Doctoral Programme in Population Health
Department of Psychology and Logopedics
Faculty of Medicine, University of Helsinki
Helsinki, Finland

Intergenerational transmission of the family environment: Mediating and moderating factors, and associations with cardiovascular health

Kateryna Savelieva

ACADEMIC DISSERTATION

To be presented, with the permission of the Faculty of Medicine of the University of Helsinki, for public examination in Auditorium XIV, University Main Building, on 3 November 2017, at 12 noon.

Helsinki 2017

Supervisors:

Docent Laura Pulkki-Råback
Department of Psychology and Logopedics
Faculty of Medicine, University of Helsinki, Helsinki, Finland

Associate Professor Markus Jokela
Department of Psychology and Logopedics
Faculty of Medicine, University of Helsinki, Helsinki, Finland

Professor Emerita Liisa Keltikangas-Järvinen
Department of Psychology and Logopedics
Faculty of Medicine, University of Helsinki, Helsinki, Finland

Reviewers:

Professor Kimmo Jokinen
Family Research Centre
University of Jyväskylä, Jyväskylä, Finland

Docent Katja Kokko
Gerontology Research Center and Faculty of Sport and Health Sciences
University of Jyväskylä, Jyväskylä, Finland

Opponent:

Professor Raija-Leena Punamäki
School of Social Sciences and Humanities
University of Tampere, Tampere, Finland

ISBN 978-951-51-3741-8 (paperback)
ISBN 978-951-51-3742-5 (PDF)

Unigrafia
Helsinki 2017

ABSTRACT

The transmission of family characteristics across generations is a well-established phenomenon. Both advantages (e.g., a higher socioeconomic position), and disadvantages (e.g., child maltreatment) are likely to "run in families". However, the pathways underlying the transmission of the family environment are poorly understood, as their health consequences. The aim of this study is to examine a) the extent to what characteristics of the family environment are transmitted across generations, b) the mediating and moderating factors that account for this transmission, and c) the role transmission plays in cardiovascular health of offspring. The family environment is conceptualized in the study in terms of two characteristics: qualities of the parent–child relationship and socioeconomic position (SEP).

Three subsamples (n = 1,433, n = 1,308, and n = 697) were derived from the population-based Young Finns Study (YFS; N = 3,596), which is a cohort study representative of the Finnish population. The parents of the original YFS participants represented Generation 1 (G1; mean age = 38 years in 1980). They were measured for two dimensions of parent–child relationship qualities (emotional warmth and acceptance) and four dimensions of SEP (education, occupation, income, and employment stability) at the baseline of the study in 1980. Their offspring (original YFS participants) represented Generation 2 (G2), who were 10 years old on average in 1980. When participants in G2 had become adults, they were examined in 2007 and 2012 for the same family characteristics that were measured from their parents when they were children. Parent–child relationship qualities and SEP were evaluated using the same measures for G1 and G2. The G2 participants were also subjected to personality testing via the Temperament and Character Inventory in 2001 (mean age = 32 years), and assessed for ideal cardiovascular health in 2007 and 2012 according to the American Heart Association's guidelines.

The findings revealed that qualities of the parent–child relationship were transmitted from one generation to another in a domain-specific way (G1 emotional warmth predicted G2 emotional warmth, $\beta = .18$, $p < .001$, and G1 acceptance predicted G2 acceptance, $\beta = .06$, $p = .057$). These associations were significant independently of the contextual characteristics (e.g., age, gender, SEP, partnership status, and number of children) in both generations. Intergenerational transmission of emotional warmth was stronger in the mother–son than in the mother–daughter dyads ($\beta = .26$ vs. .14, $p < .001$). G2 character traits such as Self-directedness and Cooperativeness partly mediated (16%) the transmission of emotional warmth from one generation to another. SEP was also transmitted across generations ($\beta = .28$, $p < .001$). Offspring SEP in adulthood partly mediated (33%) the positive impact of higher parental SEP on offspring cardiovascular

health in adulthood. In addition, the G2 participants who achieved higher SEP than their parents (upwardly mobile) had better cardiovascular health in adulthood than those who stayed in their SEP of origin (M = 4.05 vs. 3.56, p < .001).

These findings indicate that the family environment in terms of parent–child relationship qualities and SEP is likely to be transmitted from one generation to another. The transmission was modest in magnitude, but significant even after controlling for various demographic and family characteristics in both generations and taking the exceptionally long duration of the follow-up period into account. To some extent, the child's personality development and continuity of socioeconomic position seemed to explain pathways linking parental and child characteristics. These results shed light on the factors that account for the transmission, and may be useful in early prevention efforts involving the targeting of interventions to families and children at risk. Given the observational nature of this study, there is a need for randomized experimental trials to assess the extent to which interventions directed at early-life or later-life circumstances will mitigate the intergenerational transmission of psychosocial risks.

TIIVISTELMÄ

Useiden tutkimusten perusteella perheymäristön piirteet periytyvät vanhemmilta lapsille. Sekä perheen voimavarojen (esim. korkea sosioekonominen asema) että vaaratekijöiden (esim. lasten kaltoinkohtelu) tiedetään siirtyvän sukupolvelta toiselle. Perheympäristön ylisukupolvista siirtymää selittäviä kehityspolkuja tunnetaan kuitenkin heikosti. Tämän tutkimuksen tavoitteena on tarkastella, a) missä määrin perheympäristön ominaisuudet siirtyvät sukupolvelta toiselle, b) mitkä muovaavat ja välittävät tekijät siirtymää selittävät, ja c) miten perheympäristön ylisukupolvinen siirtyminen on yhteydessä jälkeläisten sydän- ja verisuoniterveyteen. Perheympäristöä tarkastellaan kahden keskeisen osa-alueen – vanhempi-lapsi-suhteen laadun ja perheen sosioekonomisen aseman – näkökulmasta.

Tutkimuksessa käytettiin suomalaista väestöä edustavaa Young Finns Study (YFS) – aineistoa, joka on pitkittäistutkimus vanhemmista ja heidän lapsistaan. Tutkittavien vanhemmat edustivat sukupolvea 1 (G1, iän keskiarvo vuonna 1980 = 38 vuotta) ja tutkittavat itse edustivat sukupolvea 2 (G2, iän keskiarvo vuonna 1980 = 10 vuotta). Vanhempien (G1) sosioekonomista asemaa (koulutus, ammattiasema, tulotaso ja työtilanne) ja vanhempi-lapsi suhteen laatua (emotionaalinen lämpö ja oman lapsen hyväksyntä) arvioitiin tutkimuksen alkumittauksessa vuonna 1980. Jälkeläisten (G2) sosioekonomista asemaa ja vanhempi-lapsi suhteen laatua arviotiin aikuisuudessa ensimmäisen kerran kun alkumittauksesta oli kulunut 27 vuotta ja toisen kerran kun alkumittauksesta oli kulunut 32 vuotta. Sosioekonomista asemaa ja vanhempi-lapsi-suhteen laatua mitattiin molemmilta sukupolvilta käyttäen samaa mittaria. Jälkeläisten (G2) persoonallisuutta (Temperament and Character Inventory) arvioitiin vuonna 2001 ja sydän- ja verisuoniterveyden tilaa vuosina 2007 ja 2012. Sydän ja verisuoniterveyden määrittelyssä käytettiin American Heart Associationin ihanteellisen sydän- ja verisuoniterveyden määritelmää.

Vanhempi-lapsi-suhteen laatua määrittävät tekijät – emotionaalinen lämpö ja hyväksyntä – siirtyivät vanhemmilta jälkeläisille ($\beta = .18$, $p < .001$ ja $\beta = .06$, $p = .057$). Yhteydet säilyivät tilastollisesti merkitsevinä sen jälkeen kun perheympäristön tekijät otettiin huomioon (esim. ikä, sukupuoli, sosioekonominen asema, siviilisääty ja lasten lukumäärä) molemmilla sukupolvilla. Emotionaalisen lämmön ylisukupolvinen siirtyminen äideiltä pojille oli voimakkaampaa kuin äideiltä tytöille. Kaksi persoonallisuuden ominaisuutta, itseohjautuvuus ja yhteistyökyky, selittivät osittain (16 %) emotionaalisen lämmön siirtymistä sukupolvelta toiselle. Myös sosioekonominen asema siirtyi vanhemmilta heidän lapsilleen ($\beta = .28$, $p < .001$), mikä selitti osittain (33 %) korkean sosioekonomisen perhetaustan omaavien lasten parempaa sydän- ja verisuoniterveyttä kun he kasvoivat

aikuisiksi. Lisäksi havaittiin, että liikkuminen sosioekonomisessa asemassa ylöspäin suhteessa omiin vanhempiin edisti hyvää sydän- ja verisuoniterveyttä.

Tulokset osoittavat, että kaksi keskeistä perheympäristön tekijää – vanhempi-lapsisuhteen laatu ja sosioekonominen asema – siirtyvät sukupolvelta toiselle. Vaikka ylisukupolviset yhteydet eivät olleet voimakkuudeltaan suuria, ne säilyivät pitkässä seurannassa tilastollisesti merkitsevinä jopa silloin, kun keskeiset perheympäristöön liittyvät tekijät otettiin huomioon molemmilla sukupolvilla. Tulokset osoittavat, että persoonallisuus ja sosioekonominen asema osittain selittävät vanhempien ja jälkeläisten ominaisuuksia yhdistäviä kehityspolkuja. Tutkimuksen tulokset antavat viitteitä siitä, millaiset tekijät selittävät perheympäristön siirtymistä sukupolven yli. Tämä tieto voi auttaa kohdentamaan ennaltaehkäiseviä toimia perheisiin, joissa on psykososiaalisia vaaratekijöitä. Tämän väitöskirjatutkimuksen kaltaisten havaintotutkimusten lisäksi satunnaistettuja, kokeellisia asetelmia tarvitaan jatkossa arvioimaan, voidaanko vaaratekijöiden siirtymisiä yli sukupolvien ehkäistä perheeseen kohdistuvilla interventioilla.

ACKNOWLEDGEMENTS

There are several people who helped and supported me during my PhD research and to whom I owe a great deal of appreciation. First and foremost, I wish to express my sincere gratitude to my supervisors Professor Emerita Liisa Keltikangas-Järvinen, Docent Laura Pulkki-Råback, and Associate Professor Markus Jokela. I am grateful to Liisa for inviting me to Finland and giving me the opportunity to work in her research project during the last few years. I am very thankful to Laura for her endless support and kindness, amazing guidance, and valuable advice on my research and professional life. I wish to warmly thank Markus for finding elegant solutions to any questions I had, and for encouraging me to think critically and develop professionally. All of my supervisors I thank for providing excellent supervision, sharing their extensive knowledge, and creating stimulating work environment.

I highly appreciate the work of the reviewers for this thesis, Professor Kimmo Jokinen and Docent Katja Kokko, for their comments on it were helpful and encouraging. I also wish to thank Professor Raija-Leena Punamäki for agreeing to act as the opponent. As for the original articles that are part of this thesis, I am grateful to my co-authors Marko Elovainio, Mirka Hintsanen, Laura Kubzansky, Jari Lipsanen, Päivi Merjonen, Vera Mikkilä, Tuija Tammelin, Nina Hutri-Kähönen, Markus Juonala, Jorma Viikari, and Olli Raitakari for their insightful comments and help. In addition, I would especially like to thank the whole Young Finns Study team for collecting and managing impressive multigenerational data, which made my research possible. I would also like to acknowledge the Department of Psychology and Logopedics at the University of Helsinki for providing me with research facilities.

My sincere thanks also goes to my current and former colleagues at the Personality and Well-Being research group. I thank Kia Gluschkoff, Elli Oksman, Aino Saarinen, Regina García Velázques, Karolina Wesołowska, Henrik Dobewall, Jaakko Airaksinen, Christian Hakulinen, and Tom Rosenström, among others, for their support, encouragement, and fun. I am especially grateful to Kaisla Komulainen for helping me to write the abstract for this thesis in Finnish and supporting me before all my major deadlines. A special thanks goes to my dear friend Valeriia Perepelytsia for our endless discussions and for helping me to stay on track.

Finally, I thank my parents from the bottom of my heart for letting me to choose my own path in life and for supporting my decisions. I am also extremely grateful to my beloved husband for always being by my side, and for all his love, patience, and support. All of those people made this big step in my life possible, and were a source of strength and inspiration for me.

CONTENTS

LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following publications:

I Savelieva, K., Keltikangas-Järvinen, L., Pulkki-Råback, L., Jokela, M., Lipsanen, J., Merjonen, P., Viikari, J., Raitakari, O., & Hintsanen, M. (2017). Intergenerational transmission of qualities of the parent–child relationship in the population-based Young Finns Study. *European Journal of Developmental Psychology 14(4),* 416-435. doi:10.1080/17405629.2016.1230057

II Savelieva, K., Pulkki-Råback, L., Jokela, M., Hintsanen, M., Merjonen, P., Hutri-Kähönen, N., Juonala, M., Viikari, J., Raitakari, O., & Keltikangas-Järvinen, L. (2017). Intergenerational continuity in qualities of the parent–child relationship: Mediating and moderating mechanisms. *Journal of Child and Family Studies 26(8),* 2191-2201. doi:10.1007/s10826-017-0729-1

III Savelieva, K., Pulkki-Råback, L., Jokela, M., Kubzansky, L., Elovainio, M., Mikkilä, V., Tammelin, T., Juonala, M., Raitakari, O., & Keltikangas-Järvinen, L. (2017). Intergenerational transmission of socioeconomic position and ideal cardiovascular health: 32-year follow-up study. *Health Psychology 36(3),* 270-279. doi:10.1037/hea0000441

The publications are referred to in the text by their roman numerals. They are reprinted with the kind permission of the copyright holders.

