‘Marry a doctor, live healthier’-A quantitative study of family health influence in Europe under different macro policy contexts

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Table of Contents

ABSTRACT 3

LIST OF TABLES AND FIGURES: 4

CHAPTER 1: INTRODUCTION 5

CHAPTER 2: RESEARCH HYPOTHESES 9

CHAPTER 2.1: INDIVIDUALS AND HEALTH INEQUALITIES (HYPOTHESIS 1) 9
CHAPTER 2.2: HEALTH POLICY DESIGN AND WELFARE REGIMES (HYPOTHESIS 2) 10

CHAPTER 3: DATA, OPERATIONALIZATION AND METHODOLOGY 14

CHAPTER 3.1: CHOICE OF VARIABLES 14
CHAPTER 3.2: METHODS OF ANALYSIS 17

CHAPTER 4: EMPIRICAL RESULTS 19

CHAPTER 4.1: HYPOTHESIS 1- THE EFFECT OF HAVING A DOCTOR SPOUSE ON ONE'S HEALTH 19
CHAPTER 4.2: HYPOTHESIS 2- THE INTERACTION BETWEEN MACRO HEALTHCARE CHARACTERISTICS AND HAVING A DOCTOR SPOUSE IN DETERMINING SUBJECTIVE GENERAL HEALTH 21

CHAPTER 5: DISCUSSION OF FINDINGS AND THEIR RELEVANCE TO SOCIAL POLICY 26

CHAPTER 6: LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH 29

CHAPTER 7: CONCLUSIONS 31

BIBLIOGRAPHY: 32

APPENDICES: 39

APPENDIX A: 39
APPENDIX B 41
APPENDIX C 42

Abstract

This thesis examined the importance of family interactions for health outcomes in European countries. The primary aim of the thesis was to improve our understanding of socio-economic determinants of health and health inequalities under varying macro-policy contexts. We identified a gap in our understanding of the effect of spousal or common-law partner interactions, particularly their caring responsibilities and health-behavioural influence within partnerships on health inequalities. Using European Social Survey and a set of linear regression analyses, we analyse two primary hypotheses. The first hypothesis aims to reconfirm existing evidence of family health spill-overs by Polyakova et al (2019), which established that families with superior informal access to health-related expertise, such as those with a medically-educated family member, exhibit better overall health outcomes. In light of this evidence, we design our second hypothesis by considering the presence of a medically-educated spouse as a proxy for superior caring abilities and access to health-related expertise within families. Given this design, we wish to see whether the reliance on family members for help and advice or 'health privilege' of some individuals persists equally given different healthcare financing design and under different welfare regime types with varying emphasis on family values and caring responsibilities. We find that individuals married to doctors not only experience better overall health but having married a doctor helps them mediate negative associations between their health and increasing proportions of private, out-of-pocket healthcare financing. We hypothesise that this is because decreased affordability of formal healthcare system forces individuals to rely on their families for provision of health-related services, and individuals with medically-educated spouses have the 'privilege' of access to superior informal care and advice. Furthermore, we find that this 'health privilege' of doctor spouses is most pronounced in welfare regimes that directly promote family values and support families in their caring responsibilities, such as the Conservative Welfare Regime. Once again, we take advantage of the hypothesized superior caring abilities and expertise that a doctor brings home to rationalise these results. We explain that in countries that support informal provision of care more than its formal alternatives and therefore where individuals rely more on their families for provision of help and advice, the difference between having a family member who is qualified to provide such care and not is starker than in countries with more developed and affordable formal healthcare and caring infrastructure. The findings presented in this thesis contribute to our improved understanding of health systems and the domains through which family interactions exert its health effects and overall health inequalities given the macro policy context under which families live. Based on our findings, we recommend that policy-makers interested in reducing health and gender inequalities should be sensitive to the effect of their policy recommendations on caring responsibilities within families. Because not all families can provide informal care and advice to an equal standard, formal health expertise, care and advice alternatives should be created for those without the privilege of living with a medically-educated or health-conscious spouse.

Key Words: Health Inequalities, Health Policy, Welfare Regimes, European Social Survey, Spousal Concordance, Spousal Health Influence

List of Tables and Figures:

Tables:

Table 1: Welfare Regimes and Expected Health Gap between families with a doctor spouse and without 12
Table 2: Linear Regression of Doctor Spouse dummy on Subjective Health 19
Table 3: Linear regression of Doctor Spouse dummy on Subjective Health with Covariates 19
Table 4:Linear Regression of Doctor Spouse and Private Healthcare Expenses on Subjective Health..... 21
Table 5: Linear Regression of Doctor Spouse dummy and Private Healthcare Expenses on Subjective Health with an interaction effect..... 22
Table 6: Linear Regression of Doctor Spouse dummy and Welfare Regime Type on Subjective Health..... 23
Table 7: Linear Regression of Doctor Spouse dummy and Welfare Regime Type on Subjective Health with an interaction effect..... 24

Figures:

Figure 1:Predicted Probability of 'Excellent' Subjective General Health by Doctor Spouse dummy 20
Figure 2: Predicted Probabilites of Subjective General Health by welfare regimes and doctor spouse dummy..... 25

Chapter 1: Introduction

Over the last 150 years, humanity has seen immense improvements in life expectancy and living standards. An average European born in 2019 can expect to live in relative peace and security until the age of 81 while a similar person born 150 years earlier would experience significantly more insecurity and die as a 36-year old (Riley et Roser,2019). We have increasingly grown accustomed to healthcare and other social support services.

However, as the society structures change through demographic and epidemiological transitions, particularly demonstrated through aging population and a shift from communicable to chronic illnesses, the social services that we began to see as human rights have been increasingly put under pressure and scrutiny for efficiency and cost-effectiveness. Healthcare as a component of Gross Domestic Product (GDP) has been steadily rising and is predicted to rise even further as a consequence of technological progress, population aging, disease transition and rise in long-term care needs (Sorenson et al,2013). To safeguard sustainability of our healthcare systems, more emphasis needs to be put on cutting wasteful spending and finding innovative means of allocating our resources to improve population health.

In the context of these new societal transitions, we should also be looking for new ways to design our social policies. Even though healthcare continues to be a major component of our health systems and represents the traditional target of health policy, the changing nature of diseases increasingly presents us with opportunities for health improvements outside of hospitals, both through prevention and effective treatment. This is because while infectious diseases prominent in the past predominantly required hospitalisation, new chronic illnesses such as obesity, cardiovascular problems or cancers place more responsibility on individuals, their lifestyles and own efforts in maintaining their health (Saracci,2010:11).

These efforts, as well as people's social context including their family and work environment are not equal for everyone and regardless of healthcare system design and spending on social policies in different countries, health inequalities are persistent everywhere and follow similar income and social class gradient (Marmot,2015). Furthermore, there is evidence of social inequalities not only in health, but also in healthcare utilisation or adherence to treatment, which indicates that health inequalities cannot be explained by healthcare systems alone (see e.g. Bryant et al,2009; Murray et al,2003 or Doorslaer et al,2004). This means that especially in the context of modern lifestyle diseases and socioeconomic inequalities, '*health systems'* can no longer be explained by and considered analogous with '*healthcare systems'*. One aspect that could help explain health inequalities and design more effective social policies is the effect of family spill-over of knowledge and values, which represents the main interest of this thesis. For this purpose, it is imperative to first define family before proceeding further. This thesis conceptualizes family in a sociological understanding according to Daly (Daly,2010), in which family is viewed as a form of social organisation that "provides for care needs, arranges intergenerational and gender relations, and plays a key role in

the social organization of life. This conceptualisation is given because of our interest in family relations precisely from such a sociological perspective. Being able to explain the influence of one's immediate family on her health behaviour and health outcomes could contribute to a more complex and representative understanding of health systems which departs from the traditional focus on healthcare.

Yet, family health transitions represent a globally under-researched area. Particularly, there is a gap in our understanding of health concordance among family members and health behavioural/value spill-overs that some family members pass on to their loved ones and other do not. Even though there has been significant academic interest in social determinants of health which present us with evidence for various income, social class or education gradients in health (see e.g. Deaton,2002; Marmot et al,1991; Adler et al,1994), the direct pathways through which these social determinants of health operate are not fully explained. Furthermore, the majority of literature on socioeconomic inequalities that do examine family influence as a possible source of health and income differentials do so in a context of parent-child interactions and stress the importance of childhood socio-economic environment on their health, educational attainment and later development (see e.g. Anderson,2018; Jones,2018; Playford et al,2017; Chen et al,2002). While such studies undoubtedly enrich our understanding of family influence on how children fare later in life, they tell us little about how new families that individuals form when they enter into long-term relationships or marry influence their health and health-related behaviour. Family interactions and knowledge or behavioural transmissions, not only between parents and their children, but also between spouses and partners, could represent a potential mechanism of generating social and health inequalities.

Although a small pool of studies emerged over the last 5 years on concordance of health states in couples (see e.g. Davillas et Pudney,2017; Jeong et Cho,2018; Jackson et al,2015, Walker et al,2017), this spousal effect on individuals' behaviour has not yet been examined under different welfare regime types and given different social policy design. This paper aims to contribute to existing debates about social determinants of health and health inequalities by learning about spousal health transmissions in the context of varying health policy design on the macro level and in different welfare state regimes. Looking at the level of state involvement in social policy and how this determines the extent to which individuals rely on their families for caring and advice could help us understand the mechanisms of state-family interactions. This could in turn inform policy-makers about the complex impacts of macro-political decisions not only on inequalities between individuals, but also between whole families and small communities as micro-social units. The design of our thesis with an emphasis on family interactions and comparative differences between country healthcare and welfare system characteristics is imperative for our two main research hypotheses.

The first main hypothesis states that different levels of healthcare spending would influence the degree to which individuals have to rely on their family members for help, advice and caring. Given this differential reliance on family members, their influence

on health and wellbeing of their loved ones was also hypothesised to vary under different levels of healthcare affordability in different countries. In other words, we aimed to explore the interactions between the influence of the family sphere and social policy sphere on health of individuals. This was done by quantifying the difference in access to medical knowledge and expertise in households across countries with different levels of macro health indicators. To do that, we used the presence of a doctor in a family as a proxy for superior informal caring and access to health-behavioural advice, easy early diagnosis and help with treatment. Based on evidence from recent research (Polyakova et al,2019) and quantitative analysis of self-reported health in this paper, we concluded that such individuals consistently report better health behaviour and health outcomes than otherwise demographically-identical individuals without doctor family members under any healthcare systems design and spending level. This confirmed that family interactions should be considered as important elements of health systems and are relevant to social policy.

We further expected the health gap between individuals with doctor spouses and those married to other professionals to vary under different healthcare system design. For this hypothesis, we mainly draw from existing research about the importance of family as a source of insurance (see e.g. Lee et Persson,2016, Kuziemko,2014 or Autor et al,2017), and on a relatively small literature that studies family as a source of expertise and value transmissions (see e.g. Bell et al,2018 or Hvide and Oyer,2018). Relying on aggregated survey data from European Social Survey (ESS), we found a negative linear relationship between subjective health of individuals and the level of private out-of-pocket healthcare expenses. We statistically confirmed that this negative effect on health outcomes of paying more for healthcare services is moderated by the presence of doctor spouses in households. In other words, this paper showed that the extent of the difference marrying a doctor makes to their spouse's health compared to those who have not married a doctor differs in countries with different healthcare payment systems. This showed us that individuals rely more on their families when state financing of healthcare services is lower, because having a doctor spouse moderated the negative effect of high private health expenses on subjective health by, for example, provision of access to otherwise unaffordable health advice and services.

The second main hypothesis examined the relationship between welfare regime types, family caring responsibilities and subjective health. We found a statistically-significant evidence of subjective health differentials under different welfare regimes. All countries in our samples were grouped into one of 5 major welfare regime types- Anglo-Saxon, Conservative, Mediterranean, Eastern European and Scandinavian based on Esping-Andersen's (1990) typology work: 'Three Worlds of Welfare Capitalism' and recent revisions to the model by Haggard et Kaufman (2008) and Martin (2015) , which address the model's initial inability to classify Mediterranean and Eastern European countries. Our findings indicate that individuals in Anglo-Saxon countries report the best subjective health after controlling for a wide range of personal attributes, such as education, age and socioeconomic status. These individuals were followed by people living in Scandinavian countries, then Conservative and Mediterranean Regimes. Worst

health was reported in Eastern European countries. When it comes to the interaction between welfare regime type and having a medically-educated spouse on subjective health, a doctor in the family made the biggest and statistically-significant difference in Conservative countries when compared to individuals in Anglo-Saxon countries. This provides us with evidence for our second main hypothesis which claims that having a doctor in the family has the greatest health impact in welfare regimes that place the strongest emphasis on the importance of family in welfare provision.

