRH) status by age of men aged 18 years old and over in percentages, RLMS 2013-2014, unweighted sample of 6,900 adult men

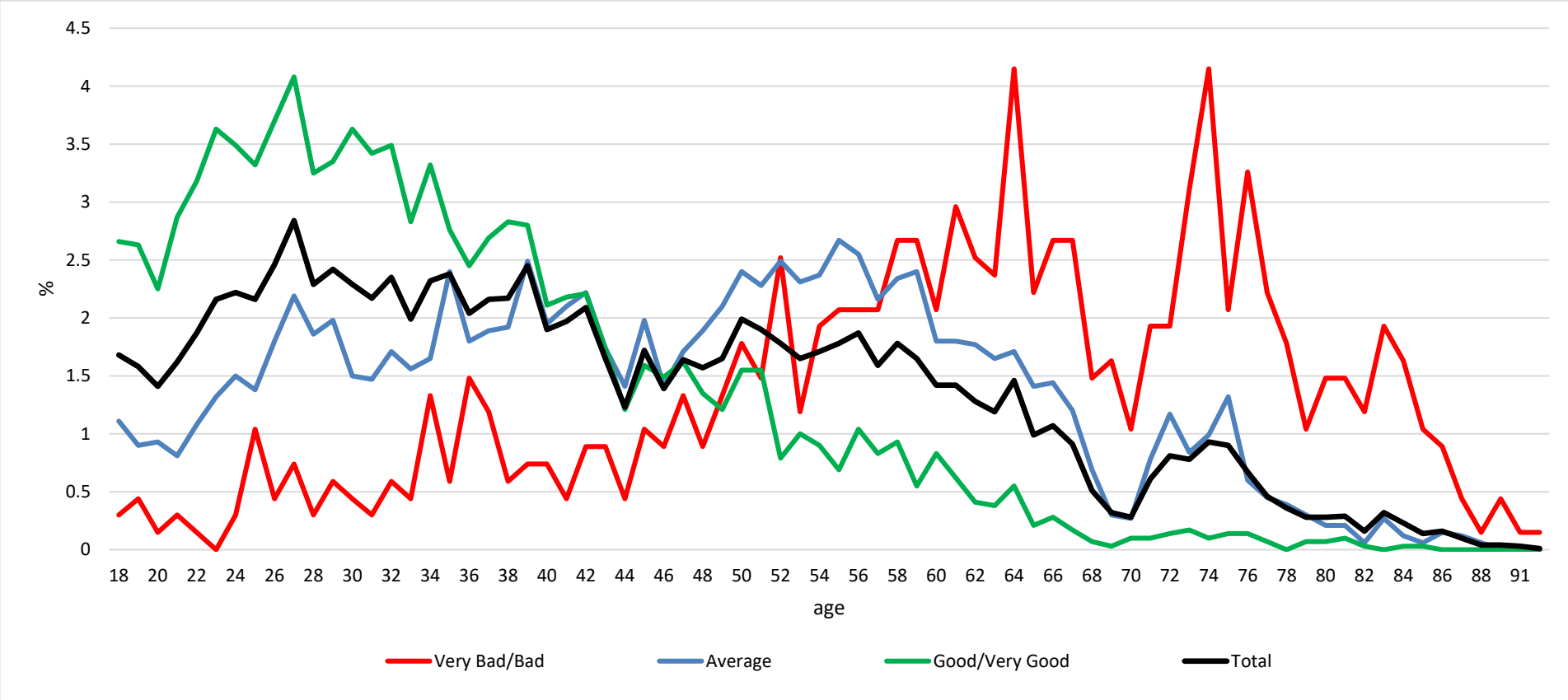


Figure B.3 Percentage of sample by self-rated health status and geographical regions of Russia based on the representative sample of 5,168 men aged 18 years and older, RLMS 2013-2014

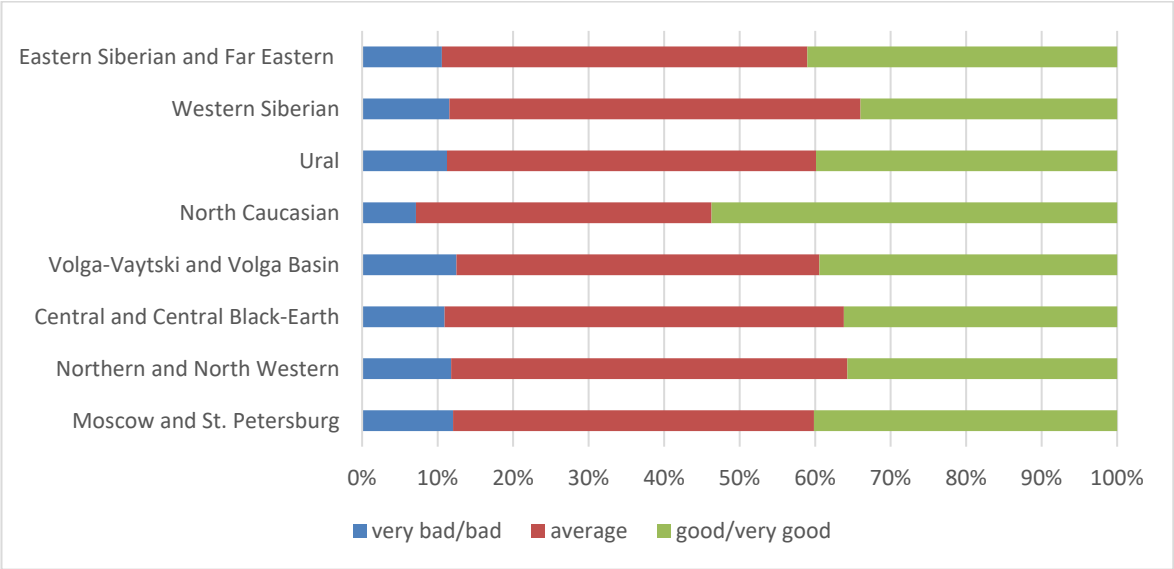


Figure B.4 Percentage of sample by family wealth quintiles and geographical regions of Russia based on the representative sample of 5,168 men aged 18 years and older, RLMS 2013-2014 (missing values are not presented)

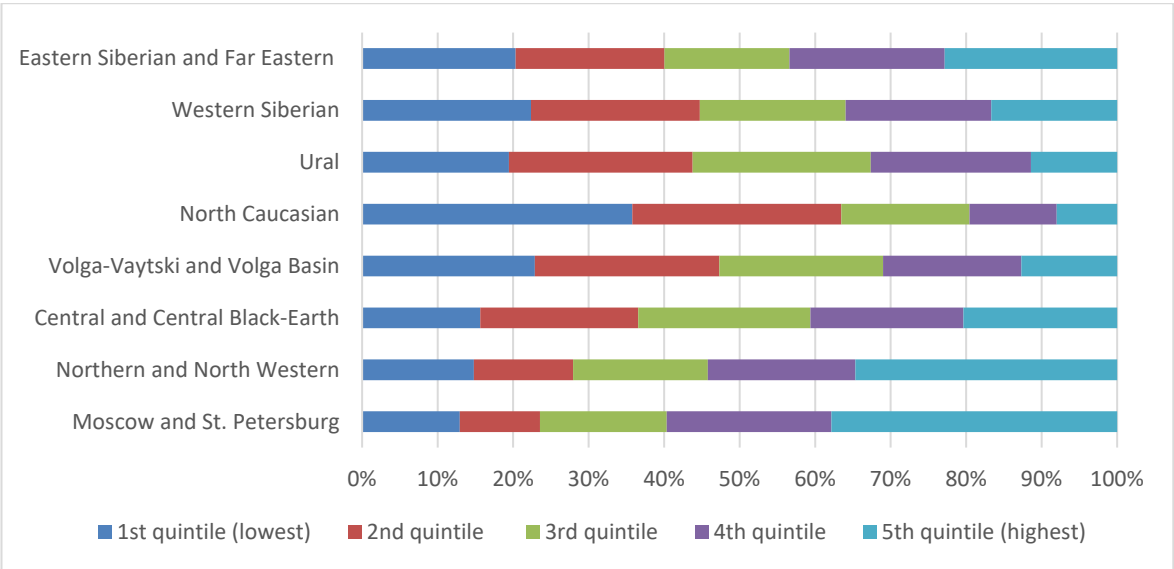


Table B.7 Results of Multinomial Logistic Regression based on multiply imputed (MI) data, Self-Rated Health (SRH) status of adult men in Russia, RLMS 2013-2014, weighted and clustered within households sample of 5,168 adult men [1]

Living arrangements by three research questions in the study	Model 1 (bivariate) *no MI required		Model 2: M1 + demographic char-s		Model 3: M2 + socio-economic char-s		Model 4: M3 + family char-s		Model 5: M4 + interaction	
	Very Bad/ Bad	Good/ Very Good	Very Bad/ Bad	Good/ Very Good	Very Bad/ Bad	Good/ Very Good	Very Bad/ Bad	Good/ Very Good	Very Bad/ Bad	Good/ Very Good
Research question 1: Partnership status (ref: unpartnered)										
Partnered	0.81	0.56***	0.51***	1.27*	0.72*	1.21*	0.74	1.09		
	(0.09)	*(0.04)*	*(0.08)*	*(0.11)*	*(0.11)*	*(0.11)*	*(0.12)*	*(0.11)*		
Research question 2: Unpartnered living alone status (ref: Yes)										
No, others	0.46***	1.33	0.76	1.02	0.79	1.00	0.72	0.95		
	(0.08)	*(0.20)*	*(0.16)*	*(0.18)*	*(0.16)*	*(0.17)*	*(0.16)*	*(0.17)*		
Research question 3: Living in intergenerational households & partnership status (ref: Yes, unpartnered)										
Yes, partnered	1.14	0.47***	0.55**	1.50***	0.89	1.43**	0.96	1.34*	1.03	0.93
	(0.18)	*(0.04)*	*(0.11)*	*(0.17)*	*(0.18)*	*(0.17)*	*(0.20)*	*(0.17)*	*(0.32)*	*(0.19)*
No, others	1.36*	0.48***	0.56**	1.25*	0.84	1.20	0.91	1.07	0.96	1.14
	(0.20)	*(0.04)*	*(0.10)*	*(0.13)*	*(0.16)*	*(0.12)*	*(0.18)*	*(0.12)*	*(0.30)*	*(0.22)*
Interaction between 'Living in intergenerational households' (ref: 'Yes, unpartnered') and 'family wealth quintiles' (ref: '1st quintile'):										
Yes, partnered # 2nd Quintile									0.85	1.63
									(0.40)	*(0.44)*
Yes, partnered # 3rd Quintile									0.73	1.73
									(0.38)	*(0.52)*
Yes, partnered # 4th Quintile									0.72	1.15
									(0.51)	*(0.36)*
Yes, partnered # 5th Quintile									3.10	2.60*
									(3.07)	*(1.00)*
No, others # 2nd Quintile									0.94	1.003
									(0.44)	*(0.27)*
No, others # 3rd Quintile									0.75	1.09
									(0.38)	*(0.30)*
No, others # 4th Quintile									0.84	0.71
									(0.55)	*(0.21)*
No, others # 5th Quintile									2.60	1.33
									(2.46)	*(0.47)*

Notes: Total N (obs) = 5,168;

Reference category for the equations is 'Average Self-Rated Health status';

Robust standard errors in italic parentheses;

$p < 0.05$ ** $p < 0.01$ *** $p < 0.001$;

[1] The total number of observations is smaller than the original sample of the study due to the post-stratified individual weights, where 1,732 individuals were not included in the representative sample (their 'pweights' were equal zero);

Full results are presented in Table B.9 of Appendix B.