ABBREVIATIONS

AHA	American Heart Association
CFI	Comparative fit index
CI	Confidence interval
CVD	Cardiovascular disease
CVH	Cardiovascular health
G1	Generation 1
G2	Generation 2
G3	Generation 3
RMSEA	Root mean square error of approximation
SEM	Structural equation modelling
SEP	Socioeconomic position
TCI	Temperament and Character Inventory
TLI	Tucker-Lewis index
YFS	Young Finns Study
WHO	World Health Organization

1 INTRODUCTION

1.1 THE CONTEXT

The family environment is considered a primary context for human development. Child's physical, cognitive, social, and emotional development is usually embedded within certain environment and interactions with caregivers. In a broader sense, the family environment refers to the circumstances and socio-emotional atmosphere within families. There are various ways to describe and measure the family environment, but it is usually defined in terms of family resources (both economic and social, i.e., socioeconomic position), family interaction (e.g., qualities of the parent–child relationship), and family structure (e.g., numbers of children, marital status) (Uhlenberg & Mueller, 2003). Several different terms have been used interchangeably to describe the family environment including "home environment", "psychosocial environment", "socioeconomic environment", "social environment", and "emotional climate". In relation to the present thesis, the family environment reflects the affective mode between parents and children and availability of different resources in the family, and is conceptualized in terms of qualities of the parent–child relationship and socioeconomic position (SEP), respectively. These two characteristics of the family environment are known to predict a wide range of physical and psychological outcomes of children (for reviews, see Bradley & Corwyn, 2002; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000), and, what is more important, to play a crucial role in the lives of successive generations (Serbin & Karp, 2004).

The recurrence of the same characteristics and behaviours across generations, as well as the pathways explaining these associations, are currently at the forefront in life-course oriented research in at least such study fields as psychology, sociology, and epidemiology (Shanahan, Mortimer, & Kirkpatrick Johnson, 2016). The traditional focus of studies on intergenerational transmission has been on continuity in terms of psychosocial risks and disadvantages (Serbin & Karp, 2004). However, with the emergence of positive psychology this attention has been redirected to the processes of supporting positive outcomes of individuals (Seligman & Csikszentmihalyi, 2014). An enhanced understanding of how the positive family environment (i.e., warm and accepting qualities of the parent–child relationship and high SEP) is transmitted across generations, and of the role this plays in offspring cardiovascular health, could add to current knowledge about the factors that foster offspring long-term health in the general population. Despite the growing evidence that adaptive and positive

behaviours may also be transmitted across generations (e.g., Raby et al., 2015; Rimal, 2003), there are still many gaps in knowledge concerning the extent to which the positive family environment in one generation is likely to be replicated in the next, and the pathways that lead to this transmission in families. Even less is known about the role of intergenerational transmission of the positive family environment in offspring cardiovascular health later in life (Havranek et al., 2015).

The quality of the parent–child relationship, as a characteristic of the proximal family environment, is one of the key factors that influence a broad range of offspring outcomes in childhood and adulthood (for reviews, see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000; Serbin & Karp, 2004). For example, a warm and supportive parent–child relationship is related to the children's better empathic responding and social competence (Raby et al., 2015; Zhou et al., 2002), better emotional regulation (Davidov & Grusec, 2006), and higher educational attainment (Estrada, Arsenio, Hess, & Holloway, 1987). The lack of such a relationship, in turn, adversely influences the children's self-esteem (Heinonen, Räikkönen, & Keltikangas-Järvinen, 2003), and is a risk factor for common health problems (Stewart-Brown, Fletcher, & Wadsworth, 2005) and depressive symptoms (e.g., Jokela et al., 2007) later in life. To date, much of the research has been focused on the transmission of parenting practices and behaviors, that is, the techniques parents use to discipline, advice and reward their children (e.g., Neppl, Conger, Scaramella, & Ontai, 2009), and less is known about the transmission of qualities of the parent–child relationship, which reflect affective mode in the parent–child dyad and indicate emotional atmosphere in the family (Keltikangas-Järvinen, 2002). In addition to the lack of prospective follow-up studies examining the transmission of parent–child relationship qualities, there is much less information about the mediating and moderating factors that may explain continuity or discontinuity in this association across generations.

Parental socioeconomic position – another facet of the family environment – is a well-established predictor of children's long-term cardiovascular health-related outcomes (Marmot, Allen, Bell, Bloomer, & Goldblatt, 2012). The concept of ideal cardiovascular health, as defined by the American Heart Association (AHA), is a comprehensive measure that encompasses different health factors and health behaviours, and is a good proxy for various cardiac outcomes in a general population (Lloyd-Jones et al., 2010). Understanding the role of the family environment and exploring potential pathways explaining offspring cardiovascular health is critical in the light of the recent release of the AHA 2020 Impact Goals, and a new initiative from the World Health Organization (WHO) "Global Hearts" aimed at improving cardiovascular health in the population. Enhanced knowledge about the transmission of SEP across generations and its role in ideal

cardiovascular health of offspring could be useful in terms of early prevention and intervention. This, in turn, may help to achieve better cardiovascular health on the population level. Although more research is needed on the intergenerational transmission of SEP (Havranek et al., 2015), no studies to date have formally evaluated the extent to which the transmission of SEP across generations accounts for ideal cardiovascular health of offspring in adulthood.

In summary, there is a need for a better understanding of the extent to which the family environment is transmitted across generations, the pathways behind this transmission, and the role the transmission plays in ideal cardiovascular health of offspring. This knowledge could be used in early prevention efforts and educational programmes targeted at supporting positive parent–child relationships and offspring cardiovascular health in the general population. The aim of this thesis is to investigate to what extent and how the family environment, in terms of qualities of the parent–child relationship and SEP, is transmitted across generations, and how the transmission of SEP contributes to ideal cardiovascular health of offspring later in life.

The next sections of the Introduction outline the theoretical and empirical background for the thesis. First, the life-course perspective to intergenerational studies and the theoretical framework for the present thesis will be introduced (Chapter 1.2). Second, existing research on the intergenerational transmission of parent-child relationship qualities and the mediating and moderating factors explaining this transmission will be reviewed (Chapter 1.3). Third, the current state of the art concerning SEP and ideal cardiovascular health will be presented in Chapter 1.4. Finally, Chapter 2 turns in more detail to the aims and research questions of this thesis.

1.2 LIFE-COURSE PERSPECTIVE

1.2.1 LIFE-COURSE PERSPECTIVE TO INTERGENERATIONAL STUDIES

The *life-course perspective* is the pre-eminent theoretical orientation in the study of lives over time and covers a wide range of theoretical and methodological models (Elder, Johnson, & Crosnoe, 2003; Shanahan et al., 2016). The emphasis is on the interdependence among humans and the role of the family environment as the primary arena for development and socialization (Elder et al., 2003). Although the first life-course studies were conducted in the USA at the beginning of the twentieth century (for a review, see Bynner, 2016), it was several decades later the approach started gaining

ground in research. Nowadays, the life-course perspective is a well-founded theoretical standpoint that is widely utilized in a diverse range of study fields including psychology, epidemiology, sociology, and demography. The life-course perspective was adopted as the major theoretical framework for this study because it is a powerful lens for studying both the intergenerational transmission of the family environment and its role in offspring cardiovascular health in adulthood.

One of the five defining principles of the life course perspective – *linked lives* – postulates that a person's life is tied to the fate of others (Elder et al., 2003). The lives of individuals are interrelated and are mutually influential over time. It is likely that few other relationships, apart from between spouses, are as intertwined and inextricably linked as those between parents and children. Inherent in this notion is the concept of *intergenerational transmission*, meaning that various behaviours, characteristics and resources are transmitted from parents to children across generations (Shanahan et al., 2016). Although parents and children have reciprocal influences on one another, intergenerational transmission is usually studied in terms of how a parent influences a child (Thornberry, 2016).

Intergenerational (also known as transgenerational) studies, by definition, explore the relationships between characteristics or behaviours among family members from at least two generations (e.g., parents and offspring) (Lawlor, Leary, & Davey Smith, 2009). Beginning as an extension of traditional longitudinal research, the intergenerational framework is now widely used across different fields because of its potential to identify the extent to which the lives of parents and children are linked (Thornberry, 2016). The core purpose of these studies is to examine the transmission of the same characteristics or behaviours across generations and to investigate the underlying pathways of established associations. Another major aim is to enhance understanding of how the accumulation of certain characteristics or behaviours across generations relates to offspring health over the life course.

Thornberry (2016) recently attempted to define the key design criteria of a scientifically credible intergenerational study. First, it should include prospective data on at least two generations, because reliance on retrospective information may introduce some bias attributable to the very long recall period (usually 20-25 years; Thornberry, 2016), or to imperfect knowledge about the behaviours and characteristics of parents or children. Second, the measures on each variable of interest should be as independent as possible, based on different reporters in each generation. Third, there should be comparable measures of a certain variable in both generations at the same age, or at least at the same developmental stage. Finally, detailed prospective data on the second generation's life-course development should be available to allow identification of mediating and moderating factors that account for intergenerational transmission. Very few studies thus far have

fulfilled all these criteria. The research design of the present thesis was developed with these needs in mind.

1.2.2 THEORETICAL FRAMEWORK OF THE STUDY

The life-course perspective postulates that the characteristics of the family environment in one generation may be transmitted to the subsequent generation (Thornberry, 2016). According to life-course epidemiology, the transmission of the characteristics of the family environment may be related to health of offspring (Lawlor et al., 2009). Several independent models have been put forward, focusing either on the transmission of some characteristics of the family environment (e.g., parenting quality; Conger, Belsky, & Capaldi, 2009) or on the role of transmission in offspring health (Kuh, Ben-Shlomo, Lynch, Hallqvist, & Power, 2003). However, there is no unifying theory or model that explains the transmission of the family environment across generations and its role in offspring health. The family environment is a complex concept incorporating multiple characteristics, hence the present study is restricted to qualities of the parent–child relationship (considered as a marker of emotional atmosphere in the family in this thesis) and socioeconomic position (an indicator of a person's standing in society).

Among the most notable models in accordance with the life-course perspective are Conger et al. (2009, 2012) hypothesis of child competent development in the transmission of parenting quality, and the pathway model developed by Kuh et al. (2003) regarding the role of SEP in offspring health. Conger et al. (2009, 2012) introduced the *model of child competent development,* suggesting that the transmission of parenting quality may operate through intermediate processes. More specifically, warm and accepting qualities of the parent–child relationship provide the foundation for offspring competent development, which, in turn, is related to their warm and accepting relationship with their children later in life. Moreover, apart from focusing on mediating variables, Conger et al. (2009) also suggested several moderating variables that may explain usually modest to moderate associations of parenting quality across generations. However, neither the role of other characteristics of the family environment, such as socioeconomic position, nor that of offspring health has been addressed in this model.

Relying on the principles of life-course epidemiology, Kuh and colleagues (2003) identified several life-course models through which to study the role of socially patterned exposures (e.g., SEP) in childhood on health in adulthood. Of these, the *pathway model* (also known as the chain-of-risk or protective chains model), referring to a sequence of linked exposures, suggests that early life events influence later life experiences and

opportunities, which, in turn, are responsible for health factors ultimately leading to specific health outcomes. According to this model, parental SEP influences offspring SEP in adulthood, which is related to offspring cardiovascular health later in life. More specifically, according to the so-called additive pathway model each exposure not only increases the risk of the subsequent exposure but also has an independent effect on the outcome (in contrast to the trigger-effect model in which earlier exposure has no independent effect on the outcome and operates only through the chain of exposures). The links in the pathway model are probabilistic rather than deterministic in nature. Social, biological, and psychological pathways may be links in such a chain, and tend to constitute mediating or moderating variables.

The framework for the present study was derived from the two above-mentioned models, and focuses on the intergenerational transmission of the family environment, mediating and moderating factors, and associations with cardiovascular health (see Figure 1).

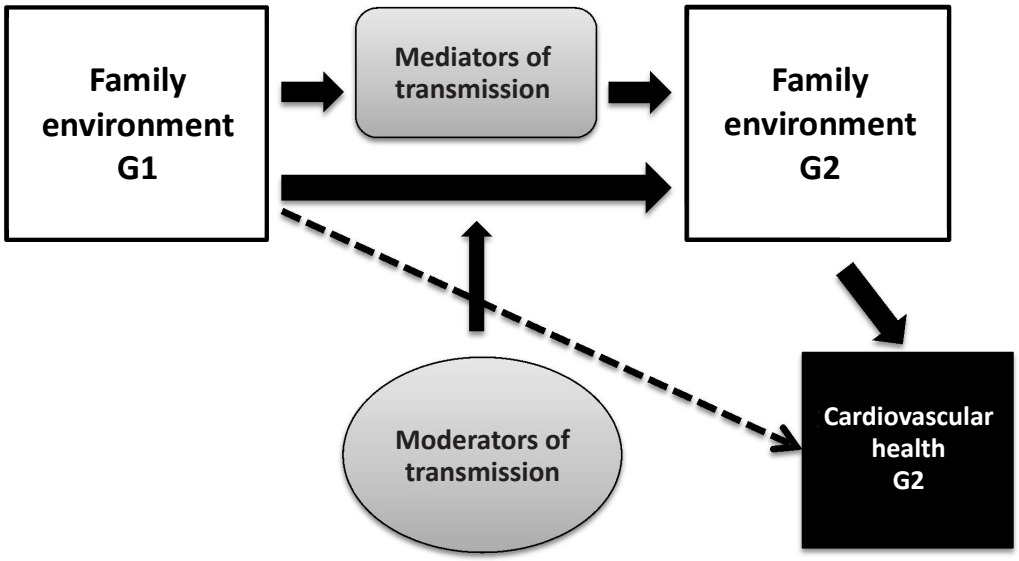


Figure 1. A framework depicting the intergenerational transmission of the family environment and cardiovascular health, modified from Conger et al. (2009, 2012) and Kuh et al. (2003): G1 = Generation 1, G2 = Generation 2.