Given these results, this paper showed that the immediate family sphere and public spheres are connected and influence one another. In so doing, it aimed to contribute to the young and emerging field of political epidemiology pioneered by Bambra et al (2005) and Clarke et al (2007). Even though family influence as a component of complex health systems cannot be used as a policy instrument, understanding how families operate and interact with social policy could help us design our social institutions in ways that maximise positive and discourage negative impacts of family member influence. This could not only help improve health outcomes overall but facilitate a more equitable distribution of health across individuals of varying socioeconomic groups and family backgrounds.

Chapter 2: Research Hypotheses

Chapter 2.1: Individuals and Health Inequalities (Hypothesis 1)

The epidemiological transition of illness in Europe over the last 150 years from communicable to chronic illnesses has entirely transformed the relative power of individuals to influence their health (Saracci,2010:9). While past diseases, such as viral infections presented individuals with limited prevention methods outside of avoiding areas infested with plague, recent chronic diseases such as cancers or cardiovascular problems offer individuals a degree of power over the disease incidence by managing their own health capital through health investments and prevention (Saracci,2010:10). This 'relative' power shifts a lot of responsibility for health improvements and maintaining from hospitals to people's homes, where they face their own choices about eating habits, exercise and adherence to treatment. The word 'relative' is in brackets because we wish to highlight that the power to positively influence one's health is not equally distributed and not all individuals possess effective means to utilise it. For example, even though there is an abundance of prevention methods and advice online and in books, it might be difficult for some individuals to access and understand this information. Moreover, even if access to such information is made easy for them, for example by arranging personal nurse visits to people's homes, they might face monetary or time constraints that prevent them from acting upon this advice. Inequalities in this 'relative' power to improve one's health are well-explored in existing academic literature on socioeconomic gradient in health (see e.g. Marmot,2015; Mackenbach,2008; James et al,1997; Smith et al,1990 or Wilkinson,1997).

It is also imperative to note that individuals live, work and interact in a social context that can influence their health behaviour. Evidence of such social context, particularly the effect of neighbourhood, family structures and social relationships on health is well-documented in both older and more recent health inequality research (see e.g. Roux,2001 or Pickett et Pearl,2001; Bjorkegren,2018 or Isen et al,2017 for effect of neighbourhood on physical health; Gore,1978 or House et al 1988 for the effect of social relationships on mental health and Seeman,2000; Schulz et Sherwood,2017; McCloskey et al,1995 or Barret et Turner,2005 for the effect of friends and family caregiving on mental and physical health). Furthermore, there is evidence in recent research about spousal concordance of health and health-behavioural changes of individuals as a consequence of their spouse's health shock events (see e.g. Hippisley-Cox,2002; Joutsenniemi et al,2011 or Fadlon et Nielsen,2017). However, the mechanisms through which this family influence impact the health of individuals and health inequalities have sparsely been researched.

One possible pathway through which family members can influence one's health has recently been explored by Polyakova et al (2019) in their working paper. This pathway operates through modification of people's health behaviour by their family members (ibid.). For example, this could be done by providing them with good quality health prevention advice, influencing their diet by cooking nutritious meals and encouraging

them to exercise or take their prescribed drugs. Polyakova et al (2019) analyse this pathway by looking at health differences between Swedish individuals who have a doctor in their extended family and similar individuals without a health-professional family member. They show that the former report not only better objective health outcomes in terms of lower specific disease incidence, but also better preventative measures and health behaviour, such as higher uptake of vaccination and lower smoking rates (ibid.). The causal mechanism through which they explain this phenomenon is a superior provision of health inputs such as advice on prevention methods, which then in turn improves health outputs of all family members (ibid.).

The first preliminary hypothesis (H_1) of this paper draws on the above-mentioned evidence from socioeconomic health inequalities between individuals and family health influence as a mechanism through which a portion of health inequality is formed and maintained. It wishes to reconfirm the findings of Polyakova et al (2019), but in a broader European context and for a much narrower family focus group- spouses only:

> ***H_1: Spouses of doctors fare better in terms of health outcomes than spouses of otherwise demographically identical spouses of non-doctor individuals.***

We have chosen to reconfirm the findings of Polyakova et al (2019) before proceeding to the two primary research hypotheses for two main reasons. Firstly, conclusions from Polyakova et al (2019) are only establishing the effect of a family member physician on health of other family members in Sweden and it is not clear how these results translate in other European countries and welfare regimes. This is necessary for the main research hypothesis in the next chapter, because we wish to compare this effect in different country groups with different social and health policy design. Secondly, we are interested to see this effect for spouses only rather than a whole extended family, because we wish to examine how macro indicators affect the health of family members living in the closest proximity and therefore who are most likely to benefit from having a doctor in the household. Confirming H_1 is essential for the second and main research hypothesis (H_2) of this paper, presented n Chapter 2.2 below.

Chapter 2.2: Health Policy Design and Welfare Regimes (Hypothesis 2)

In this chapter, we wish to analyse the interaction between family and state, which could present us with a mechanism which does not simply assume that social policies change and reform as a response to structural changes in family. Our analysis is also sensitive to the possibility that family changes, adapts and responds in its caring responsibilities and level of health influence over family members according to existing social policy design.

The Hypothesis 2 presented in this chapter is interested in the interactions between the policy context in a given country and the extent to which families step in to supplement state provision of resources. It can be broken into two sub-hypotheses:

H_{2a}: As healthcare affordability and access to services decrease, we expect the health gap between those that have a medically-educated spouse and those that do not to widen.

H_{2b}: We expect the positive effect of having a medically-educated spouse on individual's health to be stronger in welfare regimes that more directly promote family involvement in provision of care in the household- therefore more in Conservative, Mediterranean and Eastern European regimes than Anglo-Saxon or Scandinavian regimes.

In the design of both our macro indicators and hypotheses H_{2a} and H_{2b}, we decided to avoid broad comparisons, such as comparing countries based on overall social expenditure. Rather, we tried to use more specific and directly informative methods of comparing the European countries in our sample. As Esping-Andersen (1990) noted, there is a serious fault with taking country comparisons too broadly, because simply looking at the level of social expenditure without much reflection neither adequately reflects a state's commitment to welfare, nor helps one understand the impacts of the specific features of a state's welfare provision design. Using welfare regimes for this analysis is also particularly useful, because it allows us to categorise countries according to 'ideal types' of welfare institution design. This, in turn, allows us to take advantage of only 5 categories of regimes with similar welfare provision attributes instead of 30 individual countries, which makes our statistical study easier to conduct and interpret. This offers us valuable comparative insights into the effect particular designs of welfare provision have on the uptake of caring responsibilities in families and health inequalities in our societies.

Hypothesis 2a reflects our expectations of more family involvement in provision of healthcare services in countries with a lower public healthcare affordability and access to care. Research evidence suggests an association between higher out-of-pocket payments, lower access to healthcare services, their utilisation and worse health outcomes (see e.g. Andrulis,1998; Wang et al,2012; Weaver et al,2010 and Goldman et al,2007). Moreover, there is historical evidence of family networks, and particularly women, playing a crucial role in providing welfare support when formal provision systems were unavailable or inaccessible (see e.g. Oakley 1984, Kolberg 1991 or Taylor-Gooby,1991). Based on this evidence, we hypothesize that in countries with less affordable healthcare systems, family members have to step in more to provide some form of 'over-the-counter' healthcare and services directly to their loved ones without relying on the healthcare system they cannot afford. Therefore, as affordability of formal healthcare sector decreases, we expect reliance on family for care to increase and individuals with more informal health expertise, access to advice, diagnosis and prevention methods, such as doctor spouses, to exhibit better health outcomes. As a consequence, we expect the health gap between them and similar individuals with no doctor spouses to be greater in countries with more private out-of-pocket proportion of overall healthcare costs.

In our Hypothesis 2_b, we hypothesize that spouses of doctors in Conservative and Mediterranean regimes will experience more 'health privilege' than demographically-similar spouses of other professionals compared to individuals in Anglo-Saxon, Eastern European and Scandinavian Regimes. These welfare regimes to which we refer to throughout the thesis can be conceptualised as systems of welfare provision, where welfare can be understood as social security, education and/or healthcare. In our conceptualisation, we do not assume that such welfare is necessarily provided by state. Drawing on both traditional and more recent welfare regime typology literature, our hypothesis reflects our expectation that reliance on family is a lot stronger in regimes with more emphasis on informal family care provision. We expect this to give rise to starker health differences between families with and without qualified healthcare professionals (see Table 1 below).

Table 1: Welfare Regimes and Expected Health Gap between families with a doctor spouse and without

Welfare Regimes	Countries		State	Market	Family	Expected Health Gap between doctor spouses and similar spouses of other professionals
Liberal/Anglo-Saxon	Great Britain	Ireland	Marginal Role	Central Role	Marginal Role	Medium Health Gap due to central role of market in provision of welfare, which forces individuals unable to afford market services to rely on their family members
Conservative/Corporatist	Germany Austria Switzerland	France Belgium Luxembourg	Subsidiary Role	Marginal Role	Central Role	Significant Health Gap due to central role of family in welfare provision and only subsidiary, predominantly employment-linked formal state welfare provision
Scandinavian/Social Democratic	Denmark Sweden Norway	Finland Iceland Netherlands	Central Role	Marginal Role	Marginal Role	Low Health Gap due to afforable and available state services of welfare provision and less reliance on families
Mediterranean/Southern	Cyprus Spain Portugal	Italy Turkey Greece	Marginal Role	Subsidiary Role	Central Role	Significant Health Gap due to central role of family and subsidiary role of market in welfare provision, which forces those unable to afford formal services rely on family members
Eastern European	Slovakia Czech Republic Poland Hungary Isreal Slovenia	Bulgaria Estonia Croatia Lithuania Romania Ukraine	Central Role	Marginal Role	Subsidiary Role	Medium-Low Health Gap due to afforable and available state services of welfare provision which allows easy access to services, but strong cultural expectations of caring responsibilities by families

Table generated by the author of this thesis. Sources: Esping Andersen (1990), Martin (1996, 2015); Beblavy (2008); Haggard et Kaufman (2008), Bambra (2007)

In forming this hypothesis, we both draw from and aim to contribute to the small and relatively recent field of political epidemiology, which aims to combine the study of health with a more theoretical, classificatory welfare state literature pioneered by Bambra and her colleagues (see e.g. Bambra,2005; Clarke et al,2007; Taylor,2009 or Gin-Gonzales,2009). In her work, Bambra (2006, 2007, 2011) drew the connection between the type of welfare regime and health outcomes. Together with her colleagues, she also touched upon the relationship between welfare regime types and health inequalities (Bambra et al,2009). Similarly, further existing research in comparative social policy from Eikemo et al (2008) has also established that welfare regimes are important determinants of self-reported health, because of their abilities to mediate provision of services and resources. However, traditional welfare regime theory, such as Esping-Andersen's *Three Worlds of Welfare Capitalism* (1990), as well as its newer specifications which include healthcare or gender fail to take into account the local and social differentials in welfare provision (Anheier et Krlev,2014). Such a critique of welfare regime theory is post-structural in nature. It emphasizes the hybrid, diverse nature of our social lives, relations and both formal and informal actors involved in provision of welfare (ibid.). As a result, welfare provision is 'necessarily unequal across

space rather than uniform across states (Isakjee,2017). Moreover, different types of welfare are not provided through equal means, which means that, for example, a study of social security would come up with a completely different welfare regime typology than a study of family policy.

In the light of this critique, our Hypothesis 2_b is interested in looking at whether welfare regime types are associated with differential informal provision of welfare and caring within families, specifically married couples. We classify 18 European countries based on Esping-Andersen's *Three worlds of Welfare Capitalism* (1990) and particularly its state-family-market triad, because it provides us with a straightforward and informative classification of countries by their importance of family in provision of welfare. In his work, however, Esping-Andersen (1990) chose to omit both Mediterranean and Eastern European countries, a decision for which his typology was later criticized by many social policy scholars as an inadequate classificatory framework (see e.g. Leibfried,1992 or Bonoli,1997). We include these two country groups as separate welfare regimes in our analysis based on more recent welfare state work by Martin (1996, 2015), Beblavy (2008) and Haggard et Kaufman (2008). Our hypothesized results are drawn from the state-market-family triad compiled and presented in Table 1 above.

Chapter 3: Data, Operationalization and Methodology

The quantitative, empirical work of this thesis is based on aggregated data from all eight rounds (2002-2016) of European Social Survey (ESS). This dataset included all 28 countries of European Union and non-union European countries, including Iceland, Norway, Switzerland plus Israel and Turkey. ESS provided this paper not only with high quality and extensive data on respondents' personal socioeconomic context and self-reported general health, but offers us detailed information on spousal occupation, which is necessary for empirical analysis of both hypotheses of this paper. For our purposes, it is superior that its alternatives, such as EVS, EU-SILC or SHARE datasets, because ESS covers more countries and individuals for a longer time period.