B.1 Comparison between complete-case and MI analyses

After applying post-stratified individual weights for Model 1 – Model 3 of each research question, the comparison of the complete-case results between the models with all excluded missing values (number of observations is always 4,860 adult men) and the models with all available observations for those covariates which are included in the model, where:

- Covariate in Model 1 has no missing values with N(obs)=5,168;
- Covariates in Model 2 have in total 49 missing values with N(obs)=5,119;
- Covariates in Model 3 have in total 127 missing values with N(obs)=5,041.

Paying attention to the main covariate of living arrangements in each research question, the comparative results show that their estimates can significantly differ between two types of the complete-case analyses. In the models built for the first and third research questions, estimates' values are lower than the estimates presented from the complete-case analysis excluding any missing values in the sample. Opposite was found in the models for the second research question. Differences in the estimates can mean that observations are missing not completely at random in the sample of this study. Multiple imputation is required to avoid invalid inferences.

Table B.8 describes the comparison between two types of the complete case-analyses as well as multiply imputed results in terms of the significance level for living arrangements from each research question. In general, it shows that the number of observations included in each model affects the significance of the relationship between self-rated health status and living arrangements of men in each research question. For instance, in a bivariate relationship (M1) for the first research question the p-value of the 'partnership status' variable reduces down close to the cut-off of 0.05 for 95% significance level after including all available observations (even those observations who have missing values in other covariates included in M2 – M4). Opposite to the complete-case analysis excluding any missing values, having all available observations in the bivariate model indicates that unpartnered men are significantly more likely to report 'very bad/bad' health status rather than 'average' health status in comparison to partnered men. To conclude, the MI results have shown that exclusion of men with missing values from the study sample decreases the significance of the association between living arrangements and self-rated health status and increase the significance of the interactions between intergenerational living arrangements and the family wealth quantiles. In this study, multiple imputation helps to reduce the biases in the estimates and identify a clearer pattern of the significance of the association between self-rated health status and living arrangements of adult men in Russia.

Table B.8 Prevalence ratios (PRs) and p-values of the multinomial regressions for three covariates of living arrangements of men by three research questions

Research Questions	Models	Category	complete-case analysis excluding all missing values (N=4,860) [1]		complete-case analysis including all available observations [2]		Multiple imputation analysis (50 imputations)	
			Very Bad/Bad PR	Good/Very Good PR	Very Bad/Bad PR	Good/Very Good PR	Very Bad/Bad PR	Good/Very Good PR
R.Q. 1: partnership status (ref: unpartnered)	M1 (bivariate)	Partnered	0.836 (p=0.112)	0.546 (p=0.000)	0.808 (p=0.050)	0.557 (p=0.000)	-	-
	M2: M1 + demographic covariates		0.536 (p=0.000)	1.232 (p=0.022)	0.516 (p=0.000)	1.282 (p=0.005)	0.512 (p=0.000)	1.268 (p=0.007)
	M3: M2 + socio-economic covariates		0.746 (p=0.060)	1.186 (p=0.074)	0.734 (p=0.045)	1.211 (p=0.041)	0.720 (p=0.030)	1.206 (p=0.043)
	M4: M3 + family covariates		0.755 (p=0.084)	1.077 (p=0.488)	-	-	0.736 (p=0.054)	1.087 (p=0.421)
R.Q. 2: unpartnered living alone or not (ref: yes)	M1 (bivariate)	No, others	0.454 (p=0.000)	1.341 (p=0.053)	0.457 (p=0.000)	1.327 (p=0.054)	-	-
	M2: M1 + demographic covariates		0.730 (p=0.140)	1.050 (p=0.783)	0.766 (p=0.208)	1.046 (p=0.795)	0.762 (p=0.194)	1.017 (p=0.923)
	M3: M2 + socio-economic covariates		0.758 (p=0.177)	1.027 (p=0.884)	0.762 (p=0.184)	1.011 (p=0.952)	0.788 (p=0.238)	0.988 (p=0.945)
	M4: M3 + family covariates		0.690 (p=0.086)	0.966 (p=0.983)	-	-	0.721 (p=0.123)	0.950 (p=0.780)
R.Q. 3: living in an intergenerational household or not & partnership status (ref: yes, unpartnered)	M1 (bivariate)	Yes, partnered	1.210 (p=0.249)	0.450 (p=0.000)	1.137 (p=0.414)	0.469 (p=0.000)	-	-
	M2: M1 + demographic covariates		0.607 (p=0.017)	1.384 (p=0.006)	0.546 (p=0.003)	1.493 (p=0.001)	0.548 (p=0.003)	1.495 (p=0.000)
	M3: M2 + socio-economic covariates		0.974 (p=0.900)	1.333 (p=0.018)	0.959 (p=0.841)	1.392 (p=0.006)	0.892 (p=0.574)	1.432 (p=0.002)
	M5: M3 + family covariates + interaction		1.044 (p=0.889)	0.839 (p=0.408)	-	-	1.029 (p=0.925)	0.926 (p=0.709)
	M1 (bivariate)	No, others	1.426 (p=0.022)	0.470 (p=0.000)	1.361 (p=0.036)	0.482 (p=0.000)	-	-
	M2: M1 + demographic covariates		0.605 (p=0.009)	1.191 (p=0.091)	0.565 (p=0.002)	1.245 (p=0.030)	0.563 (p=0.002)	1.245 (p=0.029)
	M3: M2 + socio-economic covariates		0.894 (p=0.561)	1.154 (p=0.180)	0.888 (p=0.537)	1.182 (p=0.111)	0.842 (p=0.354)	1.195 (p=0.087)
	M5: M3 + family covariates + interaction		1.002 (p=0.893)	1.079 (p=0.698)	-	-	0.959 (p=0.895)	1.141 (p=0.495)

[1] missing values for all of the covariates, which are included in Model 2 - Model 5;

[2] Dependent variable (Self-Rated Health status) and independent variable (partnership status) have no missing values in the study sample of adult men; no multiple imputation modelling required;

B.2 Sensitivity analysis

In the sensitivity analysis, we used three life-stages as an explanatory variable of age to stratify men in three sub-samples of young (18-39 years old), middle-aged (40-59 years old) and older (60 years old and over) men respectively. The decision to classify adult men by three life-course stages is based on the distribution of their SRH status by 10-years age groups, where: men aged between 18-39 years old have the highest probability to report 'good' SRH status; men aged 40-59 years old are more likely to report 'average' SRH status than younger men, but the probability to report 'good' SRH status is still higher than 'bad' status; after 60 years old, the probability of reporting 'bad' SRH status among older men starts to be higher than 'good' status and it gets over 'average' status after 80 years old.

Living arrangements by partnership status were included as a six-categorical covariate as well as its interactions with three life-stages were added. Six categories of living arrangements were created in two steps of dividing adult men by partnership status and family structure. Firstly, men were grouped by those who are unpartnered and who are living with a partner ('partnered men') whether married or cohabiting based on the combination of reported marital status, cohabitation status and household roster (excluding any misreports or mismatching). Secondly, unpartnered and partnered men were sub-grouped by those who are living alone or in nuclear households, living in intergenerational households and living with others. As a result, the next six categories were created: Unpartnered men living alone (4.93%); Unpartnered men living in intergenerational households (18.35%); Unpartnered men living with others (1.65%); Partnered men living in nuclear households (41.49%); Partnered men living in intergenerational households (25.01%); Partnered men living with others (8.57%).

With the aim of the preliminary regression analysis to find differences in association between self-rated health status and living arrangements of adult men across the life-course, multivariate regression models with interaction terms between six types of living arrangements and three life-course stages were built. However, the regression analyses did not show any significant interactions between living arrangements and age groups suggesting that the RLMS data cannot be 'stretched' enough to find the significant differences in the relationship between living arrangements and self-rated health across the life-course of adult men in Russia. Instead, new groups of adult men were created to avoid low counts of adult men by living arrangements in a regression model and to be able to establish the relationship between living arrangements and self-rated health of adult men. The regression results based on three new covariates of living arrangements in relation to three research questions are presented in the main body of this paper.

Table B.9 Multinomial logistic regression modelling of self-rated health status of men aged 18 years old or over, RLMS 2013-2014, Model 4 separately for three research questions [1]

Covariates of interest	R.Q.1 : by partnership status						R.Q.2 : by living alone status						R.Q.3 : by ILA and partnership statuses					
	Very Bad/Bad vs Average SRH			Very Good/Good vs Average SRH			Very Bad/Bad vs Average SRH			Very Good/Good vs Average SRH			Very Bad/Bad vs Average SRH			Very Good/Good vs Average SRH		
	PR	SE	p-value	PR	SE	p-value	PR	SE	p-value	PR	SE	p-value	PR	SE	p-value	PR	SE	p-value
Partnered (ref: single)	0.74	0.12	0.054	1.09	0.11	0.421												
Single living alone (ref: not)							0.72	0.15	0.123	0.95	0.17	0.780						
Living in ILA (ref: yes, single)																		
Yes, partnered													0.95	0.20	0.827	1.34	0.17	0.021
No (others)													0.91	0.18	0.643	1.07	0.12	0.545
Additional covariates:																		
age	1.07	0.02	0.001	0.92	0.01	0.000	1.05	0.02	0.006	0.93	0.01	0.000	1.06	0.02	0.010	0.91	0.01	0.000
age-squared	1.00	0.00	0.204	1.00	0.00	0.198	1.00	0.00	0.432	1.00	0.00	0.268	1.00	0.00	0.445	1.00	0.00	0.088
Russian (ref: other nationality)	1.20	0.19	0.270	1.52	0.16	0.000	1.19	0.19	0.278	1.52	0.16	0.000	1.19	0.19	0.282	1.51	0.16	0.000
Never previously married (ref: was)	0.96	0.13	0.774	1.07	0.09	0.462	0.91	0.11	0.461	1.09	0.10	0.339	0.87	0.11	0.254	1.03	0.09	0.733
Education (ref: General education or incomplete SS)																		
Complete SS	0.47	0.11	0.001	0.94	0.14	0.701	0.46	0.11	0.001	0.94	0.14	0.696	0.46	0.11	0.001	0.93	0.14	0.654
Professional Courses	0.77	0.17	0.224	0.71	0.12	0.036	0.75	0.16	0.188	0.71	0.12	0.039	0.74	0.16	0.170	0.70	0.12	0.032
VTS with or without SE / TTS	0.74	0.15	0.134	0.65	0.09	0.003	0.73	0.14	0.109	0.65	0.10	0.003	0.72	0.14	0.088	0.65	0.10	0.003
College or Training School	0.56	0.11	0.004	0.90	0.14	0.485	0.55	0.11	0.003	0.90	0.14	0.493	0.53	0.11	0.002	0.90	0.14	0.476
Higher Education	0.39	0.08	0.000	0.99	0.15	0.972	0.38	0.08	0.000	1.00	0.15	0.997	0.37	0.08	0.000	0.99	0.15	0.956
Economically not active (ref: active)	3.53	0.53	0.000	0.89	0.08	0.233	3.60	0.54	0.000	0.89	0.08	0.196	3.68	0.56	0.000	0.91	0.09	0.308
Never served in army (ref: did)	1.70	0.21	0.000	0.68	0.05	0.000	1.73	0.21	0.000	0.68	0.05	0.000	1.74	0.21	0.000	0.69	0.06	0.000
Geographical region (ref: Moscow & St.Petersburg)																		
Central, North, North-West	0.89	0.18	0.580	0.74	0.10	0.028	0.88	0.18	0.550	0.75	0.10	0.030	0.88	0.18	0.549	0.76	0.10	0.037
Volga & Ural	0.90	0.18	0.595	0.98	0.13	0.874	0.89	0.18	0.550	0.99	0.13	0.909	0.89	0.18	0.576	1.00	0.13	0.973
North Caucasus	0.75	0.19	0.260	1.35	0.20	0.042	0.75	0.19	0.243	1.36	0.20	0.038	0.74	0.19	0.229	1.34	0.20	0.048
Siberia & Far East	0.88	0.19	0.565	0.89	0.12	0.375	0.86	0.19	0.501	0.89	0.12	0.404	0.87	0.19	0.505	0.90	0.12	0.455
Settlement type (ref: urban)																		
PGT	1.00	0.20	0.987	1.86	0.29	0.000	1.00	0.20	0.994	1.87	0.29	0.000	0.98	0.20	0.936	1.87	0.29	0.000
Rural	0.57	0.08	0.000	1.24	0.11	0.012	0.56	0.08	0.000	1.25	0.11	0.012	0.56	0.08	0.000	1.25	0.11	0.011
Family wealth quintiles (ref: 1st quintile (lowest))																		
2nd quintile	0.91	0.15	0.586	1.08	0.12	0.497	0.89	0.14	0.493	1.09	0.12	0.448	0.90	0.15	0.519	1.09	0.12	0.419
3rd quintile	1.01	0.18	0.947	1.16	0.14	0.218	0.97	0.17	0.862	1.17	0.14	0.191	1.00	0.18	0.987	1.18	0.14	0.159
4th quintile	0.86	0.17	0.427	1.39	0.17	0.008	0.81	0.16	0.279	1.41	0.17	0.005	0.86	0.17	0.461	1.42	0.18	0.005
5th quintile (highest)	0.70	0.17	0.134	1.44	0.19	0.005	0.65	0.16	0.076	1.46	0.19	0.004	0.72	0.17	0.171	1.52	0.20	0.002
Overcrowded dwelling (ref: not)	1.14	0.15	0.319	0.97	0.10	0.742	1.14	0.15	0.301	0.98	0.10	0.848	1.09	0.14	0.515	0.92	0.10	0.428
Number of minors (<=16) in household (ref: no minors)																		
1 minor	1.02	0.15	0.90	1.09	0.10	0.356	1.00	0.15	0.992	1.11	0.09	0.207	0.99	0.15	0.959	1.09	0.09	0.348
2 or more minors	0.70	0.15	0.10	1.25	0.13	0.041	0.67	0.15	0.069	1.29	0.13	0.014	0.67	0.15	0.068	1.27	0.14	0.025