1.3 QUALITIES OF THE PARENT–CHILD RELATIONSHIP

1.3.1 EMOTIONAL WARMTH AND ACCEPTANCE

One aspect of the family environment that significantly affects child development is the emotional atmosphere as expressed in the relationships between parents and children. The affective mode reflects qualities of the relationship, and is thereby indicative of general parenting quality in terms of creating a certain environment for child development (Dix, 1991). There are different theories on parent–child relationships, but two basic concepts are common to most of them: parental warmth and parental control (Maccoby, 1980). Schaefer's (1959) circumplex model defines parental warmth in terms of "love vs. hostility", and parental control in terms of "autonomy vs. control". The present thesis focuses on the "love vs. hostility" dimension, which reflects the emotional quality of the parent–child relationship and shows the degree to which there is a warm and loving or cold and rejecting atmosphere (Schaefer, 1959). A lack of emotional warmth, for example, has been shown to play role in mental and somatic health of children later in life (Jokela et al., 2007; Pulkki, Keltikangas-Järvinen, Ravaja, & Viikari, 2003). The "love vs. hostility" dimension comprises concepts such as emotional warmth and acceptance, which are interrelated and form a general warm or hostile pattern of the parent–child relationship (Schaefer, 1959).

Emotional warmth (also referred to as connectedness or closeness) is a feature of the emotional bond between parents and children, and should be differentiated from the concept of attachment security (MacDonald, 1992). Although parents tend to be quite warm and loving, there is variation in the degree of parental warmth even in a general population. Indeed, they may fall anywhere on the warmth continuum, which reflects the wide range of parenting practices that may be influential on child outcomes. Some parents show a higher level of rejection, expressing feelings of dislike for the child, or perceiving child-rearing as burdensome (Maccoby, 1980). This is characterized by parental acceptance or tolerance of the child's normal activity, whereas a lack of acceptance means that parents perceive their child as demanding and tiresome, requiring much attention, and as a burden that jeopardizes their self-fulfilment goals (Keltikangas-Järvinen, 2002). In combination, emotional warmth and acceptance rather than parenting behaviors or practices tap into the general emotional tone of the parent–child dyad, and reflect favourable or unfavourable circumstances for the child development (Keltikangas-Järvinen, 2002). According to the results of research conducted in a prospective, population-based study, a wide range of children's outcomes (e.g. personality development, mental and somatic health problems, and occupational stress later in life) was predicted by emotional warmth and acceptance or the lack thereof (Hintsanen et al., 2010;

Jokela et al., 2007; Josefsson et al., 2013; Pulkki et al., 2003). It was found in another Finnish prospective study that child-centred parenting, involving a good relationship between the parents and the child, as well as maternal support and supervision, were related to child adaptive social functioning later in life (Pulkkinen, Nygren, & Kokko, 2002), and may mitigate a link between child aggression and long-term unemployment (Kokko & Pulkkinen, 2000).

1.3.2 TRANSMISSION OF PARENT–CHILD RELATIONSHIP QUALITIES

The principle of linked lives (Elder et al., 2003) reflects the fact that the lives of parents and children are interrelated and mutually influential over time. Multiple factors seem to determine parenting (a complex concept that includes parenting quality, parenting behaviors, and parental beliefs about parenting), and parents' prior experiences with their own parents are significant predictors of their current parenting (according to Belsky's [1984] process model). More specifically, it is believed that parenting quality is replicated in the subsequent generation through intergenerational transmission, meaning that early caregiving experiences provide a basis that helps to determine parenting outcomes in the next generation (Putallaz, Costanzo, Grimes, & Sherman, 2001; Serbin & Karp, 2003; Van IJzendoorn, 1992). The theory of social learning and attachment theory have traditionally been used to explain the transmission of parenting quality across generations (Van IJzendoorn, 1992). According to the social learning theory, children observe and emulate their parents' behaviour, and parents may intentionally teach their children how to raise a child (Bandura, 1977; Patterson, 1998). Attachment theory, in turn, posits that children develop their own attachment style on the basis of the emotional bond they experience with their caregivers early in life, which in turn affects the quality of later parent–child relationships when they become parents (Bowlby, 1951; Cummings & Cummings, 2002).

The focus in most research on the intergenerational transmission of parenting quality is on harsh, unsupportive, and poor-quality parenting and child maltreatment (e.g., Bailey, Hill, Oesterle, & Hawkins, 2009; Berlin, Appleyard, & Dodge, 2011; Conger, Schofield, & Neppl, 2012; Neppl et al., 2009). Emerging evidence suggests, however, that supportive and positive parenting is also likely to be transmitted across generations (e.g., Belsky, Jaffee, Sligo, Woodward, & Silva, 2005; Chen & Kaplan, 2001; Kerr, Capaldi, Pears, & Owen, 2009). In fact, studying the transmission of positive parenting could give new insights in terms of supporting offspring positive outcomes, given that the absence of disadvantages does not necessarily indicate the presence of advantages (Ryff et al., 2006; Seligman & Csikszentmihalyi, 2014). Moreover, warm and supportive quality of

parenting may serve to buffer the effects of a disadvantaged early socioeconomic environment and childhood abuse on later health (Carroll et al., 2013; Chen, Miller, Kobor, & Cole, 2011).

Relatively little is known about the transmission of a warm and accepting parent–child relationship. With a few exceptions (Schneewind & Ruppert, 1998), most studies focusing on the transmission of emotional warmth are retrospective in design and rely on participants' recollections about their past experiences (Kitamura et al., 2009; Madden et al., 2015; Tanaka, Kitamura, Chen, Murakami, & Goto, 2009). Given that retrospective studies are prone to methodological problems such as recall bias, prospective longitudinal research is recommended for the study of the intergenerational transmission of parent–child relationship qualities (Serbin & Karp, 2004). It was shown in a German longitudinal study with a 16-year follow-up that an emotionally warm and open parent–child relationship is likely to be replicated in the next generation (Schneewind & Ruppert, 1998). However, most participants representing the younger generation did not have their own children at the time of the assessment, and it therefore remains unclear whether the transition to parenthood would change their parent–child relationships or whether the transmission would be unaffected. Moreover, few studies examine the transmission of acceptance across generations. There is thus a need for longitudinal, prospective research with multiple informants to investigate the transmission of warm and accepting parent–child relationships across generations.

Multiple variables may confound the intergenerational transmission of parent–child relationship qualities. Gender and the age of parents and offspring, the number of children, partnership status, and SEP, for example, might account for the degree to which children are likely to repeat the experienced qualities of the parent–child relationship with their own offspring later in life (Conger et al., 2009). Moreover, the child's externalizing behaviour, which has been shown to influence the parental child-rearing process, has been used as a control variable in some earlier studies (Belsky et al., 2005; Ganiban, Ulbricht, Saudino, Reiss, & Neiderhiser, 2011; Katainen, Räikkönen, & Keltikangas-Järvinen, 1997). Parental depressive symptoms may shape the way parents perceive their children and report qualities of the parent–child relationship (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). The above-mentioned variables were therefore used as covariates in the analyses to assess the transmission of parent–child relationships qualities based on similar demographic and family characteristics in both generations.

1.3.3 MEDIATORS OF THE TRANSMISSION

According to the model of competent development suggested by Conger et al. (2009, 2012), supportive and warm parenting quality provides the basis for child's competent development, which in turn is related to its own positive parenting later in life. Indicators of competent development vary across studies, however, and there is no single agreement concerning the factors that constitute competent development in children (Conger et al., 2009). Thus far, academic achievement and social competence have been considered indicators of competent development (Neppl et al., 2009; Raby et al., 2015; Shaffer et al., 2009). Findings from these studies point to the possibility that personality traits of offspring associated with competence and maturity (i.e., self-directed and cooperative character traits) may also explain the transmission of warm and accepting parent–child relationship qualities across generations.

Surprisingly little research has been conducted on the role of personality in the transmission of parenting quality (Kitamura et al., 2009; Tanaka et al., 2009). Kitamura et al. (2014), for example, found that the intergenerational transmission of high parental care and involvement was partly mediated by the greater cooperativeness of second-generation fathers, but not mothers. It was reported in the same study that critical and intolerant behaviour by second-generation parents (low cooperativeness) mediated the transmission of parental overprotection across generations. This study was limited in its reliance on a retrospective design, however. As a result, it remains unclear whether personality of offspring mediates the transmission of parenting quality, and especially the transmission of parent–child relationship qualities.

Offspring personality is a prominent candidate as a mediator in the intergenerational transmission of parent–child relationship qualities, given that parenting is known to predict the personality of offspring (Johnson, Liu, & Cohen, 2011; Josefsson et al., 2013; Oshino, Suzuki, Ishii, & Otani, 2007; Reti et al., 2002; Schlette et al., 1998; Schofield et al., 2012), and that personality is a determinant of parenting (de Haan, Prinzie, & Deković, 2009; Metsäpelto & Pulkkinen, 2003; Schofield et al., 2012; Spinath & O'Connor, 2003). According to evidence from prospective, longitudinal studies, positive parenting quality is associated with positive personality development among offspring during adolescence and early adulthood (Johnson et al., 2011; Schofield et al., 2012). In particular, observed parental warmth and lower levels of hostility have been associated with higher levels of conscientiousness and agreeableness, and lower levels of neuroticism among offspring, which are considered crucial in terms of the child's competent functioning (Schofield et al., 2012). Similarly, beneficial parenting behaviours (e.g., attentiveness, emotional maturity, compassion, and a positive regard for the child) have been related to the development of

adaptive personality traits in offspring over time (Johnson et al., 2011). Moreover, there is solid evidence of a link between parental personality and their parenting (for meta-analyses, see McCabe, 2014; Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009). According to the results of previous studies, for example, an extravert parental personality with cooperative and empathic character traits is related to a higher level of warm and supportive parenting quality (de Haan et al., 2009; Metsäpelto & Pulkkinen, 2003). Furthermore, a mature parental personality has been associated with higher warmth and lower hostility in parenting behaviour, and predicts a relative increase in positive parenting over time (Schofield et al., 2011, 2012). In the light of this evidence, there is good reason to expect that warm and accepting qualities of the parent–child relationship will provide the child with a good basis on which to develop mature personality traits later in life. These adaptive characteristics may, in turn, predict offspring's own warm and accepting parent–child relationship qualities when they become parents.

Educational attainment is another indicator of offspring competent development that may serve as a mediator in the intergenerational transmission of a positive parent–child relationship (Neppl et al., 2009). It has been shown that supportive and involved parenting is related to school achievement among offspring in adolescence (Steinberg, Lamborn, Dornbusch, & Darling, 1992). On the other hand, highly educated parents are more likely to be supportive and involved in their children's lives (Conger & Donnellan, 2007). Recent evidence indicates that the transmission of positive parenting is mediated by the educational attainments of offspring (Neppl et al., 2009). The question thus arises concerning the extent to which education of offspring mediates the transmission of parent–child relationships qualities when studied simultaneously with personality traits.

1.3.4 MODERATORS OF THE TRANSMISSION

A pivotal task in intergenerational studies of parenting is to identify factors that may either reduce or strengthen its transmission (Rutter, 1998). In other words, the modest-to-moderate association in parenting between two generations may be stronger under certain conditions but weaker or even non-existent in others. Although research on this topic is beginning to emerge, little is known about the moderators of the intergenerational transmission process (Belsky, Conger, & Capaldi, 2009; Conger et al., 2009). Studies of the moderating factors could thus highlight new ways of fostering continuity (and explaining discontinuities) in warm and accepting parent–child relationship qualities across generations.

One potential moderator of this process is gender, in other words the transmission may be stronger or weaker depending on the gender of the offspring (Conger et al., 2009). However, previous research on the

moderating role of gender has produced inconsistent results. Several studies report no moderating effect of gender in the transmission of parenting (Neppl et al., 2009; Shaffer et al., 2009), whereas others demonstrate its transmission only among mothers (Belsky et al., 2005), or only among fathers (Smith & Farrington, 2004), or then among both mothers and fathers (e.g., Kitamura et al., 2009). It was found, for example, that mothers who experienced more supportive parenting quality early in life were more likely to adopt a warm-sensitive-stimulating approach towards their own children (Belsky et al., 2005). In another study it was reported that fathers who received a lack of supervision in childhood also tended to be inconsistent in their supervision of their own children (Smith & Farrington, 2004). Even less is known about the role of both parent's and offspring's gender in the transmission of parenting (Conger et al., 2009): it remains unclear, for example, whether the intergenerational transmission of parenting quality is stronger in same-sex (e.g., mothers and daughters) or opposite-sex (e.g., mothers and sons) dyads. Given the evidence reported in earlier research supporting both mother-daughter links (Belsky et al., 2005) and mother-son dyads (Madden et al., 2015), there is a need for further investigation to establish the role of gender in the intergenerational transmission of parent–child relationship qualities.

Other potentially significant moderators of continuity or discontinuity in qualities of the parent–child relationship include personality characteristics. Although it has been suggested that the whole range of personality traits may play a moderating role in the transmission of parenting, the evidence is scant (Conger et al., 2009). In the light of what is already known about risky versus protective personality traits, it may be that traits reflecting neuroticism and low emotional stability, which tend to relate to adverse emotional outcomes, intensify the transmission of poor quality parent–child relationships, whereas agreeableness and conscientiousness may serve as a buffer, given their protective role against adverse outcomes (McCabe, 2014).

1.4 SOCIOECONOMIC POSITION AND CARDIOVASCULAR HEALTH OF OFFSPRING

1.4.1 MEASURES OF SOCIOECONOMIC POSITION

One of the first things a family determines is the socioeconomic environment the children will inhabit: the level of family income, the availability of various resources, and the opportunities and constraints that accompany the parental social position (Uhlenberg & Mueller, 2003). Although a widely studied concept, there is no single agreed-upon approach or tradition determining the description and measurement of social and economic

conditions (Krieger, Williams, & Moss, 1997). Depending on the perspective, it could refer to what an individual possesses in absolute terms (i.e., the resources perspective); what an individual has in relation to others (i.e., the relative perspective); or whether one's peer group has more or less power and privilege than other groups in society (i.e., the social-class perspective) (Schüz, 2017). A variety of terms, such as "social class", "socioeconomic status", "socioeconomic environment", and "social stratification", are frequently and interchangeably used.