The following subsection provides a rationale for and brief description of main dependent, independent and control variables used in this analysis.

Chapter 3.1: Choice of variables

Our dependent variable in this analysis is **Subjective General Health**. The rationale for choosing it as our main variable of interest lies in its simplicity, availability through all rounds of ESS and its power to capture more than simple disease incidence. This variable allows us to encapsulate experiences of individuals and their own critical, self-rated evaluations of how they feel given their social situation and age. There is research evidence for the claim that especially given older ages, more disease incidence does not necessarily mean lower self-reported health (Araujo et al,2018). Instead, individuals are able to critically determine how their health fares relative to how they should be feeling at their age (ibid.). Especially given the rising life expectancy and aging population with potentially more disease later in life, such self-rated health measures could be very helpful.

The main independent variable required for both H_1 and H_2 is a dummy **'Doctor Spouse'** indicating whether an individual who lives in marriage is married to a doctor or not. These 'doctors' in this analysis include general practitioners, specialists, physiotherapists, dentists, but also opticians, pharmacists, and nurses[1]. Such design allows us to utilize a larger sample of health professionals, while preserving the characteristics we deemed important when designing the dummy variable- whether an individual has a superior access to medical knowledge, care services, prevention and treatment methods within a household or not. This variable is important for our analysis, because it is designed to capture the differential ability to influence health of one's family members. It is particularly crucial for our intent to see whether healthcare system and welfare state design affects the extent to which individuals rely on their families for provision of caring services and advice.

[1] The individual ISCO codes used for this purpose are 2220,2221,2222,2224,2229 and 2230. For simplicity, we refer to all such health professional individuals as 'doctors' throughout the thesis.

Cases from ESS were first selected based on their marital status. They were kept in the sample if the respondents were either married or cohabiting with their partner and removed from the sample otherwise. Both marriage and cohabitation provide individuals with an environment in which they are assumed to spend long periods of free time with one person who is hypothesised to influence their behaviour[2].
They were consequently assigned into one of two groups based on their spousal/partner's occupation:

1. Treatment Group: Spouses of doctors
2. Control Group: Married Individuals with spouses that are not medically-trained

The specification of these two groups allowed us to construct a binary dummy variable that takes a value of 0 if a respondent does not have a medically-trained spouse and a value of 1 if an individual's spouse is a medic. Respondents who are themselves medics have been removed from the sample. The analysis only concentrates on the spousal effect of doctor health spill-overs despite evidence from Polyakova et al (2019) of the health effect reaching a much wider range of extended family members. The main benefit of only including spouses of doctors and otherwise identical individuals is that married individuals commonly reside in the same household, which allows us to best mirror a setting in which the doctor knows the entire medical and lifestyle history of the spouse, can easily help with diagnosis of illness and provide caring services at home. No other family member beside children, can be assumed to have this kind of deep relationship and frequent interaction. Second rationale for including only spouses stems from our desire to rule out any genetic explanations for differential health outcomes of having a medically educated parent or a sibling, such as the biological theories for social and health inequalities (Eriksen et Ursin,2009; Mackenbach,2005). Furthermore, the main concern of this paper is not to understand how far this influence of doctors on health of their family members spreads, but rather how the extent of the influence varies as individuals find themselves experiencing different features of healthcare systems.

In addition to the above-mentioned variables available through ESS, in order to conduct regression analyses for H_2 and its macro comparative element, it was necessary to manually combine and calculate two supplementary variables:

a) To examine the first sub-hypothesis of H_2, we use **private out-of-pocket healthcare expenses** for countries in which individuals live as a proxy for our first health macro indicator- Access to and Affordability of Healthcare Services[3]. This information has been obtained through World Bank Open Data, which

[2] Throughout the thesis, we refer to individuals who are married or cohabiting as 'married' for simplicity.

[3] We believe that this is a good proxy because of a large pool of research evidence for association between cost of healthcare individuals bear out-of-their-pockets, access to healthcare, its utilization and subsequently health outcomes (see e.g. Wang et al,2012, Weaver et al,2010 and Goldman et al,2007 for direct evidence of association between health outcomes, costs of services and their utilization).

provided us with open access to healthcare statistics and global development data and indicators for all countries in our sample.

b) For the second sub-hypothesis of H_2 interested in the effect of different **welfare state regimes** on health outcomes and family involvement, we create a new categorical variable, aim of which was to group individual countries into one of five respective welfare regimes as outlined in the previous chapter.

By adding these macro indicators, we are trying to see both a direct effect of them on health of both groups, but especially the extent to which they moderate or exacerbate the 'privilege' that some families have by having a doctor in the household.

Additionally, we include numerous control variables in our analysis to ensure that the effect on health that we ascribe to having a doctor spouse cannot be explained by other confounding variables. These variables have been chosen based on evidence from literature on health determinants. Firstly, we include both ***an individuals' own and mother's education*** based on evidence of a positive association between health outcomes and level of education (see e.g. Furne et al,2008; Davies et al,2018 or Feinstein et al,2006 for the health effect of own education and Abuya et al,2012; Chen et Li,2008 or Shariff et Ahn,1995 for the long term health effect of mother's education on her child). Secondly, we include ***gender,*** because there is an abundance of research pointing out gender differences in health outcomes (see e.g. Phillips,2007 or Regitz-Zagrosek,2012). Thirdly, this paper considers both ***age and quadratic age term*** as control variables due to age being one of the main physical determinants of health. This is because health is always expected to deteriorate as one grows old, hence the main age term. Quadratic term is included to more accurately predict the effect of age, which might not necessarily be as linear for all ages as the main term would suggest. Additionally, we transform individual ISCO08 (The European Socio-Economic Classification) codes available in the ESS database into a continuous ***ISEI measure of socioeconomic and occupational status*** using ISCOGEN STATA module. This is because we wish to control for social status, which is also widely reported in literature to be associated with health of individuals (see e.g. Karlsen et Nazroo,2011; Starfield et al,2002; Fein,1995 or McCartney et al,2019). Furthermore, to account for the well-researched effect of ***neighbourhood, crime and environmental risk factors*** on health of individuals, we have decided to make use of a continuous variable 'Feeling of Safety', which tells us the extent to which respondents feel safe in their neighbourhoods (for evidence in academic literature for these associations, see e.g. Evans et Kantrowitz,2002; Kawachi et Subramanian,2007; Pemberton et Humphris,2016 or Ocampo et al,2014). Lastly, we include ***country effect*** as a control variable to rule out that the effect on health of having a doctor spouse is not simply capturing country specific trends and a ***year-fixed effect*** of aggregated ESS database, to account for variation across time.

We control for these characteristics in the analysis not only because of their direct effect on individuals' health as established by the literature review above, but also because they will help us reduce the likely problem of misinterpreting results that could have

simply been explained by marital homogamy- one of two processes that could influence differences in health among different couples. Davillas et Pudney (2017:89) distinguishes between these two potential processes. They (ibid.) define the first, *causal concordance,* as 'an increasing similarity of health states caused by lifestyle and other influences shared within the marriage' and the second, *marital homogamy,* as the tendency to choose a partner similar in values, social class or education to oneself. The former represents the mechanism through which we try to explain why spouses of doctors have better health than otherwise demographically-similar individuals. Physicians are increasingly being expected to demonstrate a commitment to self-care, personal preventive measures and lifelong learning, all values considered a 'core competency' by, for example, the Royal College of Physicians and Surgeons of Canada (CanMEDS,2005). Since there is evidence that doctors themselves report better health than similar other professionals, such as lawyers (see e.g. Australian Medical Association,2011, Frank et al,2000 or Bass et McGeeney,2012), we expect that they would pass on some of this expertise and health benefit to their spouses. The latter, marital homogamy, could represent a problem for the analysis and interpretation of results if we did not control for the common characteristics of individuals based on which they could select a partner. Literature on marital homogamy and assertive mating shows that such characteristics include predominantly education level, social class, age, religion and race (see e.g. Blackwell,1998; Lichter,1990; Blackwell et Lichter,2005; Bolton,1961; Hollingshead, 1950).

One potential marital homogamy problem, however, remains and concerns the possibility that the study of medicine may have attracted more health-conscious personalities who in turn select more health-conscious spouses interested in healthy lifestyle. This potential problem cannot be addressed easily in this analysis, because we would need longitudinal data with individuals linked across rounds that extend to their life prior to marriage to see whether marrying a doctor changed their health behaviour. However, should we find statistically significant interactions between our macro-indicators and having a doctor spouse, we can assume that the problem is not as big as it initially seems, because having a doctor in the family would make a health difference in different policy contexts beyond simply having chosen a partner based on his health-related behaviour.

Chapter 3.2: Methods of Analysis

To investigate the key hypotheses, regression analyses and therefore quantitative research methods were used. ESS offered us large, high-quality and harmonized dataset over a time period of 14 years. Such a dataset allows us to gather enough individuals in both our treatment and control group to render a statistical research method possible[4]. Moreover, the sample obtained through this dataset is large enough for us to address any

[4] Our sample included 1989 married individuals with a health-professional spouse and 186,261 individuals married to other professionals. Even though the treatment group is small and comprises of only 1.06% of the whole sample overall, it can nonetheless present us with a meaningful statistical analysis, given well-designed control variables.

missing data in our variables of interest by list-wise deletion, and therefore by excluding all participants with responses for which values are missing from the analysis without substantial loss of statistical power[5]. A further benefit of ESS database is its simple accessibility for researchers, which would allow for easy replicability of results and increased reliability of findings.

However, this long timespan from the aggregate dataset presented us with a challenge when computing our continuous healthcare macro indicator- percentage of out-of-pocket healthcare expenses, because its values did not remain static over the given timespan. For this reason, the macro-indicator was manually computed for each ESS round and then subsequently aggregated into a single variable. The data was gathered for all countries in our sample from World Bank Open Data for years 2002-2016 and then linked to individual respondents based on their country of origin and the round in which they were interviewed. This health macro indicator was then added to our regression analyses as a continuous explanatory variable. In addition to that, an interaction term between this variable and our 'doctor spouse' dummy was computed. This is necessary, because H_2 presents us with a conditional hypothesis- we are interested to see whether subjective health changes as we change the percentage of healthcare expenses individuals have to bear in their country of residence if a doctor spouse is present or not (condition). In other words, we wish to see whether having a doctor spouse modifies the effect of the health macro indicator on subjective health. Because we are interested in 'context conditionality', the condition in this analysis is dichotomous- the presence of a doctor spouse is a dummy variable, which equals to 1 when the condition is met and an individual has a medically-educated spouse and 0 otherwise. Such a conditional hypothesis wishes to establish whether a relationship between two variables depends to some extent on the value of another variable and therefore require us to run a regression with an interaction term- multiplicative interaction models (Brambor et al,2005:65).

[5] In order to make sure that we are not removing a non-random class of participants, we analyse the individuals for whom our values of interest are missing. Using a test of randomness, we determine that the sample of 1098 married respondents who have failed to answer questions about their subjective health or employment did not show any signs of systematic, non-random selection.

Chapter 4: Empirical Results

Chapter 4.1: Hypothesis 1- The effect of having a doctor spouse on one's health

In order to examine our first hypothesis, two regression models were run. The first model (see Table 1) showing the results from simple regression of our main explanatory variable, 'Doctor Spouse' dummy on our outcome variable, Subjective General Health, without including any potential confounders. The second model (see Table 2) includes the same information as Model 1, but in addition to that, it controls for a wide range of confounding variables discussed in Chapter 3.1.

Table 2: Linear Regression of Doctor Spouse dummy on Subjective Health

Model 1 – Doctor Spouse
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Doctor Spouse	0.333	0.020	16.42	0.000	0.293	0.373	**
Constant	3.739	0.002	1794.2	0.000	3.734	3.743	**

Mean dependent variable	3.742	SD dependent variable	0.899
R-squared	0.001	Number of observations	187991.000
F-test	269.713	Prob > F	0.000

** p<0.01, * p<0.05

Table 3: Linear regression of Doctor Spouse dummy on Subjective Health with Covariates

Model 2 – Doctor Spouse and Covariates[a]
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Doctor Spouse	0.041	0.025	4.66	0.009	0.007	0.079	**
Education	0.019	0.001	25.24	0.000	0.017	0.020	**
Mother's Education	0.002	0.001	2.50	0.012	0.001	0.004	*
Gender	-0.008	0.005	-1.76	0.079	-0.018	0.001	
Age	-0.024	0.001	-23.56	0.000	-0.026	-0.022	**
Quadratic Age	0.000	0.000	5.42	0.000	0.000	0.000	**
Socioeconomic Status	0.004	0.000	21.66	0.000	0.003	0.004	**
Feeling of Safety	-0.152	0.003	-47.64	0.000	-0.158	-0.146	**
Constant	4.981	0.033	150.35	0.000	4.916	5.046	**

Mean dependent variable	3.767	SD dependent variable	0.888
R-squared	0.252	Number of observations	115722.000
F-test	848.945	Prob > F	0.000

*** p<0.01, * p<0.05*
[a] *Country dummies and year-fixed effects are accounted for in the analysis*

Both models present us with a strong, statistically significant (p<0.01) positive coefficients for our main explanatory variable- Doctor Spouse dummy, which indicates that there is a robust, positive relationship between having a doctor in the family and one's subjective health. The size of the coefficient, however, decreases as we add control variables in Model 2, but remains strong and statistically significant. Nevertheless, the overall fit of the model significantly increases- R^2 in Model 1 was 0.002 and increased to 0.203 in Model 2. This means that whereas Model 1 can only explain about 0.2% of variation in subjective health among respondents, Model 2 is a lot more powerful and

can explain more than 20% of the variation, while maintaining the doctor spouse dummy strong and statistically significant[6].