[1] With robust standard errors adjusted for clustering of men within households and post-stratified individual weights, leading to the sample size in the model of 4860 observations (3990 households).

Appendix B

Table B.10 Multinomial logistic regression modelling of self-rated health status of men aged 18 years old or over, RLMS 2013-2014, Model 2 + interaction terms with age [1]

Variables and interaction terms	Very Bad/Bad vs Average SRH			Very Good/Good vs Average SRH		
	PR	SE	p-value	PR	SE	p-value
R.Q.1 : by partnership status						
Partnered (ref: single)	0.57	0.15	0.033	0.91	0.08	0.334
Life-course stage (ref: young, aged 18-39)						
mid-life (aged 40-59)	3.14	0.80	0.000	0.28	0.05	0.000
old (aged 60-93)	7.43	1.81	0.000	0.11	0.03	0.000
Interaction between the two (ref: 'single' and 'aged 18-39'):						
aged 40-59 and partnered	0.66	0.22	0.208	1.16	0.21	0.433
aged 60-93 and partnered	1.09	0.35	0.779	1.06	0.32	0.838
R.Q.2 : by living alone status						
Single living alone (ref: not)	0.61	0.34	0.371	1.14	0.27	0.575
Life-course stage (ref: young, aged 18-39)						
mid-life (aged 40-59)	2.84	1.71	0.083	0.29	0.10	0.000
old (aged 60-93)	5.73	3.30	0.002	0.15	0.06	0.000
Interaction between the two (ref: 'single living alone' and 'aged 18-39'):						
aged 40-59 and living with others	0.63	0.39	0.453	1.05	0.38	0.882
aged 60-93 and living with others	1.14	0.68	0.823	0.72	0.30	0.433
R.Q.3 : by ILA and partnership statuses						
Living in ILA (ref: yes, single)						
Yes, partnered	0.77	0.33	0.546	1.09	0.16	0.561
No (others)	0.59	0.17	0.060	0.86	0.09	0.139
Life-course stage (ref: young, aged 18-39)						
mid-life (aged 40-59)	2.83	0.92	0.001	0.32	0.07	0.000
old (aged 60-93)	5.74	2.05	0.000	0.06	0.03	0.000
Interaction between the two (ref: 'in ILA, single' and 'aged 18-39'):						
aged 40-59, partnered in ILA	0.60	0.31	0.330	0.92	0.24	0.756
aged 40-59, not in ILA (other)	0.81	0.33	0.598	0.91	0.22	0.703
aged 60-93, partnered in ILA	0.99	0.54	0.982	2.38	1.55	0.183
aged 60-93, not in ILA (other)	1.55	0.65	0.296	1.95	1.22	0.289

[1] With robust standard errors adjusted for clustering of men within households and post-stratified individual weights, leading to the sample size in the model of 4860 observations (3990 households).

Table B.11 Multinomial logistic regression modelling of self-rated health status of men aged 18 years old or over, RLMS 2013-2014, Model 5 (=Model 4 + interaction terms with the family wealth quintiles), research question three [1]

Variables	R.Q.3 : by ILA and partnership statuses					
	SRH			Average SRH		
	PR	SE	p-value	PR	SE	p-value
Living in ILA (ref: yes, single)						
Yes, partnered	1.03	0.31	0.925	0.93	0.19	0.709
No (others)	0.96	0.30	0.895	1.14	0.22	0.495
Family wealth quintiles (ref: 1st quintile (lowest))						
2nd quintile	0.98	0.39	0.960	0.93	0.19	0.724
3rd quintile	1.31	0.57	0.530	0.95	0.21	0.825
4th quintile	1.04	0.63	0.948	1.63	0.41	0.052
5th quintile (highest)	0.28	0.25	0.158	0.96	0.31	0.906
Interaction between the two (ref: 'in ILA, single' and '1st quintile'):						
2nd quintile & partnered in ILA	0.85	0.40	0.728	1.63	0.44	0.072
2nd quintile & non-ILA (other)	0.94	0.44	0.900	1.00	0.27	0.990
3rd quintile & partnered in ILA	0.73	0.38	0.548	1.73	0.52	0.065
3rd quintile & non-ILA (other)	0.75	0.37	0.556	1.09	0.30	0.768
4th quintile & partnered in ILA	0.72	0.50	0.643	1.15	0.36	0.652
4th quintile & non-ILA (other)	0.84	0.55	0.795	0.71	0.21	0.249
5th quintile & partnered in ILA	3.10	3.07	0.252	2.60	1.00	0.013
5th quintile (highest) & non-ILA (other)	2.60	2.46	0.312	1.33	0.47	0.424
Other covariates:						
age	1.05	0.02	0.017	0.91	0.01	0.000
age-squared	1.00	0.00	0.530	1.00	0.00	0.064
Russian (ref: other nationality)	1.19	0.19	0.289	1.53	0.16	0.000
Never previously married (ref: was)	0.87	0.11	0.269	1.03	0.09	0.719
Education (ref: General education or incomplete SS)						
Complete SS	0.46	0.11	0.001	0.94	0.14	0.670
Professional Courses	0.75	0.16	0.187	0.71	0.12	0.043
VTS with or without SE / TTS	0.72	0.14	0.099	0.66	0.10	0.004
College or Training School	0.54	0.11	0.003	0.90	0.14	0.504
Higher Education	0.37	0.08	0.000	1.00	0.15	0.997
Economically not active (ref: active)	3.68	0.56	0.000	0.88	0.09	0.202
Never served in army (ref: did)	1.74	0.21	0.000	0.68	0.06	0.000
Geographical region (ref: Moscow & St.Petersburg)						
Central, North, North-West	0.89	0.18	0.564	0.76	0.10	0.045
Volga & Ural	0.89	0.18	0.583	1.02	0.13	0.857
North Caucasus	0.74	0.19	0.230	1.39	0.21	0.026
Siberia & Far East	0.87	0.19	0.508	0.92	0.13	0.550
Settlement type (ref: urban)						
PGT	0.98	0.20	0.915	1.87	0.29	0.000
Rural	0.56	0.08	0.000	1.25	0.11	0.012
Overcrowded dwelling (ref: not)	1.08	0.14	0.542	0.92	0.10	0.449
Number of minors (<=16) in household (ref: no minors)						
1 minor	0.99	0.15	0.933	1.09	0.09	0.347
2 or more minors	0.67	0.15	0.067	1.28	0.14	0.021

[1] With robust standard errors adjusted for clustering of men within households and post-stratified individual weights, leading to the sample size in the model of 4860 observations (3990 households).

Appendix C Additional information for Chapter 5 (Paper 2)

Table C.1 Distribution of 78,123 observations of 11,546 men aged 25 years old or older participating in at least two waves, by years of RLMS 1994-2015

Year	Observations of 11,546 men by a year of participation in RLMS				
	N	%	Among whom:		
			Observations of men by the first year of the first ever participation	Observations of men by the last year of each sequential participation [1]	Observations of men who participated only sequentially
1994	2,554	3.27%	100.00%	6.42%	70.75%
1995	2,736	3.50%	12.65%	15.28%	74.34%
1996	2,672	3.42%	9.21%	17.93%	72.49%
1998	2,740	3.51%	15.07%	15.77%	68.94%
2000	2,867	3.67%	15.28%	10.99%	68.54%
2001	3,145	4.03%	14.53%	10.37%	66.01%
2002	3,311	4.24%	10.84%	11.87%	65.33%
2003	3,374	4.32%	10.08%	14.02%	65.53%
2004	3,348	4.29%	9.17%	13.23%	65.14%
2005	3,265	4.18%	6.46%	13.35%	64.81%
2006	3,850	4.93%	22.31%	11.92%	66.31%
2007	3,897	4.99%	9.06%	14.68%	67.82%
2008	3,792	4.85%	7.91%	10.84%	68.51%
2009	3,830	4.90%	6.76%	11.46%	68.62%
2010	5,424	6.94%	33.15% [2]	11.98%	70.48%
2011	5,738	7.34%	13.51%	13.63%	73.95%
2012	5,903	7.56%	11.69%	14.47%	75.30%
2013	5,847	7.48%	8.81%	23.38%	76.55%
2014	5,104	6.53%	6.33%	14.97%	77.72%
2015	4,726	6.05%	0.00%	100.00%	72.56%
Total	**78,123**	**100%**	**14.78%**	**19.08%**	**70.64%**

[1] There could be several 'last years' for each man if he was a temporary attritor at least once.

[2] the highest rate of 33% in 2010 is due to the overall increase of the sample size in the RLMS survey from 4000 to 6000 households.