The social-class perspective is adopted in this research, together with the concept of "socioeconomic position" as is commonly used in health research. SEP indicates a person's standing in society and is defined as "the socially derived economic factors that influence what positions individuals or groups hold within the multiple-stratified structure of a society" (Galobardes, Lynch, & Smith, 2007, p. 23). Members of more advantaged groups control more resources (e.g., material, economic, social, or cultural) and have more social capital than those in less advantaged groups. Moreover, members of each group share common lifestyle and behavioural practices, resulting in the social pattering of health within society (Havranek et al., 2015).

There is no single indicator of SEP that suits all study purposes and aims. However, education, occupational status and income are widely used as individual-level indicators. It has been suggested that the choice of SEP measurements should be driven by the specific research questions (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). Some researchers recommend using these indicators separately in the analyses (Conger & Donnellan, 2007b), whereas others prefer to consider them simultaneously (Havranek et al., 2015). From the life-course perspective, however, it is important to ensure that SEP measures the same construct and has the same meaning across time and generations (Galobardes et al., 2007).

A cumulative score of several socioeconomic indicators is used in this study, given that it better reflects the entire socioeconomic position of the family. In particular, data were obtained on education, income, occupational status, and employment stability, which are considered the most accurate indicators of the family's overall socioeconomic position (Galobardes, Shaw, et al., 2006; Havranek et al., 2015). The same set of indices was used to measure SEP in both generations. Although it is argued that distinct SEP indicators (e.g., education and income) may differently account for a specific outcome (Ensminger & Fothergill, 2014), the cumulative score has the advantage of not fostering assumptions about the relative strengths of multiple risk factors or their collinearity (Evans, Li, & Whipple, 2013). Chapter 3.3.2 gives a detailed description of a cumulative SEP score.

1.4.2 INTERGENERATIONAL SOCIAL MOBILITY

In broader terms, intergenerational social mobility refers to the relationship between parental SEP and SEP their children will attain as adults. Social mobility across generations reflects the extent to which individuals move up (or down) the social ladder compared with their parents (Reforms, 2010). Individuals who maintain the same SEP as their family of origin are usually referred to as "socioeconomically stable", those who achieve a higher SEP than their parents are known as "upwardly mobile", and those who move down the socioeconomic hierarchy as "downwardly mobile". In other words, the degree of persistence or continuity in socioeconomic standing reflects the intergenerational transmission of SEP in terms of how adult SEP outcomes are linked to those of their parents, whereas intergenerational discontinuity could be expressed in terms of upward or downward mobility. Both processes – continuity and discontinuity – play an important role in the long-term health outcomes of offspring. For example, a disadvantaged SEP in childhood and adulthood relates to various risk factors of cardiovascular disease (CVD) (Power et al., 2007) and higher related mortality (Murray et al., 2011). At the same time, upward social mobility may reverse the effects of an early-life disadvantageous SEP on later cardiovascular health (Hogberg, Cnattingius, Lundholm, Sparen, & Iliadou, 2012; Tiikkaja & Hemstrom, 2008). An understanding of the role of upward mobility in later cardiovascular health could be critical in terms of prevention and intervention, given that it may alleviate the consequences of early adverse SEP by providing better opportunities to adopt a healthier lifestyle, or giving better access to healthcare as an adult (Harper, Lynch, & Smith, 2011; Havranek et al., 2015).

Previous research attests to the transmission of socioeconomic position across generations, implying that children from high-SEP families are more likely to achieve a high SEP in adulthood, whereas children from a low-SEP background also tend to have a low SEP in adulthood (for a review, see Carvalho, 2012). There are, cultural variations in the intergenerational transmission of SEP, however: in other words, the link between parental and their offspring's SEP may be looser or tighter in different societies (Corak, 2006). Children with high-income parents in the United States, for example, are likely to earn significantly (about 3 times) more later in life than the children of low-income parents (Chetty, Hendren, Kline, & Saez, 2014; Jäntti, 2009). The transmission of SEP from one generation to the next has been somewhat lower in Finland (as in other Nordic European countries) than in other Western societies, meaning that parental SEP is a weaker determinant of their offspring's SEP (Corak, 2006; Sirniö, 2016). Ever since the Second World War, Finland has been investing heavily in the provision of free education for all, supporting equal opportunities for all citizens regardless of their social background and enabling upward social mobility. Given the rapid increase in the general level of education and a substantial

growth of the service classes, therefore, each subsequent generation has been upwardly mobile compared to the previous one. Currently in the first decades of the 21st century, however, the general level of education is so high that upward social mobility is no longer possible on the same scale. Recent studies have shown that parental SEP largely defines the SEP of their offspring in Finland, and that upward-mobility opportunities have diminished (Erola, Jalonen, & Lehti, 2016; Kallio, Kauppinen, & Erola, 2016; Vauhkonen, Kallio, Kauppinen, & Erola, 2017). According to the latest results of the Programme for International Student Assessment (PISA; OECD, 2015), for instance, parental education has a stronger influence on students' academic achievement than previously. It was found in another study that income transmission is also evident in Finland, implying that the lowest and the highest income levels tend to persist across generations (Sirniö, 2016).

1.4.3 INTERGENERATIONAL (DIS-)CONTINUITY IN SOCIOECONOMIC POSITION AND IDEAL CARDIOVASCULAR HEALTH

Socioeconomic position in childhood is associated with a wide range of health-related outcomes among offspring later in life (e.g., Cohen et al., 2010; Power et al., 2013). More specifically, the socioeconomic gradient in cardiovascular diseases is widely documented, meaning that each step down the SEP hierarchy brings worse health outcomes (Clark et al., 2009; Galobardes, Smith, & Lynch, 2006; Havranek et al., 2015; Marmot et al., 2012; Poulton et al., 2002; Slopen, Goodman, Koenen, & Kubzansky, 2013; Smith, Hart, Blane, & Hole, 1998). Recent studies have also shown that SEP (or measures related to SEP) in childhood predict *positive* cardiac-health outcomes (Appleton, Buka, et al., 2013; Pulkki-Råback et al., 2015; Slopen, Chen, Guida, Albert, & Williams, 2017).

The AHA has defined a new metric of *ideal cardiovascular health,* the aim being to improve the cardiovascular health (CVH) of the population by 20% to facilitate the achievement of its 2020 Impact Goals (Lloyd-Jones et al., 2010). Ideal CVH is conceptualized as a broader, more positive construct than the mere absence of cardiovascular risks, which is consistent with the WHO's definition of health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948). As a concept it provides new means for achieving better health on the individual and population levels (Lloyd-Jones et al., 2010). It is defined by the presence of ideal levels of specific health behaviours and ideal levels of several health factors, as well as the absence of diabetes mellitus and clinical cardiovascular disease (see Table 1 and Chapter 3.3.4 for more details). Ideal CVH could be considered an umbrella term for various cardiac outcomes in a normal population. A number of studies have shown a strong relationship between ideal CVH and subclinical markers of

CVD such as coronary artery calcification, carotid intima-media thickness, and pulse wave velocity (Maclagan & Tu, 2015; Oikonen et al., 2013), as well as reductions in cardiovascular morbidity and mortality (Bambs et al., 2011; Folsom et al., 2011). Moreover, the goal of promoting and preserving ideal CVH from the beginning of life reflects a primordial prevention approach to population health (Labarthe et al., 2016).

Table 1. The Definition of Ideal Cardiovascular Health

Goal/Metric	Ideal level
Cardiovascular health factors	
Blood pressure	systolic blood pressure <120 mm Hg / diastolic blood pressure <80 mm Hg
Total cholesterol	≤5.2 mmol/l (≤200 mg/dL)
Fasting glucose	<5.6 mmol/l (<100 mg/dL)
Cardiovascular health behaviours	
Body mass index	<25 kg/m²
Current smoking	Never or quit >12 months ago
Physical activity	≥150 min/wk moderate intensity or ≥75 min/wk vigorous intensity or an equivalent combination thereof
Healthy diet score	4-5 components: - Fruits and vegetables: ≥4.5 cups/day - Fish: ≥two 3.5-oz servings/week (preferably oily fish) - Fibre-rich whole grains: ≥three 1-oz servings/day - Sodium: <1500 mg/day - Sugar-sweetened beverages: ≤450 kcal (36 oz)/week

Note. Modified from Lloyd-Jones et al. (2010)

Studies examining the positive family environment in relation to ideal cardiovascular health later in life are currently emerging. Using prospective data from the Collaborative Perinatal Project (n = 415), Appleton and

colleagues (2013) found that high attention regulation, high cognitive ability and positive home environment at seven years were associated with the so-called favorable cardiovascular health profile (presence of ideal levels of blood pressure, cholesterol and body mass index, non-smoking, the absence of diabetes mellitus, and non-use of antihypertensive and cholesterol-lowering medication) in midlife. Drawing on prospective, population-based data from Finland, Pulkki-Råback and colleagues (2015) demonstrated that favorable psychosocial factors in childhood, such as emotional environment, SEP, lack of stressful events and others, may result in a higher incidence of ideal cardiovascular health (measured according to the AHA's criteria) in adulthood. Among six psychosocial factors of the family environment, high parental SEP remained a robust predictor of adult ideal CVH when examined in conjunction with the other factors. The role of parental SEP in ideal CVH has been further demonstrated in a cross-national comparative study using population-based cohorts from Finland, Australia and the United States (Laitinen et al., 2013). The findings revealed that parental SEP predicted ideal CVH in all three cohorts after accounting for age, gender, race, and known childhood cardiovascular risk factors. Although the identified associations were relatively low, they were significant, and provided initial support acknowledging the role of a positive family environment in ideal CVH later in life. However, little is known about how parental SEP influences ideal cardiovascular health of offspring in adulthood (Havranek et al., 2015; Power et al., 2013).

According to the pathway model, parental SEP early in life may be a marker of future adult SEP, which in turn influences cardiovascular health in adulthood. For instance, high parental SEP increases the likelihood of good academic achievements among offspring, leading to a higher SEP later in life that, in turn, is related to better cardiovascular health. It is suggested in the only previous study on this issue that education of offspring acts as an intermediate mechanism in the association between a positive childhood experiences index (i.e., a complex concept that includes SEP, parental warmth and support, two-parent family etc.) and ideal cardiovascular health later in life (Slopen et al., 2017). In addition, previous prospective follow-up studies have indirectly shown that achieved SEP in adulthood explains part of the association between childhood SEP and adult CVD outcomes (Melchior, Moffitt, Milne, Poulton, & Caspi, 2007; Poulton et al., 2002; Power et al., 2007; Power, Hyppönen, & Davey Smith, 2005). Despite this evidence, however, no studies to date have evaluated whether the intergenerational transmission of SEP explains ideal CVH in offspring, or the extent to which adult SEP mediates this association.

Another major question for prevention concerns whether intergenerational discontinuity in SEP plays any role in adult cardiovascular health, and specifically the extent to which upward mobility mitigates the

effects of early-life disadvantaged SEP. Given that children in Finland still have relatively high chances of achieving a better SEP than their parents, understanding the role of upward social mobility in health may be particularly important in terms of targeting prevention and intervention related to cardiac diseases in this population. According to the social-mobility model, intergenerational SEP mobility may have an impact on adult health (Pollitt, Rose, & Kaufman, 2005). The findings from research on the protective role of upward mobility have been inconsistent, however. Some studies indicate that upward mobility may compensate for earlier socioeconomic disadvantage (Hogberg, Cnattingius, Lundholm, Sparen, & Iliadou, 2012; Tiikkaja & Hemstrom, 2008), whereas others report no such effect (Poulton et al., 2002). For example, according to evidence from the Johns Hopkins Precursors Study, the effect of low childhood SEP on cardiovascular risk in adults with high achieved SEP remains (Kittleson et al., 2006), suggesting that the developmental origins of the disease start early in life and cannot be entirely reversed by later circumstances. Given that further knowledge on this issue may offer new insights into health promotion, more research is needed to investigate the role, if any, of upward mobility in the cardiovascular health of offspring.

2 AIMS OF THE STUDY

The aim of this thesis is to enhance understanding of the extent to which the family environment is repeated across generations, how it occurs, and its consequences for ideal cardiovascular health of offspring. The study draws on prospective, longitudinal data spanning 32 years, the primary objective being to investigate the extent to which the family environment, in terms of qualities of the parent–child relationship and socioeconomic position, is transmitted across generations. A further objective is to explore the mediating and moderating factors that may explain or modify the recurrence of parent–child relationship qualities in successive generations of families. Finally, the study examines the consequences of SEP continuity and discontinuity for ideal cardiovascular health of offspring. The five specific research questions set out below are addressed. Figure 2 presents the specific questions addressed in each of the three separate studies, and how they are operationalized.