Similarly, we can look at the probability of individuals reporting a score of 5 (excellent) on subjective general health for respondents in our treatment category (doctor spouses) and control category (other professional spouse) respectively. Figure 1 below presents us with the computed probability for both categories and their respective confidence intervals. We see that while our control group is only about 21% likely to report the best possible subjective health, this probability is predicted to be more than 10% higher for our treatment group. This, together with the results from our two regression models confirms the findings of Polyakova et al (2019) in Sweden about positive health spill-overs of a medic on family members in a broader European context.

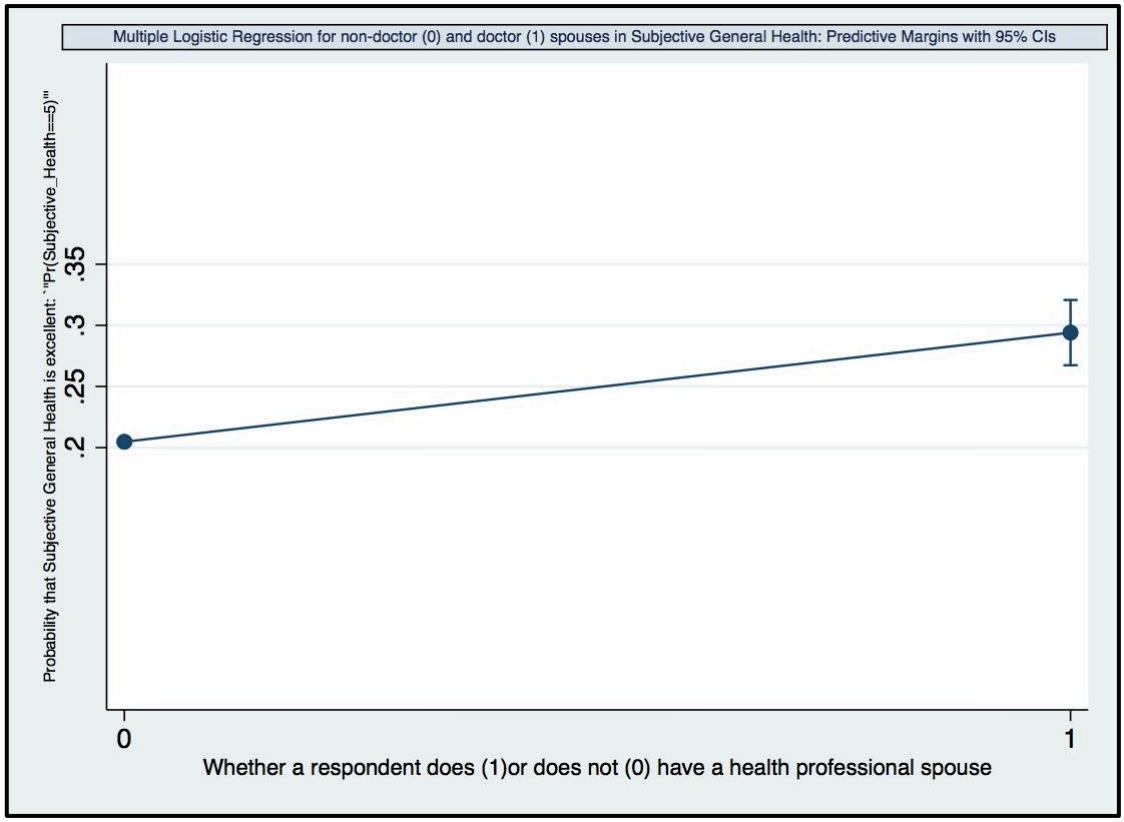

Figure 1:Predicted Probability of 'Excellent' Subjective General Health by Doctor Spouse dummy

There are numerous factors that could explain health variance in our sample and the population overall better than the presence of health professional family member, such as educational effect or socioeconomic status, which we included in Model 2. However, the fact that the coefficient for our Doctor Spouse variable remained relatively strong and statistically significant even after controlling for a wide range of variables demonstrates exactly the kind of result that our Hypothesis 1 predicted- that there is a

[6] The fact that Model 1 explains very little variation can be anticipated because there is strong evidence for other health determinants that could explain the differences in subjective health. We cannot expect the presence of doctors in the household to explain much of overall health inequalities in a society, particularly since variation in subjective health vary significantly even among individuals in the control group alone and such variation can never be attributed to a presence of a doctor in some other families.

difference in health outcomes between individuals with doctor spouses and otherwise demographically-similar individuals married to other professionals.

Chapter 4.2: Hypothesis 2- The interaction between macro healthcare characteristics and having a doctor spouse in determining subjective general health

Since H_2 consists of two separate sub-hypotheses, each requiring us to run a regression analysis with interaction term, the results are shown in four separate models. Two of these models (Model 3 and 5) present simple linear regressions from Model 2, but each also including one of our macro variables of interest- welfare regime type and private healthcare expenditure. The remaining two models (Model 4 and 6) present linear regressions with interaction terms between the macro health indicators and our Doctor Spouse dummy.

In these models, both interaction effects and their constituent variables have to be included, because we wish to avoid omitted variable bias and biased estimates of interaction term coefficients. The only control variable not included in the analysis is the country effect on subjective health because of multicollinearity issues with our computed country-specific and welfare regime specific macro health indicators. It is, therefore, not possible to account for both effects.

Table 4:Linear Regression of Doctor Spouse and Private Healthcare Expenses on Subjective Health

Model 3 – Doctor Spouses and Private Healthcare Expenses[a]
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Doctor Spouse	0.080	0.026	3.10	0.002	0.030	0.131	**
Private Healthcare Expenditure	-0.010	0.000	-7.52	0.000	-0.015	-0.008	**
Education	0.020	0.001	27.38	0.000	0.019	0.022	**
Mother's Education	-0.004	0.001	-3.93	0.000	-0.006	-0.002	**
Feeling of Safety	-0.210	0.003	-65.65	0.000	-0.217	-0.204	**
Gender	0.007	0.005	1.42	0.157	-0.003	0.017	
Age	-0.024	0.001	-22.41	0.000	-0.027	-0.022	**
Quadratic Age	0.000	0.000	5.94	0.000	0.000	0.000	**
Socioeconomic Status (ISEI)	0.004	0.000	21.39	0.000	0.003	0.004	**
Constant	4.921	0.032	151.71	0.000	4.857	4.984	**

Mean dependent variable	3.767	SD dependent variable	0.888
R-squared	0.170	Number of observations	115722.000
F-test	1481.387	Prob > F	0.000

*** p<0.01, * p<0.05*
[a] *Year-fixed effects are accounted for in the analysis*

Model 3 above presents us with a linear regression analysis where we see a statistically significant negative relationship between private out-of-pocket healthcare expenses of individuals and self-reported subjective health. This coefficient is substantively important, because we see that as the percentage of private out-of-pocket healthcare expenses increase by 1, subjective health decreases by 0.01, controlling for a wide range of characteristics. In example, this means that individuals in countries where 50% of overall healthcare expenses are being paid privately, such as Bulgaria, can expect to have subjective health lower by 0.35, compared to countries where such out-of-pocket

expenses only amount to 15%, such as Norway in 2015, keeping other covariates constant. This (0.35) is a substantial difference, considering the relatively small scale of Subjective Health outcomes- 1 (terrible health) to 5 (excellent health). The second coefficient of interest- the effect of having a doctor spouse on subjective health, is also statistically significant and tells us that while keeping control variables constant, those who married a doctor compared to individuals without such a spouse, can expect their subjective health to be better by 0.08 points.

Looking at the interaction term between the doctor spouse dummy and private healthcare expenses in Model 4 below, we see a positive and statistically significant coefficient. Given this model with interactions, the constituent Private Expense coefficient has to be interpreted differently than in Model 3- it tells us the effect of private health expenses on subjective health when there is no doctor in the household[7]. The interaction coefficient shows us the additional effect that a presence of a doctor spouse makes to the negative relationship between private healthcare expenses and subjective health. Its positive value demonstrates that marrying a doctor mediates the negative effect of each additional rise in private healthcare expenses. This means that out of individuals who experience a drop in subjective health as a result of high proportion of private healthcare expenses in their countries, those who have married a doctor experience a smaller drop in their health compared to other, demographically-similar, married individuals.

Table 5: Linear Regression of Doctor Spouse dummy and Private Healthcare Expenses on Subjective Health with an interaction effect

Model 4 – Doctor Spouse and Private Healthcare Expense Interaction[a]
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Doctor Spouse	0.057	0.067	0.85	0.394	-0.075	0.189	
Private Expense	-0.009	0.000	-7.53	0.000	-0.009	-0.008	**
Doctor#Private Expense (0)	0.000	.	.	.	.	.	
Doctor#Private Expense (1)	0.001	0.000	2.42	0.046	0.001	0.002	*
Education	0.020	0.001	27.40	0.000	0.019	0.022	**
Mother's Education	-0.004	0.001	-3.94	0.000	-0.006	-0.002	**
Feeling of Safety	-0.210	0.003	-65.67	0.000	-0.217	-0.204	**
Gender	0.007	0.005	1.41	0.160	-0.003	0.017	
Age	-0.024	0.001	-22.41	0.000	-0.027	-0.022	**
Quadratic Age	0.000	0.000	5.93	0.000	0.000	0.000	**
Socioeconomic Status (ISEI)	0.004	0.000	21.38	0.000	0.003	0.004	**
Constant	4.922	0.032	151.74	0.000	4.858	4.985	**
Mean dependent variable	3.767		SD dependent variable			0.888	
R-squared	0.178		Number of observations			115722.000	
F-test	1481.343		Prob > F			0.000	

*** p<0.01, * p<0.05,*
[a] *Year-fixed effects are accounted for in the analysis*

Both Model 3 and 4 confirm our Hypothesis 2a, which postulated that affordability and access to services are important predictors of health and that having a doctor in the family can help individuals overcome this lack of formal affordability by relying on them for caring and healthcare services.

[7] This effect decreased a little compared to Model 3, which looked at the effect of private health expenses on subjective health keeping other variables at their mean values, from -0.01 to -0.009.

To examine Hypothesis 2b, which tried to establish a relationship between welfare state regimes, having a doctor spouse and subjective health, we ran linear regression Models 5 and 6. Model 5 below showed us a simple linear relationship without any interaction effects. It presented us with statistically-significant evidence of the effect living in different welfare regimes makes on subjective health of individuals. Compared to individuals in Anglo-Saxon Regime, individuals living in all other regimes report on average lower subjective health scores. The second-best outcomes are for those living in Scandinavian Regimes, followed by Conservative and Mediterranean Regimes. The worst subjective health outcomes are reported in Eastern European Regimes. The positive effect of having a doctor spouse on health is quite strong, but statistically significant only at the 0.10% level.