Appendix C

Table C.2 Distribution of 78,123 observations of 11,546 men aged 25 years old or older participating in at least two waves, by the total number of waves of men's participation in RLMS 1994-2015

N of waves participated in, total	Observations of 11,546 men by the total number of waves participated in, RLMS			
	N	%	Among whom:	
			Had no year gaps (were followed sequentially)	Had at least one year gap
2	3,511	4.49%	99.91%	0.09%
3	5,358	6.86%	78.39%	21.61%
4	7,044	9.02%	82.85%	17.15%
5	5,850	7.49%	64.70%	35.30%
6	5,520	7.07%	80.00%	20.00%
7	3,633	4.65%	69.36%	30.64%
8	3,656	4.68%	70.02%	29.98%
9	3,789	4.85%	61.28%	38.72%
10	4,780	6.12%	77.20%	22.80%
11	2,860	3.66%	59.62%	40.38%
12	3,300	4.22%	58.18%	41.82%
13	3,211	4.11%	57.89%	42.11%
14	3,192	4.09%	53.51%	46.49%
15	3,075	3.94%	62.44%	37.56%
16	3,504	4.49%	61.64%	38.36%
17	3,162	4.05%	69.35%	30.65%
18	2,430	3.11%	40.74%	59.26%
19	3,648	4.67%	35.42%	64.58%
20	6,600	8.45%	100.00%	0.00%
Total	**78,123**	**100.00%**	**70.64%**	**29.36%**

Table C.3 Descriptive statistics for the total sample of men being 25 years old or older, participating in at least two waves over 1994-2015 and having no missing values in the health outcome, 78123 observations

variables	Full sample of men over 1994-2015							
			Sample of men who had at least one change in health status over 1994-2015					
					pre-selected - living with parents in the 1st wave of participation		pre-selected - living without parents in the 1st wave of participation	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
SRH original 5-categorical								
very bad	1,315	1.68	902	3.6	113	2.29	789	3.92
bad	8,263	10.58	7,077	28.27	1,240	25.17	5,837	29.02
average	41,761	53.46	14,262	56.96	2,831	57.47	11,431	56.84
good	25,414	32.53	2,654	10.6	694	14.09	1,960	9.75
very good	1,370	1.75	143	0.57	48	0.97	95	0.47
SRH binary								
poor	9578	12.3	7,979	31.87	1,353	27.47	6,626	32.95
fine	68545	87.7	17,059	68.13	3,573	72.53	13,486	67.05
ILA								
Not living in ILA	60760	77.8	21,287	85.02	1,773	35.99	19,514	97.03
Living with older generation in POOR health	4515	5.8	1,596	6.37	1,317	26.74	279	1.39
Living with older generation in FINE health	12390	15.9	2,018	8.06	1,719	34.9	299	1.49
Living with older generation, missing health	458	0.6	137	0.55	117	2.38	20	0.1
age groups								
25-34	20071	25.7	2,154	8.6	1,085	22.03	1,069	5.32
35-44	18477	23.7	3,769	15.05	1,360	27.61	2,409	11.98
45-54	16095	20.6	5,515	22.03	1,250	25.38	4,265	21.21
55-64	12254	15.7	5,974	23.86	775	15.73	5,199	25.85
65+	11226	14.4	7,626	30.46	456	9.26	7,170	35.65
Living with a partner								
without partner	13588	17.4	4,475	17.87	1,770	35.93	2,705	13.45
with partner	64535	82.6	20,563	82.13	3,156	64.07	17,407	86.55
education								
incomplete SS	16506	21.1	7,827	31.26	1,166	23.67	6,661	33.12
complete SS	30391	38.9	8,897	35.53	2,076	42.14	6,821	33.92
vocational SE	14816	19.0	4,328	17.29	888	18.03	3,440	17.1
higher education	16410	21.0	3,986	15.92	796	16.16	3,190	15.86
economic activity								
currently working	51091	65.4	10,811	43.18	2,476	50.26	8,335	41.44
not working or (un)paid leave	27032	34.6	14,227	56.82	2,450	49.74	11,777	58.56
Total	**78123**	100.0	25,038	100	4926	100	20,112	100

Appendix C

Table C.4 Descriptive statistics for the extra independent variables used in the sensitivity analyses *

variables	Full sample of men over 1994-2015							
			Sample of men who had at least one change in health status over 1994-2015					
					pre-selected - living with parents in the 1st wave of participation		pre-selected - living without parents in the 1st wave of participation	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
Years								
1994	2,554	3.27	1,069	4.3	160	3.25	909	4.52
1995	2,736	3.5	1,117	4.5	170	3.45	947	4.71
1996	2,672	3.42	1,155	4.6	182	3.69	973	4.84
1998	2,740	3.51	1,197	4.8	204	4.14	993	4.94
2000	2,867	3.67	1,233	4.9	212	4.3	1,021	5.08
2001	3,145	4.03	1,302	5.2	239	4.85	1,063	5.29
2002	3,311	4.24	1,313	5.2	252	5.12	1,061	5.28
2003	3,374	4.32	1,294	5.2	263	5.34	1,031	5.13
2004	3,348	4.29	1,249	5.0	262	5.32	987	4.91
2005	3,265	4.18	1,171	4.7	252	5.12	919	4.57
2006	3,850	4.93	1,335	5.3	271	5.5	1,064	5.29
2007	3,897	4.99	1,299	5.2	260	5.28	1,039	5.17
2008	3,792	4.85	1,241	5.0	257	5.22	984	4.89
2009	3,830	4.9	1,209	4.8	252	5.12	957	4.76
2010	5,424	6.94	1,457	5.8	305	6.19	1,152	5.73
2011	5,738	7.34	1,453	5.8	291	5.91	1,162	5.78
2012	5,903	7.56	1,406	5.6	297	6.03	1,109	5.51
2013	5,847	7.48	1,333	5.3	300	6.09	1,033	5.14
2014	5,104	6.53	1,139	4.6	249	5.05	890	4.43
2015	4,726	6.05	1,066	4.3	248	5.03	818	4.07
Death of an older generation								
No	77,381	99.05	24,803	99.06	4,738	96.18	20,065	99.77
Yes, at least one	742	0.95	235	0.94	188	3.82	47	0.23
Partner's health								
no partner	13,588	17.39	4475	17.9	1,770	35.93	2,705	13.45
partner poor H	8,533	10.92	5124	20.5	496	10.07	4,628	23.01
partner good H	55,138	70.58	15117	60.4	2,607	52.92	12,510	62.2
partner,miss H	864	1.11	322	1.3	53	1.08	269	1.34
Healthy women in a household								
None	13,730	17.57	6,925	27.66	1,219	24.75	5,706	28.37
Yes, at least one	64,393	82.43	18,113	72.34	3,707	75.25	14,406	71.63
Other adults aged 16+ in a household								
no other adults	4,419	5.66	1899	7.6	215	4.36	1,684	8.37
plus one adult	38,560	49.36	12479	49.8	1,685	34.21	10,794	53.67
plus two adults	19,116	24.47	5873	23.5	1,523	30.92	4,350	21.63
plus three or more adults	16,028	20.52	4787	19.1	1,503	30.51	3,284	16.33
Minors aged 15 or less in a household								
no minors <=15 in hh	43,478	55.65	17,586	70.24	3,172	64.39	14,414	71.67
1 minor <=15	22,089	28.27	4,875	19.47	1,138	23.1	3,737	18.58
2 or more minors <=15	12,556	16.07	2,577	10.29	616	12.51	1,961	9.75
Lagged health status (1-lag)								
poor H	7,766	9.94	6572	26.3	1,127	22.88	5,445	27.07
fine H	58,811	75.28	15658	62.5	3,248	65.94	12,410	61.7
m.(1st wave)	11,546	14.78	2808	11.2	551	11.19	2,257	11.22

* for the total sample of men being 25 years old or older, participating in at least two waves over 1994-2015 and having no missing values in the health outcome, 78123 observations

Appendix D Additional information for Chapter 6 (Paper 3)

Table D.1 Sampling criteria for the cross-sectional sample, RLMS 2004-2016

Step	Sampling criteria	Men's observations			Men		
		Kept, N	Lost		Kept, N	Lost	
			N	%		N	%
0	Original sample of adult men aged 16 y. old or older, 2004+	77,317	-	-	15,910	-	-
1	Keep men aged 40 - 59 y.old	25,699	51,618	66.8	5,720	10,190	64.0
2	Keep men who reported having a biological/adopted child	23,061	2,638	10.3	5,189	531	9.3
3	Keep men who reported having child(ren) aged 18 y.old or older	18,839	4,222	18.3	4,398	791	15.2
4	Keep men living with a partner	17,057	1,782	9.5	3,943	455	10.3
5	Keep men with no missing values in covariates	17,040	17	0.1	3,932	11	0.3

Appendix D

Table D.2 Sampling criteria for longitudinal analysis, RLMS 1994-2016

Step	Sampling criteria	Men's observations			Men		
		Kept, N	Lost		Kept, N	Lost	
			N	%		N	%
0	Original sample of adult men aged 16 y. old or older	108,223	-	-	19,968	-	-
1	Keep men aged 40 - 59 y.old	35,795	72,428	66.9	7,344	12,624	63.2
2	Keep men ever observed co-residing with at least one child (biological/adopted/step)	27,919	7,876	22.0	5,195	2,149	29.3
3	Keep men ever observed co-residing only with biological/adopted child(ren)	22,925	4,994	17.9	4,245	950	18.3
4	Keep men ever observed co-residing with the oldest child aged 17 y.old or older	20,144	2,781	12.1	3,336	909	21.4
5	Left-censoring before the first observation of this co-residence	17,465	2,679	13.3	3,336	-	-
6	Right-censoring one wave later after the first observation of a man in a nest where all children left *	14,242	3,223	18.5	3,336	-	-
7	Right-censoring after a gap in participation, if a nest where all children left was observed in the first consecutive wave after this gap	14,174	68	0.5	3,336	-	-
8	Right-censoring if no partner in a household observed	13,569	605	4.3	3,171	165	4.9
9	Keep observations with no missing values in covariates	13,553	16	0.1	3,161	10	0.3
10	Keep the spell where father's transition to a nest where all children left was observed	13,361	192	1.4	3,161	-	-
11	Keep the longest spell if transition to a nest where all children left was never observed	12,819	542	4.1	3,161	-	-
12	Keep men followed-up in at least two consecutive waves	12,137	682	5.3	2,479	682	21.6

* *A nest where all children left* is a parental household, where all their children (of any age) moved to separate from their parents households.

Table D.3 Distribution of 3,336 fathers (20,144 observations) ever observed co-residing with adult child(ren) by their participation's spells over 1994-2016, RLMS

Maximum number of spells participated	Observations (Overall variation)		Men (Between variation)		Within variation
	N	%	N	%	%
1	15344	76.17	2712	81.29	100
2	3691	18.32	504	15.11	100
3	911	4.52	99	2.97	100
4	176	0.87	19	0.57	100
5	22	0.11	2	0.06	100
Total	**20144**	**100**	**3336**	**100**	**100**

Note: here we present distribution before conducting any censoring in steps 5-8.

Table D.4 Distribution of 3,336 fathers (20,144 observations) ever observed co-residing with adult child(ren) by their participation's length over 1994-2016, RLMS

Maximum number of waves participated	Observations (Overall variation)		Men (Between variation)		Within variation
	N	%	N	%	%
1	669	3.32	596	17.87	100
2	1006	4.99	433	12.98	100
3	1241	6.16	363	10.88	100
4	1982	9.84	444	13.31	100
5	1302	6.46	231	6.92	100
6	1360	6.75	202	6.06	100
7	1364	6.77	180	5.4	100
8	1078	5.35	121	3.63	100
9	1241	6.16	123	3.69	100
10	993	4.93	89	2.67	100
11	1472	7.31	127	3.81	100
12	1006	4.99	80	2.4	100
13	827	4.11	62	1.86	100
14	846	4.2	60	1.8	100
15	807	4.01	53	1.59	100
16	773	3.84	48	1.44	100
17	935	4.64	55	1.65	100
18	1242	6.17	69	2.07	100
Total	**20144**	**100**	**3336**	**100**	**100**