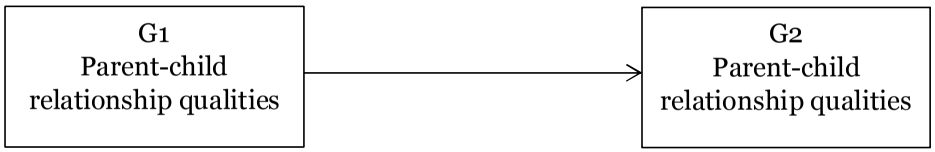
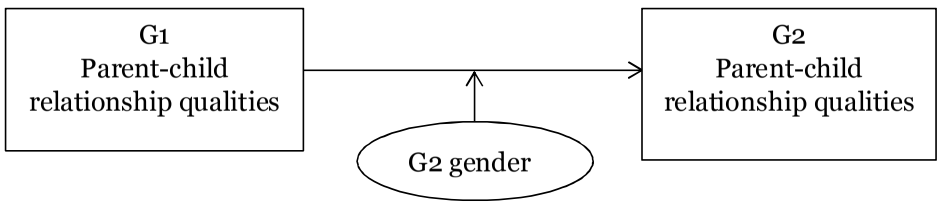
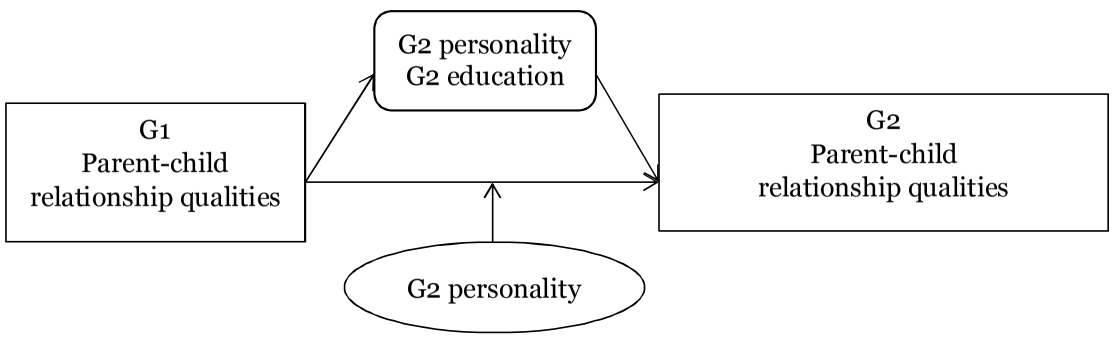
1. To what extent are qualities of the parent–child relationship transmitted across generations?

2. Does the transmission of parent–child relationship qualities differ in mother-son and mother-daughter dyads?

3. Is the intergenerational transmission of parent–child relationship qualities mediated by the personality and education of offspring; furthermore, is this association moderated by personality?

4. Is there an association between the transmission of socioeconomic position across generations and ideal cardiovascular health of offspring in adulthood?

5. Does achieving a higher SEP in adulthood compared to parental SEP (i.e., upward mobility) mitigate the effects of low SEP on ideal cardiovascular health of offspring in adulthood?

Study	Research Question	Year of Examination			
		1980	2001	2007	2012
I	To what extent are qualities of the parent–child relationship transmitted across generations?				
I	Does the transmission of parent–child relationship qualities differ in mother-son and mother-daughter dyads?				
II	Is the intergenerational transmission of parent–child relationship qualities mediated by the personality and education of offspring; furthermore, is this association moderated by personality?*				

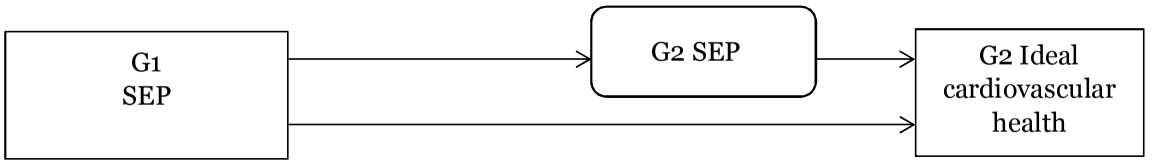
Study	Research Question	Year of Examination: 1980	2001	2007	2012
III	Is there an association between the transmission of socioeconomic position across generations and ideal cardiovascular health of offspring in adulthood?				
III	Does achieving a higher SEP in adulthood compared to parental SEP (i.e., upward mobility) mitigate the effects of low SEP on ideal cardiovascular health of offspring in adulthood?				

Figure 2. Research questions and the design of Studies I-III.
Note. Figure presents the measurement year related to each research question and does not show the control variables.
G1 = Generation 1, G2 = Generation 2, SEP = socioeconomic position.
*The moderating and mediating role of G2 personality in the transmission of parent–child relationship qualities were studied in separate models.

3 METHODS

3.1 OUTLINE OF THE YOUNG FINNS STUDY

The participants of all three studies were from the population-based, multi-centre study called the Young Finns Study (YFS). To ensure the selection of a representative sample reflecting different living conditions and the socioeconomic and demographic spectrum, Finland was divided into five areas according to the location of university cities with a medical school (Helsinki, Turku, Tampere, Oulu, and Kuopio) (Raitakari et al., 2008; Åkerblom et al., 1991). The study has been implemented in all five university cities and their rural surroundings. In those areas, Finnish children and adolescents from six age cohorts (i.e., born in 1962, 1965, 1968, 1971, 1974, and 1977) were selected from the Social Insurance Institution's population register, which covers the entire population of Finland. In practice, girls and boys from each age cohort in each municipality were placed in random order according to their unique personal identification number, and then each case-boy and case-girl was selected to ensure that the sample consisted of the required number of participants. Sixty girls and 60 boys in each age cohort were selected in four areas (Helsinki, Tampere, Turku and Oulu). To equalize the number of participants from east and west, the sample size was twofold in Kuopio, the most eastern area (Åkerblom et al., 1991). The initially selected YFS sample comprised 4,320 participants. The first cross-sectional study was conducted in 1980 and included 3,596 children and adolescents aged 3, 6, 8, 12, 15, and 18 years and their parents (83.2% of those invited). These participants had follow-up examinations in 1983, 1986, 1989, 1992, 2001, 2007, and 2012. Written informed consent was received from all participants who were at least twelve years old, and from the parents of the younger ones. The study was approved by the local ethics committees and conducted in accordance with the Helsinki declaration.

3.2 STUDY DESIGN AND THE SELECTION OF PARTICIPANTS

The parents of the original YFS participants are referred to in this study as the first generation (G1), the YFS participants as the second generation (G2), and their children as the third generation (G3). In 1980, the mothers (G1; mean age = 38 years) evaluated the qualities of their parent–child relationship with specific children (G2); in addition, the mothers and fathers (G1) reported their education, income, occupational status, and employment

stability, based on which the cumulative family index of socioeconomic position was formed. After a follow-up of 27 years, the G2 participants (mean age = 38 years) reported on the qualities of their relationships with their children (G3), as well on their education, income, occupational status and employment stability. The G2 participants who did not have children in 2007 reported on the relationship qualities in 2012, when all the G2 participants again reported on their education, income, occupational status, and employment stability. The same measures assessing the qualities of the parent–child relationships and socioeconomic position were used in both generations. The assessments were conducted independently, meaning that G2 did not know how G1 had rated them earlier. In addition, the G2 participants reported on their personality (based on the Temperament and Character Inventory) and years of education in 2001 (mean age = 32 years), and all measurements for ideal cardiovascular health were conducted twice, in 2007 and 2012. The participants returned the questionnaires by post or during a subsequent hospital visit for a medical examination in accordance with the YFS protocol. Table 2 gives the number of participants in each study.

Table 2. The Number of Participants in Each Study

		Study I	**Study II**	**Study III**
Total		**1418**	**1308**	**697**
G1	Women	1418 (100%)	1308 (100%)	697 (100%)
	Men	NA	NA	697 (100%)
G2	Women	877 (62%)	811 (62%)	392 (56%)
	Men	541 (38%)	497 (38%)	305 (44%)
G3*	Girls	714 (50%)	654 (50%)	NA
	Boys	704 (50%)	654 (50%)	NA

Note. G1 = Generation 1, G2 = Generation 2, G3 = Generation 3
NA = not applicable to this study
* G3 age and gender of the first child

Studies I-II focused on the transmission of qualities of the parent–child relationship and its mediating and moderating factors. Data on the qualities of the maternal (G1) relationship from 1980 were available for 3,412 participants (48 fathers were dropped from the sample).[1] Study I included only those who had children in 2007 and reported on the qualities of their parental relationship, whose mothers also rated their parent–child

[1] Of these 3,412 participants, 1,957 (57.4%) participated in 2007 and 1,653 (48.4%) in 2012. Of the latter two, 539 and 361, respectively, did not have children in 2007 and 2012.

relationship in 1980: this yielded an eligible sample of 1,418 participants. There were missing values in some covariates (mostly G1 and G2 education, and G2 externalizing behaviour), representing 28% of the current sample. Multiple imputation by chained equations (STATA 13.1) was applied to estimate the missing values for participants with missing data in any of the covariates (Royston & White, 2011). The pooled estimates of 50 imputed data sets were used in all the analyses (n = 1,418). Attrition analyses showed that the G2 participants in the analytical sample compared to those who had dropped out (n = 2130) were older (Mage in 1980 = 11.2 vs. 9.9, $p < .001$) and were more likely to be female (61.8% vs. 43.7%, $p < .001$); their mothers (G1) were also older (Mage in 1980 = 38 vs. 37.4, $p < .001$) and had a higher acceptance towards G2 (M = 4.02 vs. 3.86, $p < .001$). There were no other significant differences in the baseline characteristics (all ps > .106). This was in line with the attrition results from 2001 showing that male and younger participants were more likely to drop out of the YFS (Raitakari et al., 2008).

The G2 participants of Study II who had children in 2007 or 2012, and whose mothers reported on the qualities of the parent–child relationship in 1980, were eligible for the present study (n = 1,719). Of these, 1,308 yielded complete data on temperament and character traits, and comprised the analytical sample in Study II. As in Study I, multiple imputation was applied to replace any missing values in the covariates. The results of the attrition analyses in Study II were similar to those in Study I. Compared to the non-participants, the G2 participants in this sample were older (Mage in 1980 = 10.9 vs. 10.1, $p < .001$), were more likely to be female (62% vs. 44.5%, $p < .001$), and experienced higher levels of acceptance from their mothers (M = 4.00 vs. 3.89, $p < .001$).

Study III, which focused on the transmission of SEP and ideal cardiovascular health of offspring, comprised 697 participants with complete data on G1 (1980) and G2 socioeconomic position and ideal cardiovascular health in 2007 and 2012. Only the G2 participants who were healthy at enrolment were eligible for the present study: 19 participants with Type I diabetes were therefore excluded resulting in a sample of 3,577. Of these, 2,908 yielded complete data on childhood factors, 697 of whom also had complete data on adulthood factors, which was used in Study III. Attrition analyses showed that the participants in the analytical sample were 0.9 years older on average and were more likely to be female (56.4% vs. 49.6%). Differences in other baseline characteristics were minimal. The included participants were more likely to have parents working in higher-grade non-manual occupations (20.7% vs. 16.4%), and to have had a higher family income in childhood (24.2% vs. 19.8%) than those who dropped out, but there were no differences in the summary score of the childhood socioeconomic environment between the included and the excluded participants ($p > .574$). Moreover, the former did not differ from the latter in

terms of cardiovascular risk factors (all *p*s > .091). Given the considerable drop-out in Study III, all the analyses were repeated with imputed data. Missing values were estimated for the G2 participants with at least one component in ideal cardiovascular health index in 2012. All the main variables and covariates were used as predictors in the model and imputed by means of chained equations. Each component of the SEP score and the ideal cardiovascular health index were first imputed and thereafter summed up to form a composite score using a pooled estimate of 50 imputed datasets (resulting in a sample size of 2,124 participants).

3.3 MEASURES

3.3.1 QUALITIES OF THE PARENT–CHILD RELATIONSHIP

The qualities of the parent–child relationship were based on parental self-perceptions of the relationship with the child, measured via a questionnaire comprising two scales: 1) emotional warmth and 2) acceptance of the child, both derived from the Operation Family Study (Makkonen et al., 1981). The emotional warmth scale comprised four items ("My child is important to me", "I am important to my child", "I enjoy spending time with my child", and "My child enables me to self-actualize myself"). The acceptance scale consisted of three items ("I often become irritated with my child ", "In difficult situations, my child is a burden", and "My child takes too much of my time", all reverse coded). All the items were scored on a 5-point Likert-type scale, a high score reflecting high levels of emotional warmth and acceptance. The Cronbach's α reliability coefficients of emotional warmth were 0.68, 0.74 and 0.70 in 1980, 2007, and 2012, respectively; the corresponding coefficients for acceptance were 0.67 in 1980 and 0.71 in 2007 and 2012. The results of the confirmatory factor analyses (see Table 3) supported the construct validity of these scales. Previous research has also shown moderate continuity in the emotional warmth and acceptance scales over different developmental periods (Merjonen et al., 2011), and that the scales measure stable parental characteristics (Katainen et al., 1997). Predictive validity has also been demonstrated: the scales have been shown to predict offspring outcomes such as adulthood personality, self-esteem, occupational well-being, and depressive tendencies (Heinonen et al., 2003; Hintsanen et al., 2010; Jokela et al., 2007; Katainen et al., 1997; Katainen, Räikkönen, & Keltikangas-Järvinen, 1998; Keltikangas-Järvinen, Kivimäki, & Keskivaara, 2003).

Table 3. Latent Confirmatory Factor Analyses for the Parental Self-perceived Qualities of the Parent–child Relationship Scales

	Generation 1	Generation 2
Translation of the item into English	**β**	**β**
Self-perceived emotional warmth		
"My child is important to me"	.51	.59
"I am important to my child"	.51	.56
"I enjoy spending time with my child"	.78	.78
"My child enables me to self-actualize myself"	.53	.61
Self-perceived acceptance		
"I often become irritated with my child" (reversed)	.76	.71
"In difficult situations, my child is a burden" (reversed	.77	.89
"My child takes too much of my time" (reversed)	.39	.44

Note. The values are standardized factor loadings of the confirmatory factor analyses. All factor loadings are significant at $p < .001$.
The scales range from 1 (*never*) to 5 (*always*).
Model fit: χ^2 (72) = 311.2, $p < .001$, CFI = 0.946, TLI = 0.932, and RMSEA = 0.048.