Table 6: Linear Regression of Doctor Spouse dummy and Welfare Regime Type on Subjective Health

Model 5 – Doctor Spouse and Welfare State Regimes[a]
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Doctor Spouse	0.045	0.025	1.78	0.075	-0.005	0.095	
Anglo-Saxon Regime(Base)	0.000	.	.	.	.	.	
Conservative Regime	-0.265	0.009	-28.11	0.000	-0.284	-0.247	**
Mediterranean	-0.293	0.010	-28.09	0.000	-0.313	-0.272	**
Eastern European Regime	-0.537	0.009	-60.09	0.000	-0.554	-0.519	**
Scandinavian Regime	-0.193	0.010	-20.07	0.000	-0.212	-0.174	**
Education	0.018	0.001	24.29	0.000	0.017	0.020	**
Mother's Education	0.001	0.001	0.98	0.325	-0.001	0.003	
Gender	0.000	0.005	-0.01	0.989	-0.010	0.009	
Age	-0.025	0.001	-23.51	0.000	-0.027	-0.023	**
Quadratic Age	0.000	0.000	5.78	0.000	0.000	0.000	**
Feeling of Safety	-0.183	0.003	-57.49	0.000	-0.190	-0.177	**
Socioeconomic Status (ISEI)	0.004	0.000	21.01	0.000	0.003	0.004	**
Constant	5.192	0.032	161.82	0.000	5.129	5.254	**
Mean dependent variable		3.767	SD dependent variable			0.888	
R-squared		0.205	Number of observations			115722.000	
F-test		1573.084	Prob > F			0.000	

*** p<0.01, * p<0.05*
[a] *Year-fixed effects are accounted for in the analysis*

Model 6 below shows a linear regression analysis with an interaction term between welfare state regimes and having a doctor spouse. In all welfare regimes, having a doctor spouse secures individuals better subjective health outcomes than individuals married to other professionals. This effect is the strongest and statistically significant at 0.05% level in Conservative Regime. Those not married to doctors in Conservative Regime, alongside any other welfare regimes, can expect their subjective health outcomes to be lower than in Anglo-Saxon Regime, when controlling for a range of characteristics. However, having married a doctor in a Conservative Regime makes the biggest difference out of all welfare regimes in moderating this lower health outcome compared to individuals in Anglo-Saxon Regime. Therefore, we see that the health privilege individuals gain from marrying a doctor is the strongest in Conservative Regimes.

Table 7: Linear Regression of Doctor Spouse dummy and Welfare Regime Type on Subjective Health with an interaction effect

Model 6 – Doctor Spouse and Welfare State Regimes Interactions[a]
Determinants of Self-Reported Subjective Health- Coefficients from Linear Regression Analysis

Subjective Health	Coef.	St.Err.	t-value	p-value	[95%Conf	Interval]	Sig
Doctor Spouse	0.024	0.046	1.52	0.060	-0.066	0.113	
Anglo-Saxon Regime (base)	0.000	.	.	.	.	.	
Conservative Regime	-0.266	0.009	-28.06	0.000	-0.285	-0.248	**
Mediterranean Regime	-0.293	0.010	-27.99	0.000	-0.313	-0.272	**
Eastern European Regime	-0.537	0.009	-59.81	0.000	-0.554	-0.519	**
Scandinavian Regime	-0.193	0.010	-19.96	0.000	-0.212	-0.174	**
Anglo-Saxon Regime# Doctor1	0.000	.	.	.	.	.	
Conservative Regime#Doctor1	0.087	0.068	3.29	0.019	0.044	0.118	*
Mediterranean #Doctor1	0.014	0.096	0.15	0.181	-0.174	0.203	
Eastern European Regime# Doctor1	0.009	0.066	-2.67	0.149	-0.009	0.002	
Scandinavian Regime# Doctor1	0.004	0.068	-0.06	0.450	-0.127	0.138	
Education	0.018	0.001	24.28	0.000	0.017	0.020	**
Mother's Education	0.001	0.001	0.98	0.328	-0.001	0.003	
Gender	0.000	0.005	-0.03	0.977	-0.010	0.009	
Age	-0.025	0.001	-23.50	0.000	-0.027	-0.023	**
Quadratic Age	0.000	0.000	5.77	0.000	0.000	0.000	**
Feeling of Safety	-0.183	0.003	-57.48	0.000	-0.190	-0.177	**
Socioeconomic Status (ISEI)	0.004	0.000	21.02	0.000	0.003	0.004	**
Constant	5.192	0.032	161.74	0.000	5.129	5.255	**
Mean dependent variable	3.767	SD dependent variable				0.888	
R-squared	0.205	Number of observations				115722.000	
F-test	1299.587	Prob > F				0.000	

*** p<0.01, * p<0.05*
[a] *Year-fixed effects are accounted for in the analysis*

In addition to Model 6, we decided to present the results in a graphical form to facilitate easier understanding of the results for readers less familiar with categorical variable interaction coefficients (see Figure 2 below). This figure shows the predictions of subjective health scores with confidence intervals in all five welfare regimes for married individuals with and without doctor spouses. We see that in all welfare regimes, those with doctor spouses fare on average better than those without, but in Conservative Regimes, this effect is the strongest and most significant, since the confidence intervals between our two groups do not overlap.

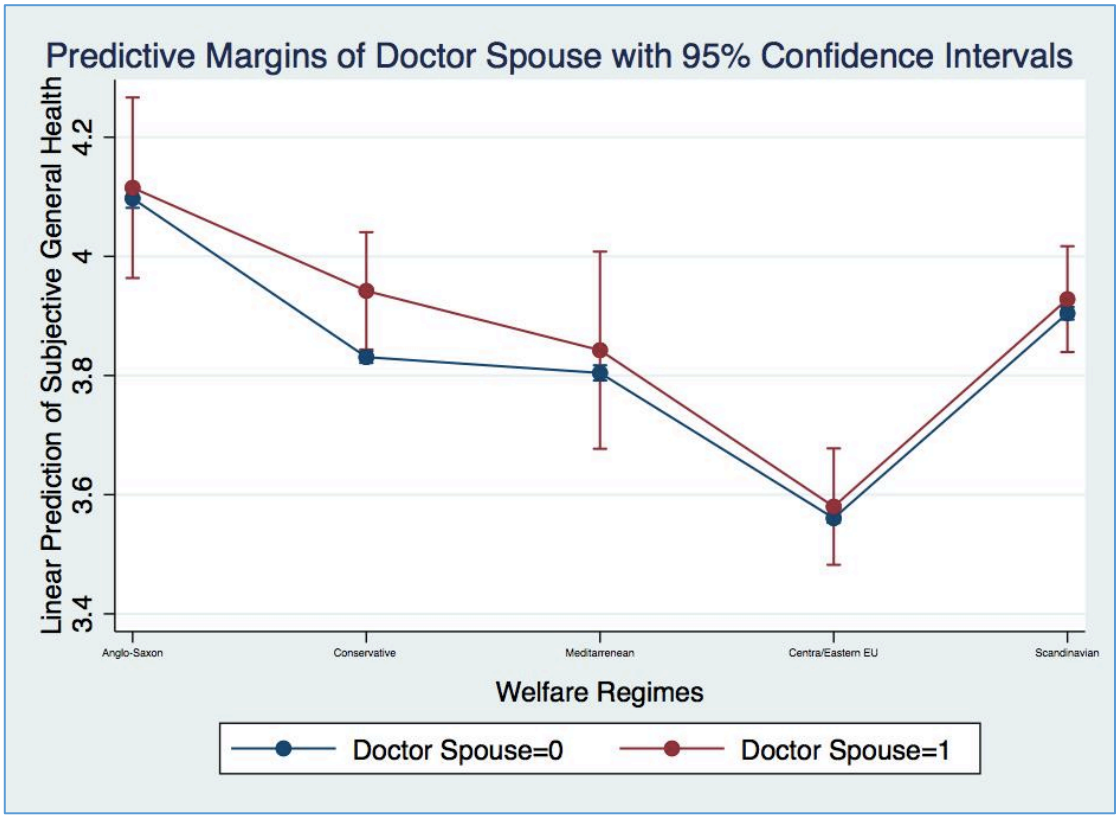

Figure 2: Predicted Probabilites of Subjective General Health by welfare regimes and doctor spouse dummy

Even though we cannot make conclusions about the interaction effects for other welfare state regimes, the significant result for Conservative Regime confirm our expectations postulated by H_{2b}. This is because we expected the effect of having a doctor spouse to be the largest in welfare regimes that promote family and encourage it in caring responsibilities[8]. As hypothesized, Conservative Regime countries such as Germany, France, Austria or Switzerland show signs of precisely such family-friendly policies and encourage families in provision of care.

[8] In order to explore the hypothesized mechanism of H_{2b} further, an additional regression analysis was run using Round 7(2014) of ESS to determine whether different welfare state regimes have an effect on the amount of help individuals provide in their families (see Appendix B). These results show what we expected- individuals in conservative regimes, and particularly women provide more hours of help to their family members than individuals in any other welfare regime, when compared to the Anglo-Saxon Regime.

Chapter 5: Discussion of Findings and their relevance to Social Policy

Our empirical results from linear regression Models 1 and 2 fully confirmed the Hypothesis 1 postulated in Chapter 2. They reconfirmed the findings of superior health outcomes for family members of doctors from Polyakova et al (2019) for Sweden in a broader European Context and for a sample of spouses only. Such results highlight not only the importance of access to health-related knowledge and expertise, but also the significance of new families that individuals form later in life through their choice of partners for health outcomes. Furthermore, the findings could encourage further research into the particular advantages that family members of doctors possess within broader health privilege transfer literature. This could help us tailor our health policies and public health interventions to mimic the positive health effects doctors spill over onto their families in a broader society. Such new policies could make health systems more understood, sustainable, equitable and efficient. Additionally, such measures could help us decrease existing and potential intergenerational health inequalities. Example of a potential intervention informed by evidence from further research into health family transmissions and health spill-overs could be an educational, public health program aimed at improving health literacy in our society.

The results from Model 3-6 are even more interesting, and policy-relevant. Firstly, they show us that families need to take up different amounts of caring and health-improving responsibilities in contexts of varying healthcare affordability and access. If we compare European countries by their overall level of private out-of-pocket expenses, in countries where such spending is higher, having a doctor in the family matters more to one's health than in countries with higher public spending. When resources are not affordable, families have to step in more. This shows that healthcare financing and the level of family involvement in alternative provision are related and therefore that there is a relationship between access to services and the need to rely on family. Such results are strongly relevant for policy-makers interested in facilitating a healthier and more equitable society. This is because our results could alert such policy-makers to additional implications of any policies which alter the distribution of healthcare financing. One such implication includes a change in reliance on family members for care and services, such that more services are demanded from state and less from family members as they become more affordable and vice versa. This, however, has a further implication for health inequalities, because not all families are able to provide caring and advice to the same standard if capacity to use formal healthcare system is reduced. Indeed, it is precisely the lower-income and less-educated families that are most at risk of not being able to afford healthcare and also the families whose ability to care at home to the same standard as richer and more educated families might be impaired. This necessarily creates health inequalities through informal caring responsibilities in healthcare systems that force people to care for themselves at home instead of through formal medical care. Such results provide us with an illuminating addition to the study of social and health inequalities by introducing a precise mechanism through which the well-researched associations between health and income or education operate.

Secondly, the models present us with evidence for the claim that the degree to which a state supports family values and its involvement in distribution of care responsibilities through policy-making matters not only to the ways families organise themselves to provide care and advice, but also to health differences between families that have superior access to caring abilities and those that do not. We have shown this by confirming our Hypothesis 2_b when we found that having a doctor spouse matters the most for health outcomes in Conservative Regime countries. This is because in conservative regimes, social policy is designed with an emphasis on supporting family and its caring responsibilities. We have, therefore, anticipated that individuals in such countries will benefit more from having a medically-trained spouse in terms of their health, than individuals in countries where family values and caring responsibilities are less encouraged. These results present us with similar implications for health inequalities as mentioned above and seem particularly relevant in the context of an aging population, which requires increases in long-term care and help from state or family to sustain the needs. Furthermore, such evidence calls for policy evaluations and design of new policies to be sensitive to its effect on family interactions and what this means for societal health inequalities. Depending on how the state views family, it can make policy in a more informed way about its impact on family responsibilities and gender balance of unpaid work at home. This is because, as our supplementary analysis in Appendix B, as well as extensive evidence from literature on gender studies showed, women are significantly more likely to take up such generally unpaid work of helping her family members (see e.g. Daly et Rake,2003; Nelson,1999 or Wheatley et al,2017). Therefore, the relevance to social policy of these findings goes well beyond health policy alone. Policy-makers and scholars in other areas, such as education or pension policies, should be sensitive to the impact of their policy design on health and social inequalities through their effect on altering family caring responsibilities.

Further research is required to deepen our understanding of the conditions under which families have to step in to compensate for the state's inability to provide adequate resources and its effect on distribution of health within a society. Nonetheless, the findings point to the importance of family influence when it comes to health outcomes, which invites more research into potential effectivity of couple-centred or family-focused health interventions rather than individual public health measures. Such measures already exist (see e.g. Gellert et al,2011; Oien et al,2008; Park et al,2009 or Robinson et al,2007 for examples of couple-focused interventions for smoking, exercise and cancer screenings), but as the systematic review by Arden-Close et McGrath (2017) notes, despite showing more favourable outcomes for couple-focused measures compared to those aimed at individuals, many of such partner intervention studies reported in literature have serious methodological limitations.

In light of our evidence from both confirmed Hypotheses 2_a and 2_b, we recommend that policy-makers interested in reducing health inequalities should be vary of supporting family caring responsibilities or altering the distribution of healthcare financing unless

they are willing to provide viable and affordable formal alternatives for those unable, unwilling or unqualified to take up such caring work within families.