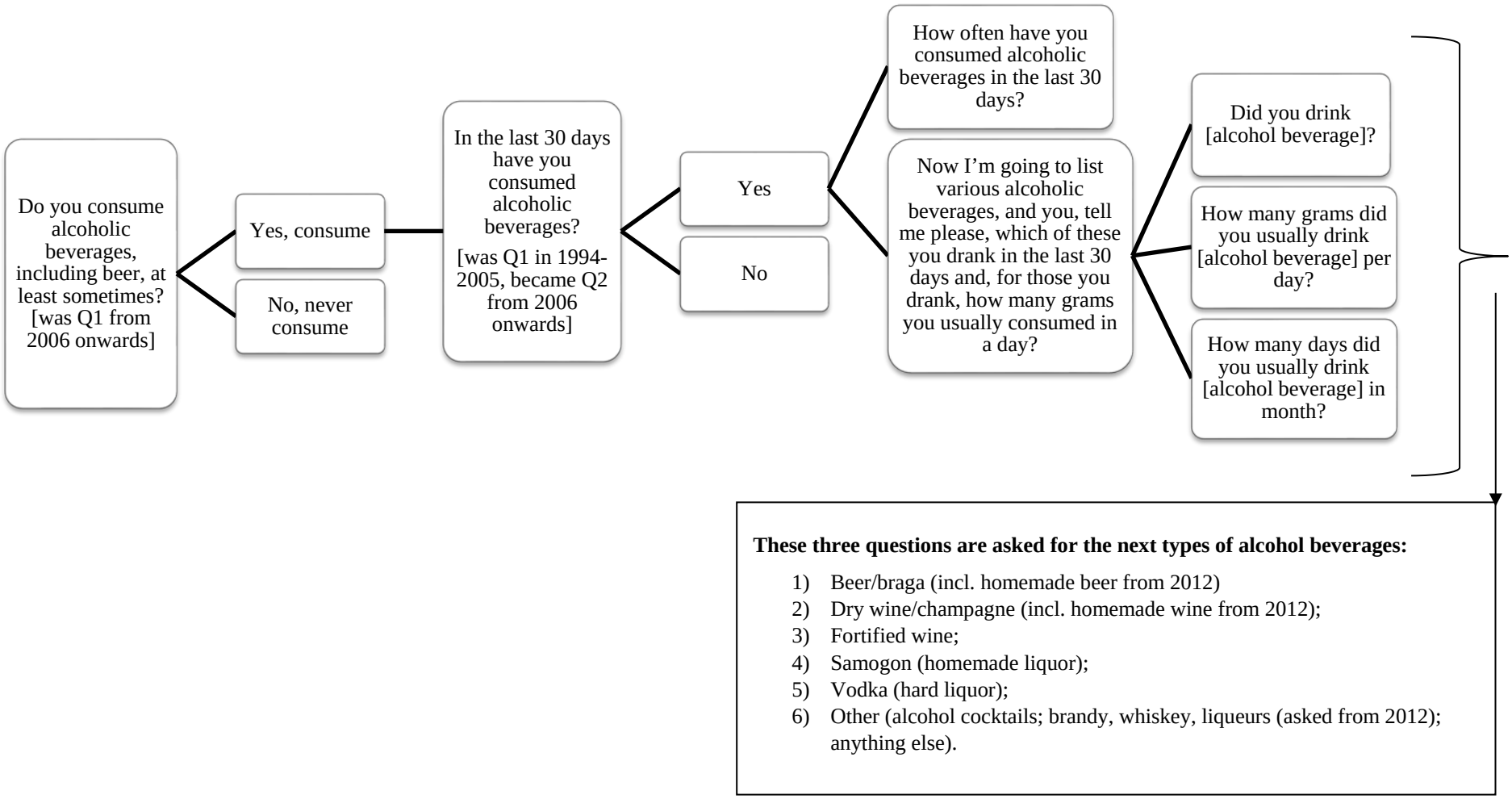
Note: here we present distribution before conducting any censoring in steps 5-8.

Appendix D

Table D.5 Descriptive statistics of life satisfaction, health status and years

Variables	Cross-sectional sample (2004 - 2016)		Longitudinal sample (1994 - 2016)	
	N	%	N	%
Life satisfaction				
Fully satisfied	1,117	6.56	702	5.78
Rather satisfied	6,819	40.02	4,008	33.02
Both yes and no	3,990	23.42	2,769	22.81
Less than satisfied	3,632	21.31	3,154	25.99
Not at all satisfied	1,355	7.95	1,420	11.7
missing	127	0.75	84	0.69
Health status				
Very good	146	0.86	115	0.95
Good	4,697	27.56	3,465	28.55
Average	10,583	62.11	7,448	61.37
Bad	1,369	8.03	959	7.9
Very bad	125	0.73	76	0.63
missing	120	0.7	74	0.61
Year				
1994	-	-	341	2.81
1995	-	-	446	3.67
1996	-	-	419	3.45
1998	-	-	434	3.58
2000	-	-	445	3.67
2001	-	-	477	3.93
2002	-	-	527	4.34
2003	-	-	544	4.48
2004	937	5.5	528	4.35
2005	928	5.45	521	4.29
2006	1,152	6.76	608	5.01
2007	1,172	6.88	642	5.29
2008	1,126	6.61	615	5.07
2009	1,095	6.43	586	4.83
2010	1,692	9.93	796	6.56
2011	1,689	9.91	834	6.87
2012	1,699	9.97	808	6.66
2013	1,629	9.56	765	6.3
2014	1,344	7.89	631	5.2
2015	1,292	7.58	628	5.17
2016	1,285	7.54	542	4.47
Total N (observations)	**17,040**	**100**	**12,137**	**100**
Total N (men)	***3932***	**-**	***2479***	**-**

Figure D.1 The questionnaire's scheme of retrieving men's information in drinking status and patterns, RLMS 1994-2016



Appendix D

Table D.6 Availability of the types of alcohol asked in RLMS 1994-2016

var name	type of alcohol	1994	1995	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
m84_1b	DRINKS BEER, BRAGA?	+	+	+	+	+	+	+	+	+	+	+	+								
m84_11b	DRINKS BEER?													+	+	+	+				
m84111b	BEER NDUSTRIAL																	+	+	+	+
m84112b	HOMEMADE BEER PER DAY																	+	+	+	+
m84_12b	BRAGA													+	+	+	+	+	+	+	+
m84_8b	HOMEMADE WINE																	+	+	+	+
m84_2b	DRINKS DRY WINE?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
m84_21b	DRY WINE, CHAMPAGNE - INDUSTRIAL																	+	+	+	+
m84_3b	FORTIFIED WINE?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
m84_31b	FORTIFIED WINE - INDUSTRIAL																	+	+	+	+
m84_4b	HOMEMADE LIQUOR?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
m84_5b	VODKA_HARD LIQUOR?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
m84_9b	BRANDY, WHISKEY, LIQUORS																	+	+	+	+
m84_7b	COCKTAILS CONTAINING ALCOHOL													+	+	+	+	+	+	+	+
m84_6b	DRINK OTHER ALCOHOL	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table D.7 Descriptive statistics by four cross-sectional samples excluding missing values of each outcome, RLMS 2004-2016

Variables	min	max	Sample without missing life satisfaction		Sample without missing health status		Sample without missing binge drinking		Sample without missing heavy smoking	
			Mean	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**
Life satisfaction	1	5	2.840	0.008	-	-	-	-	-	-
Fair/poor health	0	1	-	-	0.714	0.003	-	-	-	-
Yes, binge drinker	0	1	-	-	-	-	0.435	0.004	-	-
Yes, heavy smoker	0	1	-	-	-	-	-	-	0.379	0.004
Age 40-44	0	1	0.164	0.003	0.164	0.003	0.164	0.003	0.165	0.003
Age 45-49	0	1	0.261	0.003	0.262	0.003	0.262	0.003	0.261	0.003
Age 50-54	0	1	0.297	0.004	0.296	0.004	0.296	0.004	0.296	0.003
Age 55-59	0	1	0.278	0.003	0.278	0.003	0.278	0.003	0.278	0.003
Older generation(s) in hh	0	1	0.121	0.003	0.121	0.003	0.121	0.003	0.121	0.002
Other younger gen-n(s) in hh	0	1	0.155	0.003	0.155	0.003	0.155	0.003	0.155	0.003
Death/inst-n in hh	0	1	0.024	0.001	0.023	0.001	0.023	0.001	0.024	0.001
Incomplete SS	0	1	0.130	0.003	0.130	0.003	0.130	0.003	0.131	0.003
Complete SS	0	1	0.476	0.004	0.477	0.004	0.476	0.004	0.476	0.004
Vocational SE	0	1	0.203	0.003	0.203	0.003	0.203	0.003	0.203	0.003
Higher edu (HE)	0	1	0.191	0.003	0.191	0.003	0.191	0.003	0.190	0.003
Economically inactive	0	1	0.231	0.003	0.232	0.003	0.232	0.003	0.232	0.003
First quintile	0	1	0.190	0.003	0.190	0.003	0.190	0.003	0.191	0.003
Second quintile	0	1	0.189	0.003	0.189	0.003	0.189	0.003	0.189	0.003
Third quintile	0	1	0.190	0.003	0.189	0.003	0.189	0.003	0.189	0.003
Fourth quintile	0	1	0.190	0.003	0.190	0.003	0.190	0.003	0.190	0.003
Fifth quintile	0	1	0.189	0.003	0.189	0.003	0.188	0.003	0.188	0.003
Missing income	0	1	0.053	0.002	0.053	0.002	0.053	0.002	0.053	0.002
Moscow and St. Petersburg	0	1	0.088	0.002	0.088	0.002	0.088	0.002	0.088	0.002
Central, North, North-West	0	1	0.242	0.003	0.242	0.003	0.241	0.003	0.242	0.003
Volga & Ural	0	1	0.337	0.004	0.338	0.004	0.338	0.004	0.338	0.004
North Caucasus	0	1	0.142	0.003	0.141	0.003	0.142	0.003	0.141	0.003
Siberia & Far East	0	1	0.192	0.003	0.191	0.003	0.192	0.003	0.191	0.003
PGT/rural	0	1	0.377	0.004	0.377	0.004	0.377	0.004	0.379	0.004
Year	2004	2016	2010.450	0.027	2010.446	0.027	2010.451	0.027	2010.457	0.027
N (observations)	-	-	16913	-	16920	-	16965	-	17029	-

Appendix D

Table D.8 Descriptive statistics by four longitudinal samples excluding missing values of each outcome, RLMS 1994-2016

Variables	min	max	Sample without missing life satisfaction		Sample without missing health status		Sample without missing binge drinking		Sample without missing heavy smoking	
			Mean	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**
Life satisfaction	1	5	3.049	0.011	-	-	-	-	-	-
Fair/poor health	0	1	-	-	0.701	0.004	-	-	-	-
Yes, binge drinker	0	1	-	-	-	-	0.456	0.005	-	-
Yes, heavy smoker	0	1	-	-	-	-	-	-	0.358	0.004
Age 40-44	0	1	0.237	0.004	0.239	0.004	0.239	0.004	0.240	0.004
Age 45-49	0	1	0.312	0.004	0.311	0.004	0.313	0.004	0.312	0.004
Age 50-54	0	1	0.262	0.004	0.261	0.004	0.261	0.004	0.261	0.004
Age 55-59	0	1	0.189	0.004	0.189	0.004	0.187	0.004	0.186	0.004
Older generation(s) in hh	0	1	0.129	0.003	0.127	0.003	0.127	0.003	0.126	0.003
Other younger gen-n(s) in hh	0	1	0.199	0.004	0.199	0.004	0.198	0.004	0.197	0.004
Death/inst-n in hh	0	1	0.019	0.001	0.019	0.001	0.019	0.001	0.019	0.001
Incomplete SS	0	1	0.146	0.003	0.145	0.003	0.146	0.003	0.147	0.003
Complete SS	0	1	0.446	0.005	0.451	0.005	0.450	0.005	0.451	0.005
Vocational SE	0	1	0.204	0.004	0.203	0.004	0.202	0.004	0.202	0.004
Higher edu (HE)	0	1	0.204	0.004	0.201	0.004	0.202	0.004	0.200	0.004
Economically inactive	0	1	0.212	0.004	0.211	0.004	0.211	0.004	0.212	0.004
First quintile	0	1	0.184	0.004	0.184	0.004	0.187	0.004	0.188	0.004
Second quintile	0	1	0.194	0.004	0.193	0.004	0.194	0.004	0.196	0.004
Third quintile	0	1	0.192	0.004	0.191	0.004	0.191	0.004	0.191	0.004
Fourth quintile	0	1	0.190	0.004	0.188	0.004	0.188	0.004	0.187	0.004
Fifth quintile	0	1	0.185	0.004	0.185	0.004	0.183	0.004	0.182	0.004
Missing income	0	1	0.055	0.002	0.058	0.002	0.056	0.002	0.056	0.002
Moscow and St. Petersburg	0	1	0.086	0.003	0.086	0.003	0.086	0.003	0.086	0.003
Central, North, North-West	0	1	0.226	0.004	0.224	0.004	0.222	0.004	0.223	0.004
Volga & Ural	0	1	0.338	0.004	0.342	0.004	0.340	0.004	0.342	0.004
North Caucasus	0	1	0.171	0.003	0.170	0.003	0.171	0.003	0.168	0.003
Siberia & Far East	0	1	0.179	0.004	0.178	0.004	0.181	0.004	0.181	0.004
PGT/rural	0	1	0.354	0.004	0.359	0.004	0.359	0.004	0.363	0.004
Year	1994	2016	2006.782	0.057	2006.801	0.057	2006.821	0.057	2006.859	0.056
N (observations)	-	-	11649	-	11723	-	11901	-	12051	-