3.3.2 SOCIOECONOMIC POSITION

SEP was assessed on four indices: 1) educational level, 2) family income, 3) occupational status, and 4) employment stability. Educational level was classified as comprehensive school, secondary education, and an academic degree (graduated from a polytechnic or studying at or graduated from a university); family income was measured in quartiles according to the distribution of income in the sample; occupational status was categorized as manual, lower-grade non-manual, and higher-grade non-manual; and employment stability was measured in terms of employment, engagement in full-time studies, unemployment, long-term sickness absence, maternity leave, and retirement. SEP was used in this study as a cumulative index of four binary variables. For instance, a person with high SEP on all indicators

would receive a score of four points (upper-white-collar occupation=1 point, academic/college degree=1 point, family income in the highest quartile=1 point, high employment stability=1 point). Those with low SEP on all indicators would receive a score of 0 points. Thus, the SEP score ranged from 0 (lowest) to 4 (highest). The test-retest reliability of G1 SEP predicting their SEP three years later was $r = .96$, $p < .001$. The test-retest reliability of G2 SEP predicting SEP six years later was $r = .78$, $p < .001$.

A change score was created to examine intergenerational socioeconomic mobility: G1 SEP was subtracted from G2 SEP. Three categories were then created: 0 – stable SEP (participants with no changes in childhood and adulthood SEP), 1 – downwardly mobile (high SEP in childhood and lower in adulthood), 2 – upwardly mobile (low SEP in childhood and higher in adulthood).

3.3.3 PERSONALITY

The revised version 9 of the Temperament and Character Inventory (TCI) with 240 items was used to assess the G2 participants' temperament and character traits in 2001 (Cloninger, Przybeck, Svrakic, & Wetzel, 1994). The model (known as the psychobiological model of personality) differentiates temperament traits (Novelty seeking, Harm avoidance, Reward dependence, and Persistence) that reflect the individual's automatic response tendencies manifested early in life as well as character traits (Self-directedness, Cooperativeness, and Self-transcendence), which indicate sociocultural learning and adaptive personality functioning (Cloninger, Svrakic, & Przybeck, 1993). Instead of the original true/false response format, a 5-point Likert-type TCI scale was applied. The Cronbach's alphas were 0.85 for Novelty seeking (NS), 0.93 for Harm avoidance (HA), 0.79 for Reward dependence (RD), 0.66 for Persistence (P), 0.89 for Self-directedness (SD), 0.90 for Cooperativeness (CO), and 0.91 for Self-transcendence (ST).

The psychobiological model of personality defines mature personality as a character configuration, which is characterized by high Self-directedness and high Cooperativeness (Cloninger et al., 1993; Josefsson et al., 2013). In relation to other models of personality, mature personality is characterized by increases in Conscientiousness and Agreeableness, and decreases in Neuroticism in the Five-Factor Model of personality (Roberts & Mroczek, 2008) or regarded in terms of two distinct categories – personality adjustment and growth – according to Staudinger and Kunzmann (2005). In this study, high Self-directedness and high Cooperativeness are used as indicators of mature personality.

3.3.4 IDEAL CARDIOVASCULAR HEALTH

G2 ideal cardiovascular health was measured twice in 2007 and 2012. The ideal cardiovascular health index comprises a number of ideal health behaviours and ideal health factors. The ideal cardiovascular health behaviours include a healthy body mass index (BMI; <25 kg/m^2), a healthy level of physical activity (moderate-intensity activity for ≥150 min/wk, vigorous-intensity activity for ≥75 min/wk, or an equivalent combination thereof), non-smoking (either never having smoked or having quit smoking >12 months previously), and having an ideal diet (4-5 components of an ideal diet): 4.5 or more cups of fruit and vegetables per day, two or more 3.5-oz servings of fish per week, three or more 1-oz servings of fiber-rich whole grains per day, less than 1,500 mg of sodium per day, and less than 450 kcal (36 oz) of sugar-sweetened beverages per week. Ideal cardiovascular health factors include having healthy levels of blood pressure (systolic blood pressure <120 mm Hg and diastolic blood pressure <80 mm Hg), total cholesterol (≤5.17 mmol/l (≤200 mg/dL)), and fasting glucose (<5.6. mmol/l (<100 mg/dL)). Details of the measurement procedures are provided by Raitakari and colleagues (2008). Each health metric has an assigned score of 1 (healthy) or 0 (not healthy*),* and the metrics were summed to obtain an index of ideal cardiovascular health ranging from 0 (the lowest level) to 7 (the highest). To examine the test-retest reliability of ideal cardiovascular health index, the data from 2007 and 2012 were used. The test-retest correlation was r = .66, p < .001. Compared to the participants with low scores, those achieving high scores (i.e., 6 or 7 points) on ideal cardiovascular health six years earlier were almost 10 times more likely also to score highly six years later, indicating moderate stability of the construct over time.

3.3.5 COVARIATES

It is recommended that studies of the intergenerational transmission of parenting quality should reflect similar contextual conditions in both generations (Conger et al., 2009). Accordingly, we controlled for several demographic and family characteristics in both generations in Studies I-II. The control variables were: Age (G1, G2, and G3 first child), gender (G2 and G3 first child), partnership status (G1 and G2; 0 = *not living with the partner*, 1 = *married/cohabiting*), the number of children (G1 and G2), SEP (G1 and G2), depressive symptoms (G1 and G2), participants' externalizing behaviour in childhood (G2), children living with the participants (G3; 0 = *no*, 1 = *yes*), and whether G3 were biological children of G2 (0 = *no; not a biological child (adopted child, stepchild or other),* 1 = *yes; a biological child*). SEP in studies related to the transmission of qualities of the parent–child relationship was used as a composite variable consisting of the years of education and annual family income (measured on an eight-point scale) in

1980 and 2007 or 2012 for G1 and G2, respectively. These two indices were first standardized and then averaged to form a single indicator. Six items were used to measure the child's externalizing behaviour (G2) in 1980, rated on a two-point scale derived from the Health Examination Survey (Wells, 1980); its predictive validity has been shown previously (Pulkki-Råback, Elovainio, Kivimäki, Raitakari, & Keltikangas-Järvinen, 2005). Depressive symptoms in G1 were assessed in terms of self-reported medication use for the alleviation of depressive symptoms in 1980, whereas Beck's Depression Inventory-II was used for G2 in 2007 (Cronbach's $\alpha = .92$) (Beck, Steer, & Brown, 1996). When personality was tested as a mediator and moderator in the transmission of qualities of the parent–child relationship (Study II), all the above-mentioned variables except depressive symptoms were also controlled for. Depressive symptoms were excluded from Study II because they correlate highly with personality traits and may act as a separate mediator in the model (Cloninger, Svrakic, & Przybeck, 2006).

While studying the transmission of SEP and its role in offspring cardiovascular health (Study III), G2 cardiovascular risk factors in childhood (1980) were controlled for. The clinical measurements included body mass index (BMI), blood pressure (systolic; mm Hg), and total cholesterol (obtained from venous blood samples; mg/dL), which have been shown to predict ideal cardiovascular health in the same data set (Laitinen et al., 2013). Chronic health conditions (G2; heart problems and diabetes, for example; *yes/no*) in childhood (in 1980) and in adulthood (in 2001) were also adjusted for to eliminate the effect of early morbidity on later SEP (Kawachi, Adler, & Dow, 2010).

3.4 STATISTICAL ANALYSES

Intergenerational transmission of the parent–child relationship qualities was examined using structural equation modelling (SEM) in STATA13.1, which allowed the measurement errors to be taken into account. The model was first tested following adjustment for age (G1, G2, and G3 of the first child) and gender (G2 and G3 of the first child), and then by controlling for all the covariates in both generations (age [G1, G2, and G3 of the first child], gender [G2 and G3 of the first child], the number of children [G1 and G2], partnership status [G1 and G2], SEP [G1 and G2], G2 externalizing behaviour in childhood, G3 biological children, and G3 living with G2). Model fit was assessed in accordance with the Comparative Fit Index (CFI), the Tucker-Lewis index (TLI) and the Root Mean Square Error of Approximation (RMSEA). CFI and TLI values close to 0.95 and RMSEA equal to or under .06 provide reliable evidence of a good model fit (Hu & Bentler, 1999). The maximum-likelihood estimation method in SEM was used to estimate the

parameters, and the stepwise approach was applied to test for measurement invariance (Acock, 2013). Given the large sample size and the sensitivity of the χ^2 test to sample size, CFI was used to evaluate the differences in invariance: model differences larger than 0.01 are considered a significant deviation (Cheung & Rensvold, 2002). Multiple-group SEM-based analyses were conducted to test for gender differences in the transmission of relationship qualities in the mother-son and mother-daughter dyads. Similarly, the model adjusted for age was first examined and then adjusted for all the covariates.

Mediating role of G2 personality and G2 education in the intergenerational transmission of parent–child relationship qualities was studied using Hayes (2013) approach and conducted in SEM. First, all temperament and character traits were included in one parallel multiple-mediator model and tested separately for emotional warmth and acceptance. Second, only the statistically significant mediators (i.e., SD and CO) were included in one model. To control for all the covariates, they were first regressed on G1 and G2 emotional warmth and acceptance, and then their residuals were used in the mediation models. The mediation role of G2 educational level was tested in a simple mediation model, which was first adjusted for G2 age and gender, and G1 years of education, and then for all the covariates. Finally, the multiple-mediator model was constructed to assess the mediating role of G2 character traits and education. Similarly, the model was first controlled for age, gender, and G1 years of education, and then for all the covariates. An indirect effect was calculated as a product of the paths going through the mediator, and tested by calculating the bias-corrected 95% confidence interval (BCa 95% CI) using the bootstrapping method with 5,000 resamples. Separate indirect effects were calculated for each mediator. The mediation proportion was the size of the total indirect effect relative to the total effect (expressed in percentages). The moderating role of G2 temperament and character traits in the association between G1 qualities of the parent–child relationship and G2 qualities of the parent–child relationship were tested by the linear regression analysis. The models were first adjusted for age and gender, and then for all the covariates.

Associations between parental SEP and ideal cardiovascular health of offspring were examined using linear regression analyses. Two models were constructed: the first was adjusted for G2 age, gender, childhood cardiovascular risk factors, and chronic health conditions, and then G2 SEP was added to the initially adjusted model. Path modelling was applied to test the intergenerational transmission of SEP and its role in G2 ideal cardiovascular health. To account for the effect of covariates they were first regressed on the main variables of interest, then their residuals were used in the path model. A mediation effect of adult SEP (2007) was conducted in the *sgmediation* package and confirmed using a bias-corrected 95% confidence

interval based on 5,000 bootstrapping samples. Mediation analyses were additionally conducted for each component of ideal cardiovascular health. Linear regression analysis was used to investigate the effect of social mobility on ideal CVH following adjustment for G1 SEP and all the covariates.

All statistical analyses were performed using STATA 13.1 (StataCorp, 2013).

4 RESULTS

4.1 TRANSMISSION OF PARENT–CHILD RELATIONSHIP QUALITIES

4.1.1 EXTENT OF TRANSMISSION

The first task was to estimate measurement invariance in the qualities of the parent–child relationship across generations. The first level of invariance (same-form model) requires the same set of indicators to be relevant to the latent variable. This was used as the baseline model for further comparison. The model fit was acceptable (χ^2 (71) = 452.1, p < .001, CFI = 0.914, TLI = 0.892, and RMSEA = 0.062). Based on the modification indices, the error terms between the variables "My child is important to me" and "I am important to my child" were allowed to correlate for G2. This improved the model fit (χ^2 (72) = 311.2, p < .001, CFI = 0.946, TLI = 0.932, and RMSEA = 0.048) and was allowed in all further analyses. The second level of invariance (equal-loading model) requires the constraining factor loadings to be equal while allowing residual variances to vary. The model fit was good and did not differ significantly from the baseline model (χ^2 (77) = 339.4, p < .001, CFI = 0.941, TLI = 0.930, and RMSEA = 0.049). Finally, the restrictive invariance measurement (both the loadings and the error variances are invariant) was estimated, resulting in the following model fit (χ^2 (84) = 591.1, p < .001, CFI = 0.885, TLI = 0.876, and RMSEA = 0.065). Given the model fit, the equal-loading model was established and used in further analyses.

The transmission of qualities of the parent–child relationship was tested first following adjustment for age (G1, G2, and G3) and gender (G2 and G3). The model fit was good (χ^2 (76) = 337.87, p < .001, CFI = 0.938, TLI = 0.925, and RMSEA = 0.049). G1 emotional warmth predicted G2 emotional warmth after 27 years (β = .21, p < .001). The association between G1 and G2 acceptance was marginally significant (β = .08, p = .088). The direct paths both from G1 acceptance to G2 emotional warmth and from G1 emotional warmth to G2 acceptance were non-significant (ps > .393), and were therefore excluded from the further analyses.

Figure 3 presents the results from the fully-adjusted model. For this model, residuals of the main variables adjusted for all variables (age [G1, G2, and G3 first child], gender [G2 and G3 first child], SEP [G1 and G2], partnership status [G1 and G2], the number of children [G1 and G2], depressive symptoms [G1 and G2], G2 externalizing behaviour in childhood, G3 children living with G2, and G3 biological children) were used. The model

fit was good (χ^2 (77) = 242.4, p < .001, CFI = .957, TLI = .949, and RMSEA = .039). G1 emotional warmth remained a significant predictor of G2 emotional warmth. The association between G1 and G2 acceptance was marginally significant but similar in magnitude to the age- and gender-adjusted model.