However, it is important to remember that our main analysis only looked at the health outcomes of married individuals and our policy-recommendations follow the findings from our evidence. In addition to the main analysis, we have conducted an additional regression analysis with covariates for individuals of all marital status categories, including single, widowed and divorced individuals in the appendix (see Appendix C for the regression analysis output). This has been done to see whether individuals living in marriage or cohabitation are associated with better health outcomes compared to those without such partnerships. Such analysis has been done because we wish to be sensitive to the fact that the European Society is comprised of more than married individuals, and in fact research shows that it is precise such, particularly older, individuals living alone that are more prone to both mental and physical illnesses as a consequence of loneliness (see e.g. Malcolm et al,2019 or Mushtaq,2014). We found that married individuals are significantly more likely to be healthier than individuals of any other marital status, controlling for a range of covariates. This is important in the context of our work, which looks at the effect of family interactions and health, because our findings indicate that families matter a lot for health outcomes. We found that individuals are likely to rely on their family members when the state encourages them to, or when it is unable to provide adequate and affordable formal services. However, individuals who are isolated and do not have anyone to care for them at home are doubly affect by such a design of a society's macro policy institutions. Policy-makers should be extremely wary of suggesting policies that encourage reliance on family or that increase the out-of-pocket healthcare expenses of individuals, because apart from their negative effect on health inequalities between married individuals that we have showed, the effect on isolated, vulnerable individuals without the safety net of a family would be even more pronounced. Particularly in welfare regimes, such as the Conservative Regime, where more emphasis is being put on family values and caring responsibilities, community centres for the lonely or elderly individuals should be established and funded, design of which should aim to substitute the positive effects families have on health.

Chapter 6: Limitations and Suggestions for Future Research

Even though our regression analysis results were mostly statistically significant and confirmed our prior hypotheses, future research should address some challenges we faced during this thesis. For example, if new interviews would be conducted or new data collected through surveys in future research design, questions asked should allow us separate different streams of information relevant to health that individuals receive. This is because in today's age of internet and media, it is difficult to separate the impact of better access to expertise from other unobservable differences between individuals with and without such access (Polyakova,2019:2). With such design, it would not only be easier to ascribe a direct effect on health and health behaviour of having a doctor family member, but it would also allow us to utilise knowledge of the channels through which health-related information, advice and help spreads, which could improve our public health interventions.

Even though we established that there exists a relationship between having a doctor spouse and better health outcomes, our understanding of the mechanisms that cause this is not yet complete. Further research analysing such mechanisms could have a superior relevance for public policy and be particularly important for social policy on disability (Davillas et Pudney,2016:88). If having a doctor spouse leads to better health, we are dealing with positive health concordance that, if properly understood and reproduced though social policy for other households, could lead to decreased costs of social care, decreased health inequalities and better health outcomes. This is because the tendency for diseases to be affected by family structure and occupational choice could alter the social cost of a disease. The estimated market value of informal care supplied by family members to the disabled people in the UK amounted to £132bn in 2015, which is comparable to the total yearly cost of the National Health Service (Davillas and Pudney,2016:89). This represents a system of informal insurance though the pooling of risk by couples. However, when a disease influences both partners at the same time or both partners experience the same negative health outcomes from bad health behaviour, the capacity to care for each other in time of illness may be impaired.

Furthermore, future research should be able to extend our dependent variable to a more complex health indicator. Due to availability of variables in our aggregated dataset, we have only included subjective general health as our outcome variable. Overreliance on subjective health measures for results in our study could possibly fail to reflect the true extent of the health differences between our treatment and control groups. This is because individuals with doctor spouses might have different standards of health and may therefore report their subjective health differently. More specific health conditions and their incidence could only have been analysed in Round 4 (2014) which included a health module. However, using only this module would give us a very small sample size of our treatment group (106 individuals), which makes the quantitative study of specific disease incidence very problematic. Additionally, since we only managed to find statistically significant evidence for a strong interaction effect between welfare regime and doctor spouse for a conservative regime, it would be desirable for further research

to analyse the relationship further to get a more robust understanding of this interaction across all regime types.

Lastly, the design of our analysis required us to make two assumptions. Firstly, we have to assume that there are no doctors in the extended family of the control group or alternatively that their presence does not influence health of their extended family members. Should that not be the case, there might be a possible overlap between our control and treatment groups which might cause our coefficients to underreport the true relationship between health and having a doctor in the family. However, ESS does not allow us to control for occupation of extended family members, and thus we have to assume that the overall health of the control group in comparison to the treatment group reflects that of a group of individuals with no doctor family members. Secondly, we have to assume that pursuing medical education is not conditional on the health of the spouse in such a way that individuals choose to study medicine to take care of their sick partners. This would also bias our results and underreport the health benefit of a doctor spouse, because health differentials between doctor spouses and other individuals would not reflect the health spill-over effect of having married a doctor, but rather existing health conditions prior to marriage. Such an assumption is not too problematic to make in practice, because commonly, decisions to start medical school usually happen prior to finding a partner.

Chapter 7: Conclusions

This paper tried to examine the importance of family characteristics and interactions for health outcomes and thus improve our understanding of socioeconomic determinants of health and health inequalities in different macro policy contexts.

The results from our linear regression analysis showed that there is a significant effect of having a doctor spouse on one's health and thus suggested that informal and easy access to knowledge and expertise within a nuclear family matters when it comes to health outcomes. Such a result cannot be directly utilized by policy-makers, because we cannot simply help facilitate more doctor marriages in our societies. However, especially given the significant results from our interaction effects with macro health indicators, the results could inform and encourage further social policy research into the mechanisms through which this health differences between families of doctors and other families arise. Such further research could also address the aforementioned limitations of this thesis, namely its' inability to build a more complex health index, which would be able to capture both subjective and objective health outcomes of our respondents.

Nonetheless, our findings are statistically-significant and indicate two potential mechanisms that could be at play. Firstly, lack of access and affordability may increase the reliance on family members for care and health-related services, whereby those with doctor spouses have superior informal access to knowledge of diagnosis, health prevention methods, medications and treatment at home. Secondly, there may be differences in the extent to which having a doctor spouse improves one's health regardless of the proportion of out-of-pocket expenses but depending on the family policy in the countries in which these individuals live. This mechanism would explain that in countries which belong to regimes that strongly encourage family values and caring responsibilities, such as conservative regimes, individuals rely more on their family members for help or advice. Since doctors generally possess superior knowledge when it comes to health advice or care, those who have married a doctor are expected to benefit more in regimes that consider families as valuable and inherently important social units.

Such findings not only tell us that using theoretical social policy tools, such as welfare regime typologies can be useful for empirical, quantitative analyses, but also force us to improve our understanding of health systems and the domains through which social, family structures exert its health effects. To reduce health inequalities, this thesis recommends that the design of our institutions should be done so that necessary reliance on family to supply health and caring services would be minimised and affordable formal health expertise, care and advice alternatives would be created for those without the privilege of living with a medically-educated spouse.

Bibliography:

Abuya, B., Ciera, J. and Kimani-Murage, E. (2012). Effect of mother's education on child's nutritional status in the slums of Nairobi. *BMC Pediatrics*, [online] 12(1). Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3444953/. [Accessed 9 Aug. 2019].

Adler, N., Boyce, T., Chesney, M., Cohen, S. and et al (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, 49(1), pp.15-24.

Ahn, N. and Shariff, A. (1995). Determinants of Child Height in Uganda: A Consideration of the Selection Bias Caused by Child Mortality. *Food and Nutrition Bulletin*, [online] 16(1), pp.1-12. Available at: https://www.jstor.org/stable/29793719?seq=1#page_scan_tab_contents. [Accessed 9 Aug. 2019].

Anderson, L. (2018). Adolescent mental health and behavioural problems, and intergenerational social mobility: A decomposition of health selection effects. *Social Science & Medicine*, [online] 197, pp.153-160. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0277953617306913?via%3Dihub. [Accessed 9 Aug. 2019].

Andrulis, D. (1998). Access to Care Is the Centerpiece in the Elimination of Socioeconomic Disparities in Health. *Annals of Internal Medicine*, 129(5), p.412.

Anheier, H. and Krlev, G. (2014). Welfare Regimes, Policy Reforms, and Hybridity. *American Behavioral Scientist*, 58(11), pp.1395-1411.

Araújo, L., Teixeira, L., Ribeiro, O. and Paúl, C. (2018). Objective vs. Subjective Health in Very Advanced Ages: Looking for Discordance in Centenarians. *Frontiers in Medicine*, [online] 5. Available at: https://www.frontiersin.org/articles/10.3389/fmed.2018.00189/full. [Accessed 9 Aug. 2019].

Arden-Close, E. and McGrath, N. (2017). Health behaviour change interventions for couples: A systematic review. *British Journal of Health Psychology*, 22(2), pp.215-237.

Australian Medical Association (2011). AMA Position Statement: Health of Medical Practitioners. Sydney: AMA Ltd Publication.

Bambra, C., Fox, D. and Scott-Samuel, A. (2005). Towards a politics of health. *Health Promotion International*, 20(2), pp.187-193.

Bambra, C. (2006). Health Status and the Worlds of Welfare. *Social Policy and Society*, 5(1), pp.53-62.

Bambra, C. (2007). Going beyond the three worlds of welfare capitalism: regime theory and public health research. *Journal of Epidemiology & Community Health*, 61(12), pp.1098-1102.

Bambra, C., Pope, D., Swami, V., Stanistreet, D., Roskam, A., Kunst, A. and Scott-Samuel, A. (2009). Gender, health inequalities and welfare state regimes: a cross-national study of 13 European countries. *Journal of Epidemiology & Community Health*, 63(1), pp.38-44.

Bambra, C. (2011). Health inequalities and welfare state regimes: theoretical insights on a public health 'puzzle'. *Journal of Epidemiology & Community Health*, [online] 65(9), pp.740-745. Available at: https://jech.bmj.com/content/jech/65/9/740.full.pdf [Accessed 9 Aug. 2019].

Barrett, A. and Turner, R. (2005). Family Structure and Mental Health: The Mediating Effects of Socioeconomic Status, Family Process, and Social Stress. *Journal of Health and Social Behavior*, [online] 46(2), pp.156-169. Available at: https://journals.sagepub.com/doi/abs/10.1177/002214650504600203. [Accessed 9 Aug. 2019].

Bass, K. and McGeeney, K. (2019). *U.S. Physicians Set Good Health Example*. [online] Gallup.com. Available at: https://news.gallup.com/poll/157859/physicians-set-good-health-

example.aspx?utm_source=alert&utm_medium=email&utm_campaign=syndication&utm_content=morelink&utm_term=Health%20-%20USA%20-%20Weight%20-%20Wellbeing%20-%20Well-Being%20Index [Accessed 12 Aug. 2019].

Beblavy, M. (2008). New Welfare State Models Based on the New Member States' Experience?. *SSRN Electronic Journal*.

Bell, A., Chetty, R., Jaravel, X., Petkova, N. and Van Reenen, J. (2018). Who Becomes an Inventor in America? The Importance of Exposure to Innovation*. *The Quarterly Journal of Economics*, 134(2), pp.647-713.

Bjorkegren, E. (2018). Neighborhoods and Youth Health: Everybody Needs Good Neighbors?. *Institute for Evaluation of Labour Market and Education Policy*, Working Paper.

Blackwell, D. (1998). Marital Homogamy in the United States: The Influence of Individual and Paternal Education. *Social Science Research*, [online] 27(2), pp.159-188. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0049089X98906184. [Accessed 9 Aug. 2019].

Blackwell, D. and Lichter, D. (2005). Homogamy among Dating, Cohabiting, and Married Couples. *The Sociological Quarterly*, [online] 45(4), pp.719-737. Available at: https://www.researchgate.net/publication/227671997_Homogamy_Among_Dating_Cohabiting_and_Married_Couples. [Accessed 9 Aug. 2019].

Bolton, C. (1961). Mate Selection as the Development of a Relationship. *Marriage and Family Living*, [online] 23(3), p.234. Available at: https://www.jstor.org/stable/346967?seq=1#page_scan_tab_contents. [Accessed 9 Aug. 2019].

Bonoli, G. (1997). Classifying Welfare States: a Two-dimension Approach. *Journal of Social Policy*, 26(3), pp.351-372.

Brambor, T., Clark, W. and Golder, M. (2005). Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis*, 14(1), pp.63-82.

Bryant, T., Leaver, C. and Dunn, J. (2009). Unmet healthcare need, gender, and health inequalities in Canada. *Health Policy*, [online] 91(1), pp.24-32. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0168851008002388. [Accessed 9 Aug. 2019].

CanMEDS (2012). *CanMEDS Physician Competency Framework*. Ottawa: Royal College of Physicians and Surgeons of Canada.

Chen, E., Matthews, K. and Boyce, W. (2002). Socioeconomic differences in children's health: How and why do these relationships change with age?. *Psychological Bulletin*, [online] 128(2), pp.295-329. Available at: https://cpb-us-e1.wpmucdn.com/sites.northwestern.edu/dist/0/63/files/2013/03/02-Psych-Bull-SES-Diff-Child-Health-Relationships-Change-Age.pdf. [Accessed 9 Aug. 2019].