Table D.9 Distribution of fathers' observations in the samples for the fixed-effects models, RLMS 1994-2016

Variables	Sample without missing life satisfaction		Sample without missing health status *		Sample without missing binge drinking *		Sample without missing heavy smoking *	
	Mean	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**
Life satisfaction	3.049	0.011	2.954	0.014	3.071	0.013	3.130	0.016
Fair/poor health	0.704	0.004	0.593	0.006	0.713	0.005	0.704	0.007
Yes, binge drinker	0.458	0.005	0.475	0.006	0.490	0.006	0.492	0.007
Yes, heavy smoker	0.357	0.004	0.362	0.006	0.371	0.005	0.504	0.007
Age 40-44	0.237	0.004	0.239	0.005	0.226	0.005	0.239	0.006
Age 45-49	0.312	0.004	0.332	0.006	0.313	0.005	0.330	0.007
Age 50-54	0.262	0.004	0.269	0.006	0.279	0.005	0.269	0.006
Age 55-59	0.189	0.004	0.160	0.005	0.182	0.004	0.163	0.005
Older gen-n(s) in hh	0.129	0.003	0.137	0.004	0.127	0.004	0.133	0.005
Other younger gen-n(s) in hh	0.199	0.004	0.190	0.005	0.197	0.005	0.211	0.006
Death/inst-n in hh	0.019	0.001	0.017	0.002	0.019	0.002	0.021	0.002
Incomplete SS	0.146	0.003	0.140	0.004	0.150	0.004	0.185	0.006
Complete SS	0.446	0.005	0.460	0.006	0.465	0.006	0.500	0.007
Vocational SE	0.204	0.004	0.204	0.005	0.193	0.004	0.181	0.006
Higher edu (HE)	0.205	0.004	0.196	0.005	0.193	0.004	0.134	0.005
Economically inactive	0.212	0.004	0.189	0.005	0.211	0.005	0.246	0.006
First quintile	0.183	0.004	0.190	0.005	0.198	0.005	0.225	0.006
Second quintile	0.194	0.004	0.181	0.005	0.193	0.004	0.196	0.006
Third quintile	0.192	0.004	0.187	0.005	0.191	0.004	0.192	0.006
Fourth quintile	0.191	0.004	0.187	0.005	0.186	0.004	0.176	0.006
Fifth quintile	0.185	0.004	0.194	0.005	0.176	0.004	0.155	0.005
Missing income	0.054	0.002	0.061	0.003	0.056	0.003	0.055	0.003
Moscow and St. Petersburg	0.086	0.003	0.084	0.003	0.076	0.003	0.064	0.004
Central, North, North-West	0.226	0.004	0.218	0.005	0.223	0.005	0.187	0.006
Volga & Ural	0.338	0.004	0.334	0.006	0.340	0.005	0.385	0.007
North Caucasus	0.171	0.004	0.195	0.005	0.178	0.004	0.208	0.006
Siberia & Far East	0.179	0.004	0.169	0.005	0.182	0.004	0.156	0.005
PGT/rural	0.352	0.004	0.380	0.006	0.382	0.006	0.411	0.007
Year	2006.8	0.1	2007.0	0.1	2006.6	0.1	2006.9	0.1
N (obs-s)	11542	-	6419	-	7800	-	4698	-

*Excluded men with no changes in the outcome due to the modelling requirements of the fixed-effects logistic regression approach.

Appendix D

Table D.10 Mean satisfaction with life (from high to low) by covariates

Variable	Cross-Sectional Sample (2004-2016)				Longitudinal Sample (1994-2016)			
	Mean	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**	
Age 40-44	2.74	0.02	2.70	2.78	3.01	0.02	2.97	3.05
Age 45-49	2.81	0.02	2.78	2.85	3.05	0.02	3.02	3.09
Age 50-54	2.88	0.02	2.85	2.91	3.04	0.02	3.00	3.08
Age 55-59	2.88	0.02	2.85	2.91	3.10	0.02	3.05	3.15
Co-residing with children	2.82	0.01	2.80	2.84	3.04	0.01	3.02	3.06
All children left the nest	2.89	0.01	2.86	2.92	3.16	0.04	3.08	3.24
No older generation in hh	2.85	0.01	2.83	2.86	3.06	0.01	3.03	3.08
Older generation(s) in hh	2.79	0.02	2.74	2.83	2.99	0.03	2.94	3.05
No other younger gen-n in hh	2.84	0.01	2.82	2.86	3.04	0.01	3.02	3.07
Other younger gen-n(s) in hh	2.84	0.02	2.80	2.88	3.07	0.02	3.02	3.11
No death/inst-n in hh	2.84	0.01	2.82	2.85	3.04	0.01	3.02	3.06
Death/inst-n in hh	3.03	0.06	2.92	3.14	3.31	0.07	3.17	3.46
Incomplete HS	3.09	0.03	3.02	3.15	3.51	0.04	3.43	3.58
PTU and/or SS	2.93	0.02	2.90	2.96	3.11	0.02	3.07	3.15
Tech-l/prof-l/inc-t HE	2.85	0.01	2.82	2.87	3.04	0.02	3.01	3.07
Higher edu (HE)	2.60	0.02	2.56	2.63	2.79	0.02	2.75	2.83
Economically active	2.70	0.01	2.68	2.71	2.95	0.01	2.93	2.97
Economically inactive	3.32	0.02	3.28	3.35	3.42	0.02	3.38	3.47
First quintile	3.25	0.02	3.21	3.29	3.43	0.02	3.38	3.48
Second quintile	2.99	0.02	2.95	3.02	3.22	0.02	3.17	3.26
Third quintile	2.80	0.02	2.77	2.84	3.02	0.02	2.98	3.07
Fourth quintile	2.64	0.02	2.60	2.67	2.86	0.02	2.82	2.91
Fifth quintile	2.52	0.02	2.49	2.55	2.71	0.02	2.66	2.75
Moscow and St. Petersburg	2.69	0.03	2.64	2.74	2.88	0.03	2.81	2.94
Central, North, North-West	2.77	0.02	2.73	2.80	2.95	0.02	2.91	3.00
Volga & Ural	2.90	0.01	2.87	2.93	3.14	0.02	3.11	3.18
North Caucasus	2.73	0.02	2.69	2.78	2.91	0.03	2.86	2.96
Siberia & Far East	2.98	0.02	2.94	3.01	3.21	0.03	3.16	3.26
Urban	2.81	0.01	2.79	2.83	3.05	0.01	3.02	3.07
PGT/rural	2.88	0.01	2.85	2.91	3.05	0.02	3.02	3.09
1994	-	-	-	-	3.71	0.06	3.59	3.82
1995	-	-	-	-	3.70	0.05	3.60	3.80
1996	-	-	-	-	3.87	0.05	3.77	3.97
1998	-	-	-	-	4.06	0.05	3.97	4.15
2000	-	-	-	-	3.65	0.05	3.55	3.76
2001	-	-	-	-	3.46	0.05	3.36	3.56
2002	-	-	-	-	3.14	0.05	3.05	3.24
2003	-	-	-	-	3.19	0.05	3.10	3.29
2004	3.13	0.04	3.06	3.20	3.15	0.05	3.06	3.24
2005	3.05	0.04	2.98	3.12	3.02	0.05	2.92	3.11
2006	3.07	0.03	3.00	3.13	3.08	0.05	2.99	3.18
2007	3.00	0.03	2.94	3.06	2.97	0.04	2.88	3.05
2008	2.94	0.03	2.87	3.00	2.96	0.05	2.87	3.05
2009	2.94	0.03	2.87	3.01	2.96	0.05	2.87	3.05
2010	2.86	0.03	2.80	2.91	2.81	0.04	2.73	2.89
2011	2.78	0.03	2.73	2.83	2.72	0.04	2.65	2.79
2012	2.70	0.02	2.65	2.74	2.62	0.04	2.55	2.69
2013	2.62	0.03	2.57	2.67	2.53	0.04	2.46	2.61
2014	2.68	0.03	2.62	2.74	2.66	0.04	2.58	2.75
2015	2.72	0.03	2.67	2.78	2.67	0.04	2.58	2.75
2016	2.76	0.03	2.70	2.82	2.76	0.05	2.68	2.85
Total N (ob-s)	16904	-	-	-	11649	-	-	-