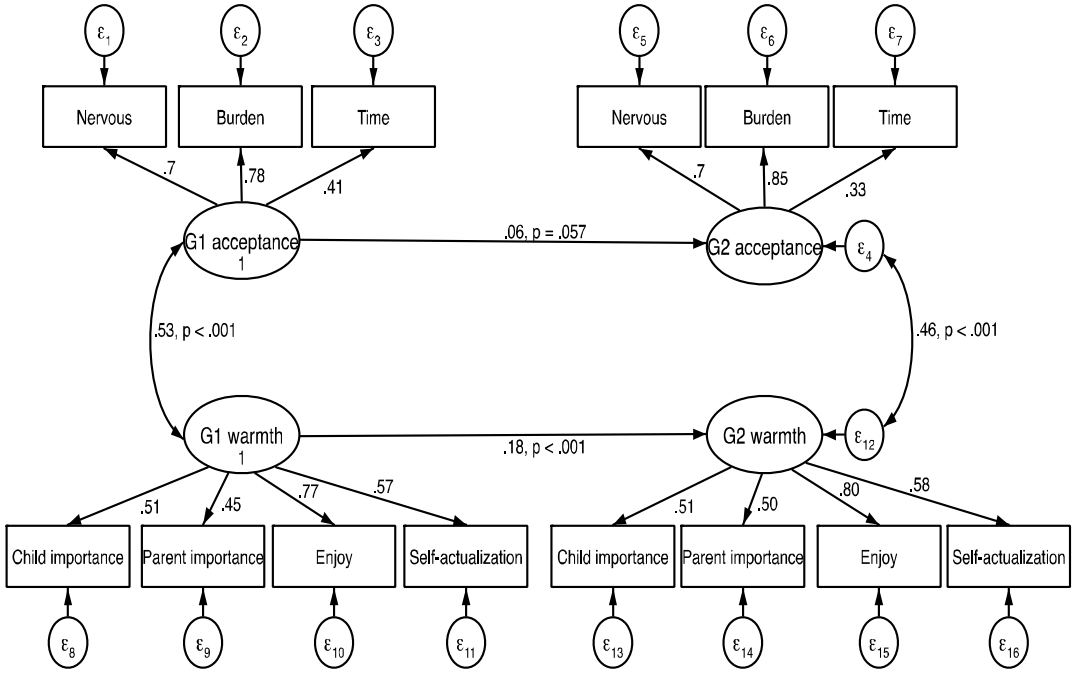


Figure 3. The intergenerational transmission of parent–child relationship qualities. standardized coefficients are reported and paths with non-significant coefficients are omitted.

G2 age ranged from three to 18 years when the qualities of the G1 parent–child relationship were assessed. Similarly, G3 age ranged from one to 31 years during the assessment of G2 parent–child relationship qualities. To compensate for this age difference, additional analyses were conducted with age-standardized measures of G1 relationship qualities within G2 cohorts and G2 relationship qualities within G3 cohorts. The results resembled those obtained in the linear regression analyses based on unstandardized measures (data not shown). Moreover, no significant moderating role of G2 or G3 age was found in the transmission of acceptance and emotional warmth (all *p*s > .629), indicating that the association of G1 relationship qualities with G2

relationship qualities was not significantly different across the developmental phases of the offspring.

4.1.2 GENDER DIFFERENCES

G2 gender was tested as a potential moderator in the transmission of parent–child relationship qualities, adjusted first only for age and then for all the covariates. Table 4 presents the results of the unconstrained model, in which no assumptions about equality were made, and of the constrained model with equal intercepts and factor loadings. As indicated by the significant multiple-group comparison (χ^2 (27) = 328.7, p < .001), the transmission of emotional warmth was almost twice as strong among G2 men (β = .26, *p* < .001) than among G2 women (β = .14, *p* < .001). There was no gender difference in the transmission of acceptance across generations.

Table 4. The Intergenerational Transmission of Parent–child Relationship Qualities in Mother–son and Mother–daughter Dyads (fully adjusted model)

	G2 sons (n = 541)			G2 daughters (*n* = 877)		
	B	β	*p-value*	B	β	*p-value*
G1 acceptance predicting G2 acceptance						
Model 1	0.06	.06	.239	0.05	.06	.193
Model 2	0.06	.06	.226	0.05	.06	.193
G1 warmth predicting G2 warmth						
Model 1	0.33	.26	< .001	0.08	.13	.008
Model 2	0.27	.26	< .001	0.10	.14	.004

Note. G1 = Generation 1, G2 = Generation 2.
B, unstandardized linear regression coefficient; β, standardized linear regression coefficient. The models are adjusted for age (G1, G2, and G3 first child), gender (G2 and G3 first child), SEP (G1 and G2), partnership status (G1 and G2), the number of children (G1 and G2), depressive symptoms (G1 and G2), G2 externalizing behaviour in childhood, G3 children living with G2, and G3 biological children.
Model 1. Unconstrained solution (no assumptions made about equality):
χ^2 (146) = 346.7, p < .001, CFI = 0.947, TLI = 0.934, and RMSEA = 0.044.
Model 2. Constrained solution (equal intercepts and factor loadings):
χ^2 (168) = 414.4, p < .001, CFI = 0.935, TLI = 0.930, and RMSEA = 0.046.

4.1.3 PERSONALITY AND EDUCATION

The character traits of the TCI model – Self-directedness and Cooperativeness – were found to mediate the transmission of qualities of the parent–child relationship (all *p*s ≤ .050). No mediating role for any of the temperament traits (Novelty Seeking, Harm avoidance, Reward dependence, and Persistence) was found (all *p*s > .240).

Figure 4 presents the results from the single mediation model of G2 Self-directedness on the relation between G1 and G2 acceptance, adjusted for age and gender. Higher levels of G1 acceptance predicted higher G2 SD in adulthood (however, the association was small in magnitude), and higher G2 SD, in turn, predicted higher levels of G2 acceptance towards own children. The total effect of G1 acceptance on G2 acceptance was statistically significant (*c* = 0.07 (*SE* = 0.03), *p* = .035). The coefficients were similar in direction and magnitude when adjusted for all covariates (data not shown). The indirect effect was significant in the model adjusted for age and gender (*ab* = 0.01, *SE* = 0.01, bias-corrected bootstrapped 95% CIs [0.001, 0.025]), but attenuated by 1.4% and became non-significant in the fully-adjusted model (*ab* = 0.01, *SE* = 0.01, BCa 95% CI [-0.001, 0.027]). The proportion of total effect that was mediated by Self-directedness was 14%.

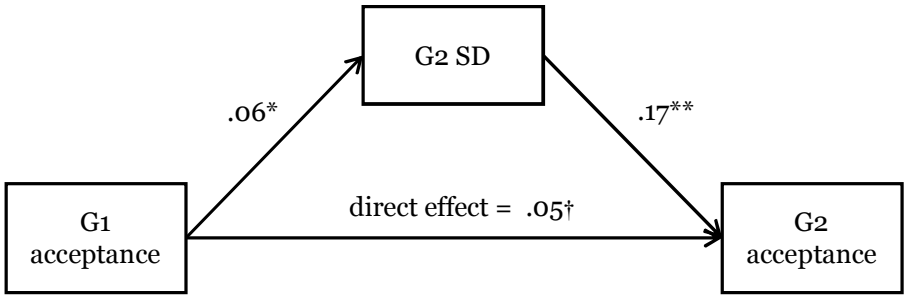


Figure 4. The mediation effect of offspring Self-directedness (SD) in the association between G1 and G2 acceptance, adjusted for age and gender.
Note. Standardized coefficients are reported. Standardized indirect effect: *ab* = 0.01, BCa 95% CI (0.001, 0.025). G1 = Generation 1, G2 = Generation 2. ***$p < .001$, **$p < .01$, *$p < .05$, †$p < .10$.

Figure 5 shows the results from the multiple mediation model of G2 Self-directedness and Cooperativeness on the transmission of G1 and G2 emotional warmth, adjusted for age and gender. Higher G1 emotional warmth predicted higher G2 SD and CO in adulthood (the associations were small in magnitude, however), and higher G2 SD and CO predicted higher emotional warmth towards G3. The total effect of G1 emotional warmth on

G2 emotional warmth was statistically significant (c = 0.11 (SE = 0.02), p < .001). The associations were similar in the fully-adjusted model (data not shown). Bias-corrected bootstrapped 95% CIs for the total indirect effect (ab = 0.02, SE = 0.01) were above zero and therefore statistically significant in the age- and gender-adjusted model (0.005, 0.030), and in the fully adjusted model (0.002, 0.027). The proportion of the total association of G1 emotional warmth with G2 emotional warmth mediated by both SD and CO was 13% in the fully adjusted model.

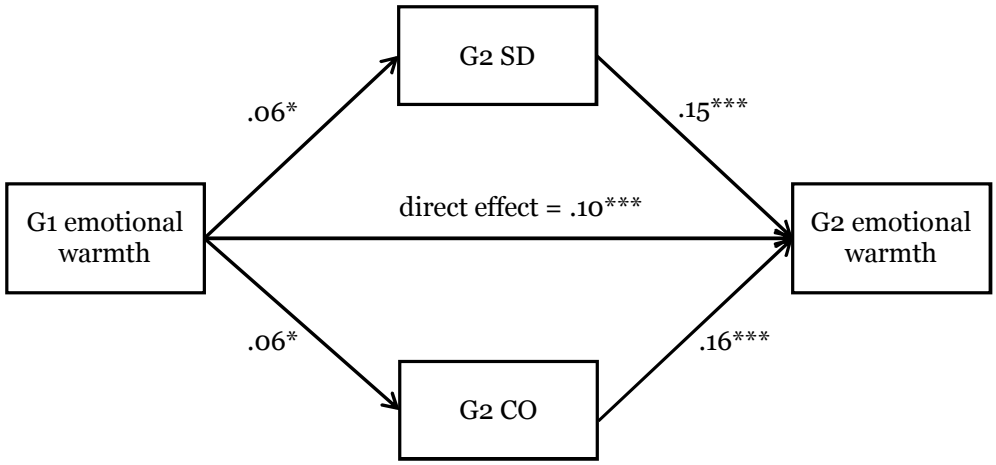


Figure 5. The mediation effect of offspring Self-directedness (SD) and Cooperativeness (CO) in the association between G1 and G2 emotional warmth adjusted for age and gender.
Note. Standardized coefficients are reported. Standardized indirect effect: ab = 0.02, BCa 95% CI (0.005, 0.030). The error terms of G2 SD and G2 CO were allowed to correlate.
G1 = Generation 1, G2 = Generation 2. ***p < .001, **p < .01, *p < .05.

Figure 6 presents the results from the multiple mediator model of G2 Self-directedness, Cooperativeness and education in the transmission of emotional warmth across generations, adjusted for age (G1, G2, and G3), gender (G2 and G3) and G1 education. The total indirect effect was statistically significant (ab = 0.02, SE = 0.01, BCa 95% CI [0.003, 0.030]). The specific indirect effect were marginally significant for SD and CO (SD: ab = 0.01, SE = 0.01, p = .046), CO: ab = 0.01, SE = 0.01, p = .027), and non-significant for education (ab = -0.00, SE = 0.00, p = .438). The coefficients were similar when adjusted for all the covariates (data not shown). The proportion of the total association mediated was 16% in this model.

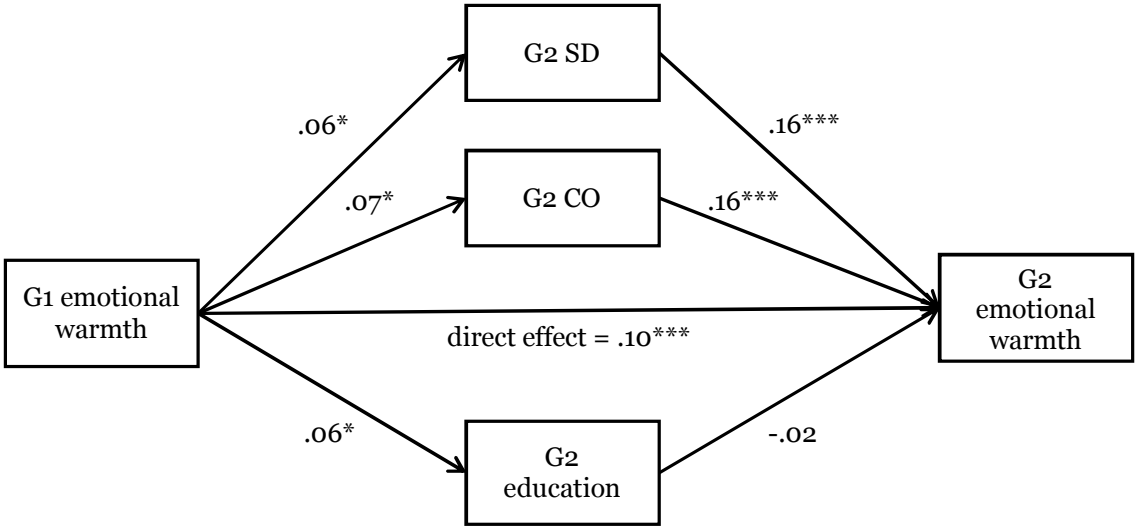


Figure 6. The mediating role of offspring Self-directedness (SD), Cooperativeness (CO) and years of education in the association between G1 and G2 emotional warmth (n = 1,308).
Note. Standardized coefficients are reported. Standardized indirect effect: *ab* = 0.02, BCa 95% CI (0.003, 0.030). The error terms of G2 SD, G2 CO and G2 education were allowed to correlate.
G1 = Generation 1, G2 = Generation 2. ***p < .001, **p < .01, *p < .05

The mediating role of G2 education in the transmission of emotional warmth was also tested in a single mediation model (Figure 5), which was adjusted for age (G1, G2, and G3), gender (G2 and G3), and G1 education. Higher G1 emotional warmth was associated with higher G2 education in adulthood (standardized beta [β] = .08, p = .003), and G2 education was related to higher G2 emotional warmth towards G3 (β = .06, p = .039). The total effect was statistically significant (β = 0.13, p < .001), but the indirect effect was nonsignificant (ab = 0.00, SE = 0.00, BCa 95% CI [-0.000, 0.011]). In the fully adjusted model, the direct path from G2 education to G2 emotional warmth became nonsignificant (p = .314).

G2 temperament and character traits were also tested as moderators in the transmission of parent–child relationship qualities (Table 5). No significant interactions were found between G1 qualities of the parent–child relationship and G2 temperament and character traits on G2 qualities of the parent–child relationship in the age- and gender-adjusted model or in the fully-adjusted model.