Chen, Y. and Li, H. (2008). Mother's education and child health: Is there a nurturing effect?. *Journal of Health Economics*, [online] 28(2), pp.413-426. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0167629608001537. [Accessed 9 Aug. 2019].

Clarke, A., McCarthy, M., Alvarez-Dardet, C., Sogoric, S., Groenewegen, P., Groot, W. and Delnoij, D. (2007). New directions in European public health research: report of a workshop. *Journal of Epidemiology & Community Health*, 61(3), pp.194-197.

Daly, M. (2010). Families versus State and Market. In: F. Castles, S. Liebfried, J. Lewis, H. Obinger and C. Pierson, ed., *The Oxford Handbook of the Welfare State*, 1st ed. Oxford: University of Oxford Press.

Daly, M. and Rake, K. (2003). *Gender and the welfare state*. Oxford: Polity Marketing.

Davies, N., Dickson, M., Davey Smith, G., van den Berg, G. and Windmeijer, F. (2018). The causal effects of education on health outcomes in the UK Biobank. *Nature Human Behaviour*, [online] 2(2), pp.117-125. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6217998/. [Accessed 9 Aug. 2019].

Davillas, A. and Pudney, S. (2017). Concordance of health states in couples: Analysis of self-reported, nurse administered and blood-based biomarker data in the UK Understanding Society panel. *Journal of Health Economics*, [online] 56, pp.87-102. Available at: https://www.sciencedirect.com/science/article/pii/S0167629617300358. [Accessed 9 Aug. 2019].

Deaton, A. (2002). Policy Implications Of The Gradient Of Health And Wealth. *Health Affairs*, 21(2), pp.13-30.

Diez Roux, A. (2001). Investigating Neighborhood and Area Effects on Health. *American Journal of Public Health*, [online] 91(11), pp.1783-1789. Available at: https://ajph.aphapublications.org/doi/full/10.2105/AJPH.91.11.1783. [Accessed 9 Aug. 2019].

Doorslaer, E., Koolman, X. and Jones, A. (2004). Explaining income-related inequalities in doctor utilisation in Europe. *Health Economics*, [online] 13(7), pp.629-647. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1002/hec.919. [Accessed 9 Aug. 2019].

Eikemo, T., Bambra, C., Judge, K. and Ringdal, K. (2008). Welfare state regimes and differences in self-perceived health in Europe: A multilevel analysis. *Social Science & Medicine*, 66(11), pp.2281-2295.

Eriksen, H. and Ursin, H. (2009). Social inequalities in health: Biological, cognitive and learning theory perspectives. *Norsk Epidemiologi*, [online] 12(1). Available at: https://www.researchgate.net/publication/41758391_Social_inequalities_in_health_Biological_cognitive_and_learning_theory_perspectives. [Accessed 9 Aug. 2019].

Esping-Andersen, G. (1990). *Three worlds of welfare capitalism*. Princeton: Princeton University Press.

Evans, G. and Kantrowitz, E. (2002). Socioeconomic Status and Health: The Potential Role of Environmental Risk Exposure. *Annual Review of Public Health*, 23(1), pp.303-331.

Fadlon, I. and Nielsen, T. (2017). Family Health Behaviors. *National Bureau of Economic Research*, [online] Working Paper(No. w24042). Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3074248. [Accessed 9 Aug. 2019].

Fein, O. (1995). The influence of social class on health status. *Journal of General Internal Medicine*, [online] 10(10), pp.577-586. Available at: https://www.ncbi.nlm.nih.gov/pubmed/8576775. [Accessed 9 Aug. 2019].

Feinstein, L., Sabates, R., Anderson, T., Sorhaindo, A. and Hammond, C. (2019). Measuring the effects of education on health and civic engagement: Proceedings of the Copenhagen Symposium. *Copenhagen Symposium*. [online] Copenhagen: OECD. Available at: https://www1.oecd.org/education/innovation-education/37425753.pdf [Accessed 12 Aug. 2019].

Frank, E., Biola, H. and Burnett, C. (2000). Mortality rates and causes among U.S. physicians. *American Journal of Preventive Medicine*, [online] 19(3), pp.155-159. Available at: https://www.ajpmonline.org/article/S0749-3797%2800%2900201-4/abstract. [Accessed 9 Aug. 2019].

Furnee, C., Groot, W. and van den Brink, H. (2008). The health effects of education: a meta-analysis. *The European Journal of Public Health*, [online] 18(4), pp.417-421. Available at: https://academic.oup.com/eurpub/article/18/4/417/477619. [Accessed 9 Aug. 2019].

Gellert, P., Ziegelmann, J., Warner, L. and Schwarzer, R. (2011). Physical activity intervention in older adults: does a participating partner make a difference?. *European Journal of Ageing*, 8(3), pp.211-219.

Gil-Gonzalez, D., Ruiz-Cantero, M. and Alvarez-Dardet, C. (2009). How political epidemiology research can address why the millennium development goals have not been achieved: developing a research agenda. *Journal of Epidemiology & Community Health*, 63(4), pp.278-280.

Goldman, D., Joyce, G. and Zheng, Y. (2007). Prescription Drug Cost Sharing. *JAMA*, [online] 298(1), p.61. Available at: https://jamanetwork.com/journals/jama/article-abstract/207805. [Accessed 9 Aug. 2019].

Haggard, S. and Kaufman, R. (2009). The Eastern European Welfare State in Comparative Perspective. In: A. Cerami and P. Vanhuysse, ed., *Post-Communist Welfare Pathways Theorizing Social Policy Transformations in Central and Eastern Europe*, 1st ed. London: Palgrave Macmillan.

Hippisley-Cox, J. (2002). Married couples' risk of same disease: cross sectional study. *BMJ*, 325(7365), pp.636-636.

Hollingshead, A. (1950). Cultural Factors in the Selection of Marriage Mates. *American Sociological Review*, [online] 15(5), p.619. Available at: https://www.jstor.org/stable/2086915?seq=1#page_scan_tab_contents. [Accessed 9 Aug. 2019].

House, J., Landis, K. and Umberson, D. (1988). Social relationships and health. *Science*, [online] 241(4865), pp.540-545. Available at: https://science.sciencemag.org/content/241/4865/540. [Accessed 9 Aug. 2019].

Hvide, H. and Oyer, P. (2018). Dinner Table Human Capital and Entrepreneurship- Working Paper. *SSRN Electronic Journal*.

Isakjee, A. (2017). Welfare State Regimes: A Literature Review. *IRiS Working Paper Series-University of Birmingham*, 18.

Isen, A., Rossin-Slater, M. and Walker, W. (2017). Every Breath You Take—Every Dollar You'll Make: The Long-Term Consequences of the Clean Air Act of 1970. *Journal of Political Economy*, 125(3), pp.848-902.

Jackson, S., Steptoe, A. and Wardle, J. (2015). The Influence of Partner's Behavior on Health Behavior Change. *JAMA Internal Medicine*, [online] 175(3), p.385. Available at: https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2091401. [Accessed 9 Aug. 2019].

James, W., Nelson, M., Ralph, A. and Leather, S. (1997). Socioeconomic determinants of health: The contribution of nutrition to inequalities in health. *BMJ*, [online] 314(7093), pp.1545-1545. Available at: https://www.bmj.com/content/314/7093/1545.short. [Accessed 9 Aug. 2019].

Jeong, S. and Cho, S. (2018). Concordance in the Health Behaviors of Couples by Age: A Cross-sectional Study. *Journal of Preventive Medicine and Public Health*, [online] 51(1), pp.6-14. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5797723/. [Accessed 9 Aug. 2019].

Jones, A. (2018). Race, Socioeconomic Status, and Health during Childhood: A Longitudinal Examination of Racial/Ethnic Differences in Parental Socioeconomic Timing and Child Obesity Risk. *International Journal of Environmental Research and Public Health*, [online] 15(4), p.728. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5923770/. [Accessed 9 Aug. 2019].

Joutsenniemi, K., Moustgaard, H., Koskinen, S., Ripatti, S. and Martikainen, P. (2011). Psychiatric comorbidity in couples: a longitudinal study of 202,959 married and cohabiting individuals. *Social Psychiatry and Psychiatric Epidemiology*, 46(7), pp.623-633.

Karlsen, S. and Nazroo, J. (2011). Relation Between Racial Discrimination, Social Class, and Health Among Ethnic Minority Groups. *American Journal of Public Health*, [online] 92(4),

pp.624-631. Available at: https://ajph.aphapublications.org/doi/full/10.2105/AJPH.92.4.624. [Accessed 9 Aug. 2019].

Kawachi, I. and Subramanian, S. (2007). Neighbourhood influences on health. *Journal of Epidemiology & Community Health*, [online] 61(1), pp.3-4. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2465584/. [Accessed 9 Aug. 2019].

Kolberg, J. (1991). The Gender Dimension of the Welfare State. *International Journal of Sociology*, 21(2), pp.119-148.

Kuziemko, I. (2014). Human Capital Spillovers in Families: Do Parents Learn from or Lean on Their Children?. *Journal of Labor Economics*, 32(4), pp.755-786.

Lee, S. and Persson, P. (2016). Financing from Friends and Family. *The Review of Financial Studies*, 29(9), pp.2341–2386.

Lichter, D. (1990). Delayed Marriage, Marital Homogamy, and the Mate Selection Process among White Women. *Social Science Quarterly*, 71(4).

Liebfried, S. (2012). Towards a European welfare state. In: Z. Ferge and J. Kolberg, ed., *Social policy in a changing Europe*, 1st ed. Frankfurt: Campus-Verlag, pp.245–79.

Mackenbach, J. (2008). Socioeconomic Inequalities in Health in 22 European Countries. *The New England Journal of Medicine*, [online] 358, pp.2468-2481. Available at: https://www.nejm.org/doi/full/10.1056/nejmsa0707519. [Accessed 9 Aug. 2019].

Mackenbach, J. (2005). Genetics and health inequalities: hypotheses and controversies. *Journal of Epidemiology & Community Health*, [online] 59(4), pp.268-273. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1733045/. [Accessed 9 Aug. 2019].

Malcolm, M., Frost, H. and Cowie, J. (2019). Loneliness and social isolation causal association with health-related lifestyle risk in older adults: a systematic review and meta-analysis protocol. *Systematic Reviews*, 8(1).

Marmot, M. (2015). *The Health Gap*. New York: Bloomsbury Publishing USA.

Marmot, M., Stansfeld, S., Patel, C., North, F., Head, J., White, I., Brunner, E., Feeney, A., Marmot, M. and Smith, G. (1991). Health inequalities among British civil servants: the Whitehall II study. *The Lancet*, 337(8754), pp.1387-1393.

Martin, C. (1996). Social Welfare and the Family in Southern Europe. *South European Society and Politics*, 1(3), pp.23-41.

Martin, C. (2015). Southern Welfare States: Configuration of the Welfare Balance between State and the Family. In: M. Baumeister and R. Sala, ed., *Southern Europe?: Italy, Spain, Portugal, and Greece from the 1950s Until the Present Day*, 1st ed. Frankfurt: Campus Verlag.

McCartney, G., Bartley, M., Dundas, R., Katikireddi, S., Mitchell, R., Popham, F., Walsh, D. and Wami, W. (2019). Theorising social class and its application to the study of health inequalities. *SSM - Population Health*, [online] 7. Available at: https://www.sciencedirect.com/science/article/pii/S2352827318302258. [Accessed 9 Aug. 2019].

McCloskey, L., Figueredo, A. and Koss, M. (1995). The Effects of Systemic Family Violence on Children's Mental Health. *Child Development*, [online] 66(5), pp.1239-1261. Available at: https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-8624.1995.tb00933.x. [Accessed 9 Aug. 2019].

Murray, L., Woolgar, M., Murray, J. and Cooper, P. (2003). Self-exclusion from health care in women at high risk for postpartum depression. *Journal of Public Health*, [online] 25(2), pp.131-137. Available at: https://academic.oup.com/jpubhealth/article/25/2/131/1504969. [Accessed 9 Aug. 2019].

Mushtaq, R. (2014). Relationship Between Loneliness, Psychiatric Disorders and Physical Health ? A Review on the Psychological Aspects of Loneliness. *Journal of Clinical and Diagnostic Research*.

Nelson, M. (1999). Between Paid and Unpaid Work- Gender Patterns in Supplemental Economic Activities among White, Rural Families. *Gender & Society*, [online] 13(4), pp.518-539. Available at: https://www.jstor.org/stable/190312?seq=1#page_scan_tab_contents. [Accessed 9 Aug. 2019].

Oakley, A. (1984). *The Sociology of Housework*. 2nd ed. Hoboken: Blackwell Publishers.