Table D.11 Proportion of men in average/bad/very bad health by covariates

Variable	Cross-Sectional Sample (2004-2016)				Longitudinal Sample (1994-2016), full				Longitudinal Sample (1994-2016), excluding men with no change in SRH			
	Mean	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**	
Age 40-44	0.59	0.01	0.57	0.60	0.60	0.01	0.58	0.62	0.52	0.01	0.50	0.55
Age 45-49	0.66	0.01	0.65	0.68	0.68	0.01	0.66	0.69	0.59	0.01	0.57	0.61
Age 50-54	0.75	0.01	0.74	0.76	0.75	0.01	0.73	0.76	0.63	0.01	0.61	0.65
Age 55-59	0.80	0.01	0.79	0.81	0.80	0.01	0.78	0.82	0.65	0.01	0.62	0.67
Co-residing with children	0.68	0.00	0.68	0.69	0.69	0.00	0.69	0.70	0.59	0.01	0.58	0.60
All children left the nest	0.78	0.01	0.77	0.79	0.80	0.01	0.77	0.83	0.67	0.03	0.62	0.73
No older generation in hh	0.72	0.00	0.71	0.73	0.71	0.00	0.70	0.72	0.60	0.01	0.59	0.62
Older generation(s) in hh	0.66	0.01	0.64	0.68	0.63	0.01	0.61	0.66	0.53	0.02	0.49	0.56
No other younger gen-n in hh	0.71	0.00	0.70	0.71	0.69	0.00	0.68	0.70	0.58	0.01	0.57	0.60
Other younger gen-n(s) in hh	0.76	0.01	0.74	0.78	0.76	0.01	0.74	0.78	0.63	0.01	0.60	0.66
No death/inst-n in hh	0.71	0.00	0.71	0.72	0.70	0.00	0.69	0.71	0.59	0.01	0.58	0.60
Death/inst-n in hh	0.77	0.02	0.73	0.81	0.78	0.03	0.72	0.83	0.69	0.04	0.60	0.78
Incomplete HS	0.74	0.01	0.71	0.76	0.73	0.01	0.70	0.76	-	-	-	-
PTU and/or SS	0.72	0.01	0.70	0.73	0.69	0.01	0.68	0.71	-	-	-	-
Tech-l/prof-l/inc-t HE	0.73	0.01	0.72	0.74	0.71	0.01	0.70	0.73	-	-	-	-
Higher edu (HE)	0.67	0.01	0.65	0.69	0.67	0.01	0.65	0.69	-	-	-	-
Economically active	0.69	0.00	0.69	0.70	0.69	0.00	0.68	0.70	0.59	0.01	0.57	0.60
Economically inactive	0.78	0.01	0.77	0.79	0.73	0.01	0.72	0.75	0.62	0.01	0.59	0.64
First quintile	0.74	0.01	0.72	0.75	0.70	0.01	0.68	0.72	0.60	0.01	0.57	0.62
Second quintile	0.74	0.01	0.72	0.75	0.73	0.01	0.71	0.75	0.60	0.01	0.57	0.63
Third quintile	0.71	0.01	0.69	0.73	0.71	0.01	0.69	0.73	0.61	0.01	0.58	0.63
Fourth quintile	0.72	0.01	0.71	0.74	0.72	0.01	0.70	0.74	0.61	0.01	0.59	0.64
Fifth quintile	0.66	0.01	0.65	0.68	0.65	0.01	0.63	0.67	0.55	0.01	0.53	0.58
Moscow and St. Petersburg	0.68	0.01	0.66	0.70	0.70	0.01	0.67	0.72	-	-	-	-
Central, North, North-West	0.72	0.01	0.71	0.74	0.72	0.01	0.70	0.74	-	-	-	-
Volga & Ural	0.72	0.01	0.71	0.73	0.73	0.01	0.71	0.74	-	-	-	-
North Caucasus	0.63	0.01	0.61	0.65	0.56	0.01	0.54	0.59	-	-	-	-
Siberia & Far East	0.77	0.01	0.76	0.79	0.76	0.01	0.74	0.78	-	-	-	-
Urban	0.72	0.00	0.71	0.73	0.73	0.01	0.72	0.74	-	-	-	-
PGT/rural	0.70	0.01	0.69	0.71	0.65	0.01	0.64	0.67	-	-	-	-
1994	-	-	-	-	0.77	0.02	0.72	0.81	0.58	0.04	0.50	0.66
1995	-	-	-	-	0.71	0.02	0.67	0.76	0.46	0.04	0.39	0.53
1996	-	-	-	-	0.74	0.02	0.70	0.79	0.57	0.03	0.50	0.64
1998	-	-	-	-	0.75	0.02	0.71	0.79	0.58	0.03	0.51	0.64
2000	-	-	-	-	0.74	0.02	0.70	0.78	0.59	0.03	0.53	0.65
2001	-	-	-	-	0.75	0.02	0.71	0.79	0.63	0.03	0.57	0.69
2002	-	-	-	-	0.73	0.02	0.69	0.76	0.59	0.03	0.54	0.65
2003	-	-	-	-	0.74	0.02	0.70	0.78	0.62	0.03	0.57	0.68
2004	0.75	0.01	0.72	0.78	0.74	0.02	0.70	0.78	0.62	0.03	0.56	0.67
2005	0.74	0.01	0.71	0.77	0.72	0.02	0.68	0.76	0.60	0.03	0.54	0.65
2006	0.77	0.01	0.74	0.79	0.74	0.02	0.70	0.77	0.62	0.03	0.56	0.67
2007	0.74	0.01	0.72	0.77	0.73	0.02	0.69	0.76	0.60	0.03	0.55	0.65
2008	0.75	0.01	0.73	0.78	0.72	0.02	0.68	0.76	0.59	0.03	0.54	0.65
2009	0.76	0.01	0.73	0.78	0.71	0.02	0.68	0.75	0.60	0.03	0.55	0.65
2010	0.73	0.01	0.71	0.75	0.69	0.02	0.66	0.73	0.61	0.02	0.56	0.65
2011	0.71	0.01	0.69	0.73	0.68	0.02	0.65	0.71	0.61	0.02	0.57	0.66
2012	0.68	0.01	0.66	0.70	0.65	0.02	0.62	0.69	0.58	0.02	0.53	0.63
2013	0.69	0.01	0.67	0.71	0.65	0.02	0.61	0.68	0.58	0.02	0.53	0.63
2014	0.68	0.01	0.65	0.70	0.65	0.02	0.61	0.68	0.58	0.03	0.53	0.63
2015	0.68	0.01	0.65	0.70	0.62	0.02	0.59	0.66	0.58	0.03	0.52	0.63
2016	0.65	0.01	0.63	0.68	0.62	0.02	0.58	0.66	0.58	0.03	0.53	0.64
Total N (ob-s)	16911	-	-	-	11723	-	-	-	6489	-	-	-

Appendix D

Table D.12 Proportion of men who are binge drinkers by covariates

Variable	Cross-Sectional Sample (2004-2016)				Longitudinal Sample (1994-2016), full				Longitudinal Sample (1994-2016), excluding men with no change in binge drinking			
	Mean	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**	
Age 40-44	0.47	0.01	0.45	0.49	0.49	0.01	0.47	0.50	0.52	0.01	0.49	0.54
Age 45-49	0.45	0.01	0.44	0.47	0.46	0.01	0.44	0.47	0.49	0.01	0.47	0.51
Age 50-54	0.43	0.01	0.42	0.44	0.44	0.01	0.43	0.46	0.48	0.01	0.46	0.50
Age 55-59	0.40	0.01	0.38	0.41	0.41	0.01	0.39	0.43	0.46	0.01	0.44	0.49
Co-residing with children	0.43	0.00	0.42	0.44	0.45	0.00	0.44	0.46	0.49	0.01	0.48	0.50
All children left the nest	0.44	0.01	0.43	0.46	0.48	0.02	0.45	0.52	0.46	0.02	0.41	0.51
No older generation in hh	0.44	0.00	0.43	0.45	0.46	0.00	0.45	0.47	0.49	0.01	0.48	0.50
Older generation(s) in hh	0.40	0.01	0.38	0.42	0.42	0.01	0.39	0.44	0.48	0.02	0.45	0.51
No other younger gen-n in hh	0.43	0.00	0.43	0.44	0.45	0.01	0.44	0.46	0.49	0.01	0.48	0.50
Other younger gen-n(s) in hh	0.42	0.01	0.41	0.44	0.47	0.01	0.45	0.49	0.50	0.01	0.47	0.52
No death/inst-n in hh	0.43	0.00	0.42	0.44	0.45	0.00	0.44	0.46	0.49	0.01	0.48	0.50
Death/inst-n in hh	0.49	0.03	0.44	0.54	0.47	0.03	0.40	0.53	0.50	0.04	0.42	0.58
Incomplete HS	0.44	0.01	0.41	0.47	0.45	0.02	0.42	0.48	-	-	-	-
PTU and/or SS	0.45	0.01	0.44	0.46	0.48	0.01	0.46	0.49	-	-	-	-
Tech-l/prof-l/inc-t HE	0.44	0.01	0.43	0.45	0.46	0.01	0.44	0.47	-	-	-	-
Higher edu (HE)	0.39	0.01	0.37	0.40	0.41	0.01	0.39	0.43	-	-	-	-
Economically active	0.44	0.00	0.43	0.45	0.46	0.01	0.45	0.47	0.50	0.01	0.49	0.51
Economically inactive	0.42	0.01	0.40	0.43	0.41	0.01	0.40	0.43	0.45	0.01	0.43	0.48
First quintile	0.45	0.01	0.43	0.46	0.45	0.01	0.43	0.47	0.48	0.01	0.46	0.51
Second quintile	0.43	0.01	0.41	0.45	0.45	0.01	0.43	0.47	0.48	0.01	0.46	0.51
Third quintile	0.44	0.01	0.42	0.45	0.47	0.01	0.45	0.49	0.50	0.01	0.47	0.52
Fourth quintile	0.45	0.01	0.43	0.46	0.47	0.01	0.45	0.49	0.51	0.01	0.49	0.54
Fifth quintile	0.41	0.01	0.39	0.42	0.42	0.01	0.40	0.44	0.47	0.01	0.45	0.50
Moscow and St. Petersburg	0.34	0.01	0.31	0.36	0.34	0.01	0.31	0.37	-	-	-	-
Central, North, North-West	0.42	0.01	0.41	0.44	0.45	0.01	0.43	0.47	-	-	-	-
Volga & Ural	0.45	0.01	0.44	0.47	0.47	0.01	0.46	0.49	-	-	-	-
North Caucasus	0.40	0.01	0.38	0.42	0.41	0.01	0.39	0.43	-	-	-	-
Siberia & Far East	0.48	0.01	0.47	0.50	0.51	0.01	0.49	0.53	-	-	-	-
Urban	0.44	0.00	0.43	0.45	0.46	0.01	0.45	0.47	-	-	-	-
PGT/rural	0.42	0.01	0.41	0.43	0.44	0.01	0.43	0.46	-	-	-	-
1994	-	-	-	-	0.59	0.03	0.53	0.64	0.57	0.03	0.51	0.64
1995	-	-	-	-	0.54	0.02	0.49	0.58	0.51	0.03	0.45	0.57
1996	-	-	-	-	0.53	0.02	0.49	0.58	0.54	0.03	0.48	0.60
1998	-	-	-	-	0.53	0.02	0.48	0.57	0.53	0.03	0.47	0.59
2000	-	-	-	-	0.53	0.02	0.48	0.58	0.53	0.03	0.47	0.58
2001	-	-	-	-	0.54	0.02	0.50	0.59	0.55	0.03	0.49	0.60
2002	-	-	-	-	0.49	0.02	0.45	0.54	0.48	0.03	0.43	0.53
2003	-	-	-	-	0.50	0.02	0.46	0.54	0.49	0.03	0.44	0.54
2004	0.47	0.02	0.44	0.51	0.47	0.02	0.43	0.52	0.49	0.03	0.44	0.54
2005	0.49	0.02	0.45	0.52	0.46	0.02	0.42	0.51	0.47	0.03	0.42	0.52
2006	0.48	0.01	0.45	0.51	0.48	0.02	0.44	0.52	0.50	0.02	0.46	0.55
2007	0.47	0.01	0.44	0.50	0.45	0.02	0.41	0.49	0.48	0.02	0.43	0.52
2008	0.47	0.01	0.44	0.50	0.44	0.02	0.40	0.48	0.48	0.02	0.43	0.53
2009	0.45	0.02	0.42	0.48	0.42	0.02	0.38	0.46	0.46	0.03	0.41	0.51
2010	0.46	0.01	0.44	0.48	0.46	0.02	0.43	0.50	0.52	0.02	0.48	0.57
2011	0.47	0.01	0.45	0.50	0.45	0.02	0.42	0.49	0.53	0.02	0.48	0.57
2012	0.43	0.01	0.41	0.45	0.42	0.02	0.39	0.45	0.50	0.02	0.45	0.54
2013	0.39	0.01	0.36	0.41	0.38	0.02	0.34	0.41	0.45	0.02	0.41	0.50
2014	0.37	0.01	0.34	0.39	0.35	0.02	0.32	0.39	0.43	0.03	0.38	0.48
2015	0.34	0.01	0.32	0.37	0.32	0.02	0.28	0.36	0.38	0.03	0.33	0.43
2016	0.38	0.01	0.36	0.41	0.34	0.02	0.30	0.38	0.42	0.03	0.36	0.47
Total N (ob-s)	17031	-	-	-	12137	-	-	-	7930	-	-	-

Table D.13 Proportion of men who are heavy smokers by covariates

Variable	Cross-Sectional Sample (2004-2016)				Longitudinal Sample (1994-2016), full				Longitudinal Sample (1994-2016), excluding men with no change in heavy smoking			
	Mean	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**		**Mean**	**S.E.**	**95% CI**	
Age 40-44	0.41	0.01	0.39	0.43	0.38	0.01	0.36	0.40	0.54	0.01	0.51	0.57
Age 45-49	0.39	0.01	0.37	0.40	0.36	0.01	0.34	0.37	0.50	0.01	0.48	0.53
Age 50-54	0.37	0.01	0.36	0.39	0.36	0.01	0.34	0.37	0.50	0.01	0.47	0.52
Age 55-59	0.36	0.01	0.34	0.37	0.33	0.01	0.31	0.35	0.46	0.02	0.43	0.50
Co-residing with children	0.37	0.00	0.36	0.38	0.36	0.00	0.35	0.37	0.50	0.01	0.49	0.52
All children left the nest	0.40	0.01	0.39	0.41	0.38	0.02	0.34	0.41	0.48	0.03	0.42	0.54
No older generation in hh	0.38	0.00	0.37	0.39	0.36	0.00	0.35	0.37	0.50	0.01	0.49	0.52
Older generation(s) in hh	0.38	0.01	0.36	0.40	0.37	0.01	0.34	0.39	0.50	0.02	0.46	0.54
No other younger gen-n in hh	0.38	0.00	0.37	0.38	0.35	0.00	0.34	0.36	0.51	0.01	0.49	0.52
Other younger gen-n(s) in hh	0.39	0.01	0.37	0.41	0.38	0.01	0.37	0.40	0.50	0.02	0.47	0.53
No death/inst-n in hh	0.38	0.00	0.37	0.38	0.36	0.00	0.35	0.36	0.50	0.01	0.49	0.52
Death/inst-n in hh	0.44	0.02	0.39	0.49	0.42	0.03	0.36	0.49	0.55	0.05	0.45	0.64
Incomplete HS	0.50	0.01	0.47	0.53	0.45	0.02	0.42	0.48	-	-	-	-
PTU and/or SS	0.42	0.01	0.40	0.43	0.40	0.01	0.39	0.42	-	-	-	-
Tech-l/prof-l/inc-t HE	0.39	0.01	0.38	0.40	0.37	0.01	0.36	0.38	-	-	-	-
Higher edu (HE)	0.25	0.01	0.24	0.27	0.23	0.01	0.21	0.24	-	-	-	-
Economically active	0.38	0.00	0.37	0.38	0.36	0.00	0.35	0.36	0.52	0.01	0.50	0.53
Economically inactive	0.39	0.01	0.37	0.40	0.37	0.01	0.35	0.38	0.46	0.01	0.43	0.49
First quintile	0.42	0.01	0.41	0.44	0.40	0.01	0.38	0.42	0.51	0.01	0.48	0.53
Second quintile	0.37	0.01	0.36	0.39	0.35	0.01	0.33	0.37	0.52	0.02	0.49	0.55
Third quintile	0.37	0.01	0.35	0.38	0.35	0.01	0.33	0.36	0.50	0.02	0.47	0.53
Fourth quintile	0.39	0.01	0.38	0.41	0.37	0.01	0.35	0.39	0.50	0.02	0.47	0.54
Fifth quintile	0.34	0.01	0.32	0.35	0.31	0.01	0.29	0.33	0.48	0.02	0.44	0.51
Moscow and St. Petersburg	0.36	0.01	0.33	0.38	0.33	0.01	0.30	0.36	-	-	-	-
Central, North, North-West	0.40	0.01	0.38	0.41	0.39	0.01	0.37	0.41	-	-	-	-
Volga & Ural	0.36	0.01	0.35	0.37	0.35	0.01	0.33	0.36	-	-	-	-
North Caucasus	0.35	0.01	0.33	0.37	0.33	0.01	0.31	0.35	-	-	-	-
Siberia & Far East	0.41	0.01	0.40	0.43	0.37	0.01	0.35	0.39	-	-	-	-
Urban	0.37	0.00	0.36	0.38	0.35	0.01	0.34	0.36	-	-	-	-
PGT/rural	0.40	0.01	0.38	0.41	0.37	0.01	0.36	0.39	-	-	-	-
1994	-	-	-	-	0.35	0.03	0.30	0.40	0.59	0.05	0.49	0.68
1995	-	-	-	-	0.32	0.02	0.28	0.36	0.49	0.04	0.40	0.57
1996	-	-	-	-	0.32	0.02	0.27	0.36	0.42	0.04	0.34	0.50
1998	-	-	-	-	0.33	0.02	0.29	0.38	0.41	0.04	0.33	0.48
2000	-	-	-	-	0.41	0.02	0.36	0.46	0.58	0.04	0.51	0.66
2001	-	-	-	-	0.38	0.02	0.34	0.43	0.55	0.04	0.48	0.62
2002	-	-	-	-	0.36	0.02	0.32	0.40	0.50	0.03	0.43	0.56
2003	-	-	-	-	0.40	0.02	0.35	0.44	0.57	0.03	0.51	0.64
2004	0.42	0.02	0.39	0.46	0.38	0.02	0.34	0.43	0.53	0.03	0.46	0.59
2005	0.39	0.02	0.36	0.42	0.34	0.02	0.30	0.38	0.44	0.03	0.38	0.50
2006	0.42	0.01	0.39	0.44	0.40	0.02	0.36	0.43	0.51	0.03	0.45	0.57
2007	0.42	0.01	0.39	0.45	0.39	0.02	0.35	0.43	0.52	0.03	0.46	0.58
2008	0.40	0.01	0.37	0.43	0.37	0.02	0.33	0.41	0.51	0.03	0.45	0.57
2009	0.39	0.01	0.36	0.41	0.37	0.02	0.33	0.41	0.51	0.03	0.45	0.57
2010	0.39	0.01	0.37	0.41	0.36	0.02	0.32	0.39	0.51	0.03	0.45	0.56
2011	0.38	0.01	0.36	0.40	0.34	0.02	0.31	0.37	0.47	0.03	0.41	0.52
2012	0.39	0.01	0.37	0.42	0.37	0.02	0.34	0.40	0.58	0.03	0.53	0.64
2013	0.35	0.01	0.33	0.37	0.34	0.02	0.30	0.37	0.50	0.03	0.44	0.55
2014	0.36	0.01	0.33	0.38	0.36	0.02	0.32	0.40	0.52	0.03	0.46	0.58
2015	0.34	0.01	0.31	0.36	0.33	0.02	0.29	0.36	0.46	0.03	0.39	0.52
2016	0.31	0.01	0.28	0.33	0.29	0.02	0.25	0.33	0.38	0.03	0.32	0.45
Total N (ob-s)	17020	-	-	-	12051	-	-	-	4782	-	-	-

Appendix D

Table D.14 Descriptive statistics of all variables by sub-samples of nest-leaving, Russian fathers, longitudinal sample 1994-2016, RLMS

	Men with observed nest-leaving event		**Men** with never observed nest-leaving event		Diff (nest-leaving vs. not)	**Observations** with observed nest-leaving event		**Observations** with no nest-leaving event (children are still in hh)		Diff (nest-leaving vs. not)
	Mean	**S.E.**	**Mean**	**S.E.**	**[1 - 3]**	**Mean**	**S.E.**	**Mean**	**S.E.**	**[6 - 8]**
Variable	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Life satisfaction	3.21	0.02	2.98	0.01	0.23	3.16	0.04	3.04	0.01	0.12
Average/bad/ very bad	0.77	0.01	0.67	0.01	0.10	0.80	0.01	0.70	0.00	0.10
Yes, binge drinker	0.51	0.01	0.43	0.01	0.08	0.48	0.02	0.45	0.00	0.03
Yes, heavy smoker	0.38	0.01	0.35	0.01	0.04	0.38	0.02	0.36	0.00	0.02
Age 40-44	0.24	0.01	0.24	0.00	0.01	0.13	0.01	0.25	0.00	-0.12
Age 45-49	0.35	0.01	0.30	0.00	0.05	0.29	0.02	0.31	0.00	-0.03
Age 50-54	0.28	0.01	0.25	0.00	0.03	0.32	0.02	0.26	0.00	0.07
Age 55-59	0.13	0.01	0.21	0.00	-0.08	0.26	0.02	0.18	0.00	0.08
Older generation(s) in hh	0.11	0.01	0.13	0.00	-0.02	0.11	0.01	0.13	0.00	-0.02
Other younger gen-n(s) in hh	0.18	0.01	0.21	0.00	-0.03	0.03	0.01	0.21	0.00	-0.18
Death/inst-n in hh	0.03	0.00	0.02	0.00	0.01	0.05	0.01	0.02	0.00	0.03
Incomplete HS	0.09	0.00	0.08	0.00	0.00	0.09	0.01	0.08	0.00	0.00
PTU and/or SS	0.28	0.01	0.28	0.00	-0.01	0.27	0.02	0.28	0.00	-0.01
Tech-l/prof-l/inc-t HE	0.46	0.01	0.42	0.01	0.04	0.46	0.02	0.43	0.00	0.03
Higher edu (HE)	0.17	0.01	0.21	0.00	-0.04	0.18	0.01	0.20	0.00	-0.03
Economically inactive	0.18	0.01	0.23	0.00	-0.05	0.24	0.02	0.21	0.00	0.02
First quintile	0.20	0.01	0.20	0.00	0.00	0.18	0.01	0.20	0.00	-0.02
Second quintile	0.22	0.01	0.20	0.00	0.02	0.21	0.01	0.20	0.00	0.00
Third quintile	0.22	0.01	0.20	0.00	0.02	0.20	0.01	0.20	0.00	-0.01
Fourth quintile	0.20	0.01	0.20	0.00	0.00	0.23	0.02	0.20	0.00	0.03
Fifth quintile	0.16	0.01	0.21	0.00	-0.05	0.19	0.01	0.20	0.00	-0.01
Moscow and St. Petersburg	0.04	0.00	0.11	0.00	-0.07	0.05	0.01	0.09	0.00	-0.04
Central, North, North-West	0.26	0.01	0.21	0.00	0.06	0.27	0.02	0.22	0.00	0.05
Volga & Ural	0.38	0.01	0.32	0.01	0.06	0.39	0.02	0.34	0.00	0.05
North Caucasus	0.08	0.00	0.21	0.00	-0.12	0.10	0.01	0.18	0.00	-0.08
Siberia & Far East	0.23	0.01	0.16	0.00	0.07	0.20	0.01	0.18	0.00	0.02
PGT/rural	0.39	0.01	0.35	0.01	0.04	0.38	0.02	0.36	0.00	0.02
1994	0.04	0.00	0.02	0.00	0.01	-	-	0.03	0.00	-0.03
1995	0.05	0.00	0.03	0.00	0.01	0.05	0.01	0.04	0.00	0.01
1996	0.05	0.00	0.03	0.00	0.01	0.04	0.01	0.03	0.00	0.00
1998	0.05	0.00	0.03	0.00	0.02	0.07	0.01	0.03	0.00	0.03
2000	0.06	0.00	0.03	0.00	0.03	0.05	0.01	0.04	0.00	0.01
2001	0.06	0.00	0.03	0.00	0.03	0.04	0.01	0.04	0.00	0.00
2002	0.06	0.00	0.04	0.00	0.02	0.04	0.01	0.04	0.00	0.00
2003	0.06	0.00	0.04	0.00	0.02	0.05	0.01	0.05	0.00	0.00
2004	0.06	0.00	0.04	0.00	0.02	0.04	0.01	0.04	0.00	0.00
2005	0.06	0.00	0.04	0.00	0.02	0.05	0.01	0.04	0.00	0.01
2006	0.06	0.00	0.05	0.00	0.02	0.03	0.01	0.05	0.00	-0.02
2007	0.06	0.00	0.05	0.00	0.01	0.05	0.01	0.05	0.00	-0.01
2008	0.06	0.00	0.05	0.00	0.01	0.07	0.01	0.05	0.00	0.02
2009	0.05	0.00	0.05	0.00	0.00	0.05	0.01	0.05	0.00	0.00
2010	0.06	0.00	0.07	0.00	-0.01	0.05	0.01	0.07	0.00	-0.01
2011	0.05	0.00	0.07	0.00	-0.02	0.06	0.01	0.07	0.00	-0.01
2012	0.05	0.00	0.07	0.00	-0.03	0.07	0.01	0.07	0.00	0.01
2013	0.03	0.00	0.07	0.00	-0.04	0.06	0.01	0.06	0.00	0.00
2014	0.02	0.00	0.06	0.00	-0.04	0.04	0.01	0.05	0.00	-0.01
2015	0.02	0.00	0.06	0.00	-0.04	0.04	0.01	0.05	0.00	-0.01
2016	0.01	0.00	0.06	0.00	-0.05	0.06	0.01	0.04	0.00	0.02
N (observations)	**3550**	-	**8418**	-	-	**734**	-	**11234**	-	-

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