Øien, T., Storrø, O., Jenssen, J. and Johnsen, R. (2008). The impact of a minimal smoking cessation intervention for pregnant women and their partners on perinatal smoking behaviour in primary health care: A real-life controlled study. *BMC Public Health*, 8(1).

O'Campo, P., Wheaton, B., Nisenbaum, R., Glazier, R., Dunn, J. and Chambers, C. (2015). The Neighbourhood Effects on Health and Well-being (NEHW) study. *Health & Place*, [online] 31, pp.65-74. Available at: https://www.sciencedirect.com/science/article/pii/S1353829214001609. [Accessed 9 Aug. 2019].

Park, S., Song, H., Hur, H. and Kim, G. (2009). Effects of a Cognition-Oriented Breast Self-Examination Intervention for Korean Women and Their Spouses. *Public Health Nursing*, 26(3), pp.259-268.

Pemberton, S. and Humphris, R. (2016). Locality, neighbourhood and health: a literature review. *ISIS Working Paper Series- University of Birmingham*, [online] 13. Available at: https://www.birmingham.ac.uk/Documents/college-social-sciences/social-policy/iris/2016/working-paper-series/IRiS-WP-13-2016UPWEB2.pdf [Accessed 12 Aug. 2019].

Phillips, S. (2007). Measuring the health effects of gender. *Journal of Epidemiology & Community Health*, [online] 62(4), pp.368-371. Available at: https://jech.bmj.com/content/62/4/368. [Accessed 9 Aug. 2019].

Pickett, K. and Pearl, M. (2001). Multilevel analyses of neighbourhood socioeconomic context and health outcomes: a critical review. *Journal of Epidemiology & Community Health*, [online] 55(2), pp.111-122. Available at: https://jech.bmj.com/content/55/2/111.short. [Accessed 9 Aug. 2019].

Playford, C., Dibben, C. and Williamson, L. (2017). Socioeconomic disadvantage, fetal environment and child development: linked Scottish administrative records based study. *International Journal for Equity in Health*, [online] 16(1). Available at: https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-017-0698-4. [Accessed 9 Aug. 2019].

Polyakova, M., Chen, Y. and Persson, P. (2019). The Roots of Health Inequality and The Value of Intra-Family Expertise. *SSRN Electronic Journal*. [online] Available at: https://www.nber.org/papers/w25618. [Accessed 9 Aug. 2019].

Regitz-Zagrosek, V. (2012). Sex and gender differences in health. *EMBO reports*, [online] 13(7), pp.596-603. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3388783/. [Accessed 9 Aug. 2019].

Riley, D. and Rosen, D. (2019). *Life expectancy globally and by world regions since 1770*. [online] Our World in Data. Available at: https://ourworldindata.org/grapher/life-expectancy-globally-since-1770 [Accessed 10 Aug. 2019].

Robinson, J., Turrisi, R. and Stapleton, J. (2007). Efficacy of a Partner Assistance Intervention Designed to Increase Skin Self-examination Performance. *Archives of Dermatology*, 143(1).

Saracci, R. (2010). *Epidemiology*. Oxford: Oxford University Press.

Schulz, R. and Sherwood, P. (2017). Physical and Mental Health Effects of Family Caregiving. *AJN, American Journal of Nursing*, [online] 108(Supplement), pp.23-27. Available at: https://www.tandfonline.com/doi/abs/10.5175/JSWE.2008.773247702?journalCode=uswe20&. [Accessed 9 Aug. 2019].

Seeman, T. (2000). Health Promoting Effects of Friends and Family on Health Outcomes in Older Adults. *American Journal of Health Promotion*, [online] 14(6), pp.362-370. Available at: https://journals.sagepub.com/doi/abs/10.4278/0890-1171-14.6.362. [Accessed 9 Aug. 2019].

Smith, G., Bartley, M. and Blane, D. (1990). The Black report on socioeconomic inequalities in health 10 years on. *BMJ*, [online] 301(6748), pp.373-377. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1679935/. [Accessed 9 Aug. 2019].

Sorenson, C., Drummond, M. and Bhuiyan-Khan, B. (2013). Medical technology as a key driver of rising health expenditure: disentangling the relationship. *ClinicoEconomics and Outcomes Research*, p.223.

Starfield, B., Riley, A., Pitt, W. and Robertson, J. (2002). Social class gradients in health during adolescence. *Journal of Epidemiology & Community Health*, [online] 56(5), pp.354-361. Available at: https://jech.bmj.com/content/56/5/354.short. [Accessed 9 Aug. 2019].

Taylor, S. (2009). Political epidemiology: Strengthening socio-political analysis for mass immunisation – lessons from the smallpox and polio programmes. *Global Public Health*, 4(6), pp.546-560.

Taylor-Gooby, P. (1991). Welfare State Regimes and Welfare Citizenship. *Journal of European Social Policy*, 1(2), pp.93-105.

Walker, J., Liddle, J., Jordan, K. and Campbell, P. (2017). Affective concordance in couples: a cross-sectional analysis of depression and anxiety consultations within a population of 13,507 couples in primary care. *BMC Psychiatry*, [online] 17(1). Available at: https://bmcpsychiatry.biomedcentral.com/articles/10.1186/s12888-017-1354-7. [Accessed 9 Aug. 2019].

Wang, S., Chen, L., Hsu, S. and Wang, S. (2012). Health care utilization and health outcomes: a population study of Taiwan. *Health Policy and Planning*, [online] 27(7), pp.590-599. Available at: https://www.ncbi.nlm.nih.gov/pubmed/22258470. [Accessed 9 Aug. 2019].

Weaver, K., Rowland, J., Bellizzi, K. and Aziz, N. (2010). Forgoing medical care because of cost. *Cancer*, [online] 116(14), pp.3493-3504. Available at: https://onlinelibrary.wiley.com/doi/full/10.1002/cncr.25209. [Accessed 9 Aug. 2019].

Wheatley, D., Lawton, C. and Hardill, I. (2019). Gender Differences in Paid and Unpaid Work. In: V. Caven and S. Nachmias, ed., *Hidden Inequalities in the Workplace*. [online] London: Palgrave Macmillan. Available at: https://link.springer.com/book/10.1007/978-3-319-59686-0#about [Accessed 9 Aug. 2019].

Wilkinson, R. (1997). Socioeconomic determinants of health: Health inequalities: relative or absolute material standards?. *BMJ*, [online] 314(7080), pp.591-591. Available at: https://www.bmj.com/content/314/7080/591.full. [Accessed 9 Aug. 2019]

Appendices:

Appendix A:

Descriptive statistics of main variables

Variable		Variable Type	Number of Observations	Mean	Standard Deviation	Minimum value	Maximum value
Subjective Health (valuation of general health)		Dependent (continuous)	187,991	3.742083	0.8992927	1	5
Doctor Spouse Dummy (0=no doctor,1=doctor)		Independent (dummy)	188,250 (186,261:1,989)	0.010566	0.1022456	0	1
Private Expense (% of healthcare expenditure)		Independent (continuous)	188,250	26.45522	10.4169	15.9	56.8
	Total	Independent (categorical)	188,250	3.329408	1.244572	1	5
Welfare Regime	**Anglo-Saxon Regime**	1	16,994	0.110395	0.317567	0	1
	Conservative Regime	2	39,607	0.210395	0.407598	0	1
	Mediterranean Regime	3	30,457	0.161791	0.368259	0	1
	Eastern European Regime	4	61,006	0.354731	0.478438	0	1
	Scandinavian Regime	5	34,411	0.182811	0.386518	0	1
Education (in years)		Control (continuous)	186,454	12.25998	4.1393810	0	56
Mother's Education (in years)		Control (continuous)	177,607	9.148744	2.2989060	0	55
Gender (0=male,1=female)		Control (dummy)	188,141	0.509467	0.4999118	0	1
Age (in years)		Control (continuous)	187,476	51.89704	14.800790	14	105
Feeling of Safety (subjective rating of)		Control (continuous)	186,488	2.002413	0.7857885	1	4
Socioeconomic Status (isei computed from ISCO08)		Control (continuous)	125,206	42.691	16.215160	10	89

Countries	Variable Type	Number of Observations	Percentage of sample	Minimum value	Maximum value
Total	Control (dummy)	**374,729**	**100**	**0**	**1**
Austria (Base)	1	10,723	2.86	0	1
Belgium	2	14,343	3.83	0	1
Bulgaria	3	8,324	2.22	0	1
Switzerland	4	13,860	3.70	0	1
Cyprus	5	4,409	1.18	0	1
Czech Republic	6	15,216	4.06	0	1
Germany	7	23,342	6.23	0	1
Denmark	8	10,836	2.89	0	1
Estonia	9	13,410	3.58	0	1
Spain	10	15,501	4.14	0	1
Finland	11	16,200	4.32	0	1
France	12	15,051	4.02	0	1
Great Britain	13	17,626	4.70	0	1
Greece	14	9,759	2.60	0	1
Croatia	15	3,133	0.84	0	1
Hungary	16	13,132	3.50	0	1
Ireland	17	18,247	4.87	0	1
Israel	18	14,910	3.98	0	1
Iceland	19	2,211	0.59	0	1
Italy	20	4,793	1.28	0	1
Lithuania	21	8,158	2.18	0	1
Luxembourg	22	3,187	0.85	0	1
Netherlands	23	15,186	4.05	0	1
Norway	24	13,248	3.54	0	1
Poland	25	14,124	3.77	0	1
Portugal	26	14,988	4.00	0	1
Romania	27	12,458	3.32	0	1
Sweden	28	14,390	3.84	0	1
Slovenia	29	10,914	2.91	0	1
Slovakia	30	8,791	2.35	0	1
Turkey	31	4,272	1.14	0	1
Ukraine	13	9,987	2.67	0	1

Appendix B

Appendix B – Hours of help in one's family and Covariates
Determinants of the amount of family help one provides- Coefficients from Linear Regression

Help Family (h)	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
Subjective Health	-0.113	0.021	-5.36	0.000	-0.154	-0.071	**
No Doctor Spouse (base)	0.000	.	.	.	.	.	
Doctor Spouse	-0.093	0.114	-0.81	0.416	-0.316	0.131	
Anglo-Saxon Regime (base)	0.000	.	.	.	.	.	
Conservative Regime	0.232	0.077	3.02	0.003	0.082	0.383	**
Mediterranean Regime	-0.212	0.067	-3.17	0.002	-0.343	-0.081	**
Eastern European Regime	-0.242	0.065	-3.71	0.000	-0.370	-0.114	**
Scandinavian Regime	-0.098	0.071	-1.38	0.169	-0.238	0.042	
Education	-0.006	0.005	-1.09	0.275	-0.016	0.005	
Mother's Education	0.000	0.000	0.56	0.578	0.000	0.000	
Male (base)	0.000	.	.	.	.	.	
Female	0.317	0.036	8.88	0.000	0.247	0.388	**
Age	-0.042	0.008	-5.01	0.000	-0.058	-0.025	**
Quadratic Age	0.000	0.000	5.46	0.000	0.000	0.001	**
Feeling of Safety	0.069	0.024	2.84	0.005	0.021	0.117	**
Socioeconomic Status	-0.003	0.001	-2.82	0.005	-0.006	-0.001	**
Constant	2.910	0.270	10.79	0.000	2.381	3.438	**
Mean dependent variable		1.462	SD dependent variable			1.341	
R-squared		0.053	Number of observations			6006.000	
F-test		25.569	Prob > F			0.000	

*** p<0.01, * p<0.05*

Appendix C

Appendix C – Marriage or Partnership and Covariates[a]
Determinants of the Subjective General Health- Coefficients from Linear Regression

Subjective Health	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Single/Widowed/Divorced (base)	.	.	.	.	.	.	
Married/Cohabiting	0.106	0.004	28.98	0.000	0.099	0.113	**
Doctor Spouse	0.083	0.020	4.12	0.000	0.044	0.123	**
Education	0.022	0.001	40.89	0.000	0.021	0.023	**
Mother's Education	0.003	0.001	3.87	0.000	0.001	0.004	**
Gender	-0.060	0.003	-17.71	0.000	-0.067	-0.054	**
Age	-0.020	0.001	-35.66	0.000	-0.021	-0.019	**
Quadratic Age	0.000	0.000	2.60	0.009	0.000	0.000	**
Socioeconomic Status	0.004	0.000	33.12	0.000	0.004	0.004	**
Feeling of Safety	0.091	0.022	2.89	0.004	0.031	0.128	**
Constant	4.481	0.018	244.40	0.000	4.445	4.517	**

Mean dependent variable	3.769	SD dependent variable	0.921
R-squared	0.267	Number of Observations	220400.000
F-test	1741.580	Prob > F	0.000

*** p<0.01, *p<0.05*

[a]*Country dummies and year-fixed effects are accounted for in the analysis*