Table 5. Transmission of Qualities of the Parent–Child Relationship across Generations Moderated by the Temperament and Character Traits of (G2) Offspring

		Transmission of emotional warmth			Transmission of acceptance		
Moderator		B* (SE)	95% CI	*p*-value	B* (SE)	95% CI	*p*-value
G2 temperament traits							
Novelty seeking	Model 1	-0.11 (0.06)	-0.23, 0.01	.064	-0.05 (0.07)	-0.19, 0.09	490
	Model 2	-0.10 (0.06)	-0.22, 0.02	.092	-0.06 (0.07)	-0.20, 0.08	.417
Harm avoidance	Model 1	-0.01 (0.04)	-0.09, 0.08	.903	0.03 (0.06)	-0.08, 0.14	.608
	Model 2	-0.00 (0.04)	-0.09, 0.08	.949	0.03 (0.05)	-0.08, 0.14	.560
Reward dependence	Model 1	-0.09 (0.06)	-0.20, 0.02	.101	0.08 (0.07)	-0.05, 0.21	.242
	Model 2	-0.08 (0.06)	-0.18, 0.04	.183	0.08 (0.07)	-0.05, 0.21	.244
Persistence	Model 1	-0.00 (0.04)	-0.09, 0.08	.965	-0.07 (0.05)	-0.17, 0.04	.230
	Model 2	-0.00 (0.04)	-0.09, 0.08	.908	-0.06 (0.05)	-0.17, 0.04	.247
G2 character trait							
Self-directedness	Model 1	-0.01 (0.06)	-0.12, 0.11	.893	-0.06 (0.07)	-0.19, 0.09	.442
	Model 2	-0.00 (0.06)	-0.12, 0.11	.968	-0.05 (0.07)	-0.18, 0.09	.507
Cooperativeness	Model 1	-0.06 (0.06)	-0.18, 0.07	.377	0.02 (0.07)	-0.12, 0.17	.760
	Model 2	-0.06 (0.06)	-0.18, 0.07	.374	0.03 (0.07)	-0.11, 0.17	.656
Self-transcendence	Model 1	-0.05 (0.04)	-0.14, 0.04	.276	0.03 (0.05)	-0.08, 0.13	.580
	Model 2	-0.04 (0.04)	-0.12, 0.05	.416	0.04 (0.05)	-0.06, 0.14	.452

Note. B, unstandardized linear regression coefficient; SE, standard error; CI, confidence intervals.

Model 1 is adjusted for age (G1, G2, and G3) and gender (G2 and G3). Model 2 is adjusted for all covariates (age [G1, G2, and G3 first child], gender [G2 and G3 first child], SEP [G1 and G2], partnership status [G1 and G2], the number of children [G1 and G2], G2 externalizing behaviour in childhood, G3 children living with G2, and G3 biological children).

*Bs are the interaction terms between G1 parent–child relationship qualities x G2 temperament and character traits on G2 parent–child relationship qualities.

4.2 TRANSMISSION OF SOCIOECONOMIC POSITION AND IDEAL CARDIOVASCULAR HEALTH

4.2.1 CONTINUITY IN SOCIOECONOMIC POSITION AND IDEAL CARDIOVASCULAR HEALTH

Parental (G1) socioeconomic position predicted SEP among offspring (G2) 27 (β = .29, p < .001) and 32 (β = .23, p < .001) years later after controlling for G2 age and gender. G1 favorable family socioeconomic position was associated with better adulthood cardiovascular health in G2 independently of age, gender, childhood cardiovascular risk factors, and chronic health conditions in childhood and early adulthood (β = .13, p < .001), and after additional adjustment for the offspring's own SEP in adulthood (β = .09, p = .019). A dose-response pattern was observed showing an increasing tendency towards ideal cardiovascular health among offspring in line with rising levels of parental SEP (Figure 7). The results with the imputed data (n = 2,124) were statistically significant and similar in direction and magnitude to the findings in the complete data (data not shown).

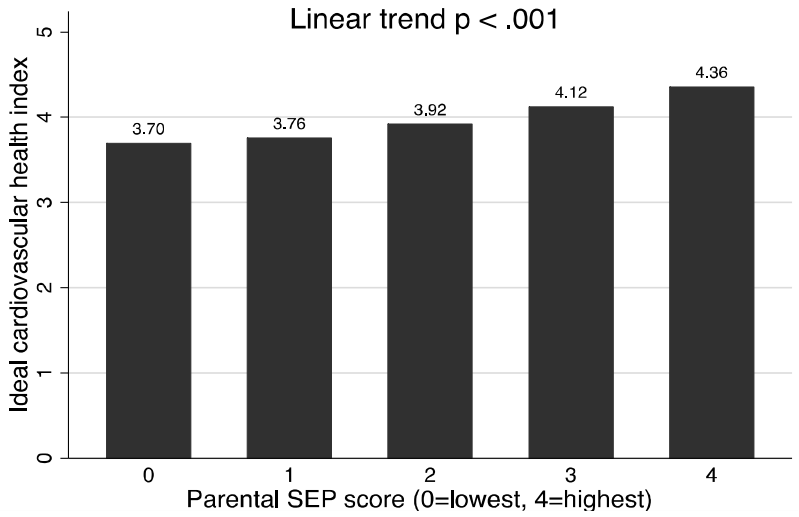


Figure 7. Mean levels of ideal cardiovascular health among offspring in adulthood in line with the parental SEP score.

The results from the path modelling (Figure 8) show the associations between G1 SEP, G2 SEP and G2 ideal cardiovascular health at two-time points (2007 and 2012). The model was adjusted for G2 age, gender, childhood cardiovascular risk factors, and chronic conditions in 1980 and 2001. The model fit was good (χ^2 (2) = 1.336, p = .513, CFI = 1.00, TLI = 1.00, and RMSEA = 0.000). As mentioned above, higher G1 SEP was associated with higher G2 SEP, and higher G2 SEP (2007) was related to higher G2 incidence of ideal cardiovascular health in adulthood (2012) (Figure 8). The mediation analysis confirmed that high G2 SEP mediated the association between G1 SEP and G2 cardiovascular health (*ab* = 0.05, BCa 95% CI [0.03, 0.08]). The proportion of the total effect mediated by G2 SEP was 33%. With one exception, the associations in the path model with the imputed data were similar to the results from the complete data (the path from ideal cardiovascular health in 2007 to adult SEP in 2012 became statistically significant in the imputed data).

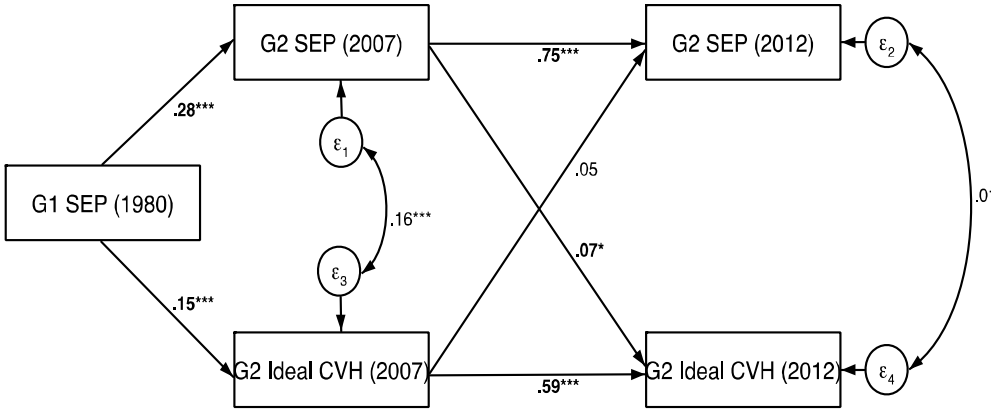


Figure 8. Parental (G1) socioeconomic position (SEP) in childhood, offspring (G2) SEP and offspring (G2) ideal cardiovascular health (ideal CVH) from two time-points in adulthood: standardized coefficients are reported and the model is adjusted for age, gender, childhood cardiovascular risk factors, and chronic conditions in 1980 and 2001.
***p < .001, **p < .01, *p < .05.

Table 6 presents the results from the additional mediation analyses conducted for each component of ideal cardiovascular health index. Among ideal health behaviours, a mediating role of G2 SEP was found for physical activity (*ab* = 0.04, BCa 95% CI [0.01, 0.07]) and non-smoking (*ab* = 0.06, BCa 95% CI [0.03, 0.10]) in 2012. No significant indirect effects through G2 SEP were found for the ideal-health factors (all *ps* > .05). The original

mediation analyses were repeated excluding physical activity and non-smoking from ideal cardiovascular health index, but the significant indirect effect of adult SEP on ideal cardiovascular health index remained (*ab* = 0.02, BCa 95% CI [0.001, 0.042]). This indicates that not only did G2 SEP mediate the association between G1 SEP and these two health behaviours, there was also a mediation effect of adult SEP on the entire cardiovascular health index.

Table 6. The Associations between Parental Socioeconomic Position (SEP) and Ideal Cardiovascular Health among Offspring in Adulthood Mediated by Offspring SEP

Ideal Cardiovascular Health	Total effect	Indirect effect
Ideal Health Factors		
Ideal level of blood pressure	**0.14 (0.05, 0.23)**	0.02 (-0.01, 0.04)
Ideal level of plasma glucose	**0.13 (0.03, 0.24)**	0.01 (-0.02, 0.04)
Ideal level of total cholesterol	-0.02 (-0.13, 0.07)	0.01 (-0.02, 0.04)
Ideal Health Behaviours		
Ideal level of body mass index	**0.13 (0.04, 0.22)**	0.02 (-0.01, 0.05)
Ideal level of physical activity	0.05 (-0.56, 0.13)	**0.04 (0.01, 0.07)**
Healthy diet	0.13 (-0.03, 0.25)	0.02 (-0.03, 0.07)
Non-smoking	0.03 (-0.08, 0.14)	**0.06 (0.03, 0.10)**

Note. Unstandardized coefficients are reported for the total and indirect effects, and bias-corrected bootstrapped 95% confidence intervals based on 5,000 bootstrap samples are presented in brackets. The model is adjusted for G2 age, gender, childhood cardiovascular risk factors, and chronic health conditions in 1980 and 2001.

4.2.2 UPWARD SOCIAL MOBILITY AND IDEAL CARDIOVSCULAR HEALTH

As indicated in Figure 9, the upwardly mobile participants (i.e., participants with low parental SEP but higher achieved SEP) had 0.49 points higher ideal cardiovascular health score in adulthood compared to participants with a stable SEP (M = 4.05 vs. 3.56, $p < .001$). Given that improvements in SEP are manifest in different ways (e.g., rising from the lowest to the highest, from the lowest to the middle, or from the middle to the highest level), interactions between upward mobility and parental SEP on ideal cardiovascular health were examined to establish whether the effect of upward mobility depends on the nature of the rise. No significant interactions were found (p = .330), indicating that upward social mobility was similarly associated with ideal CVH across different levels of parental SEP. Upward mobility did not fully compensate for the effects of low parental SEP, however, which remained a significant predictor of ideal CVH in the regression model adjusted for all

covariates (β = .22, $p < .001$). The results with the imputed data were similar in direction and magnitude to the findings in the complete data (data not shown).

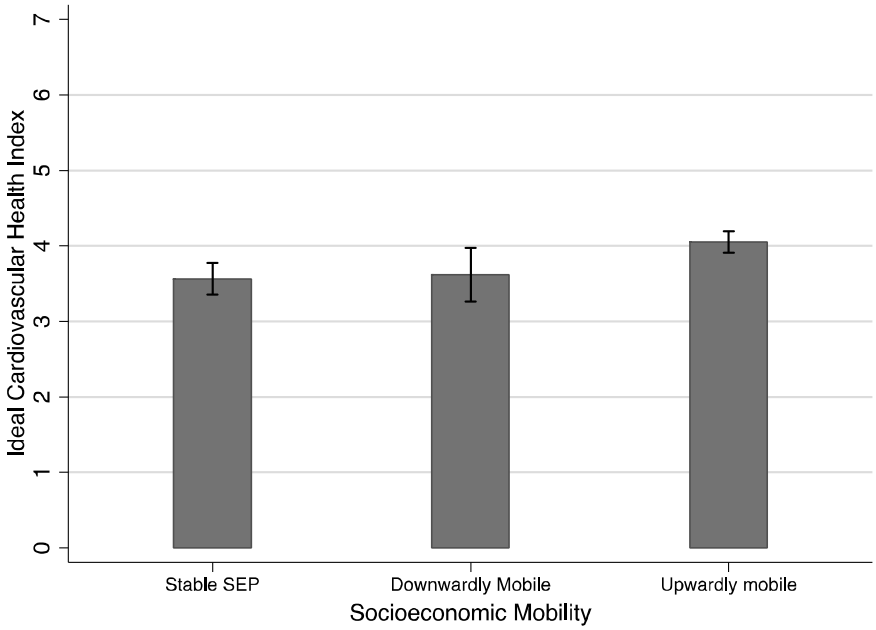


Figure 9. Mean levels and 95% confidence intervals of the ideal CVH index in adulthood in the different SEP groups.

5 DISCUSSION

This thesis examined the intergenerational transmission of the family environment, the underlying mediating and moderating factors, and the role of the transmission in the long-term cardiovascular health of offspring. The family environment was conceptualized as exposure of the child stemming from parental characteristics, measured as qualities of the parent–child relationship (emotional warmth and acceptance) and parental socioeconomic position. The study was based on prospective two-generation data spanning 32 years from the population-based Young Finns study. The main findings were that: 1) qualities of the parent–child relationship were transmitted over generations in a domain-specific way (e.g., emotional warmth predicted emotional warmth but not the other domain); 2) the transmission of parent–child relationship qualities was stronger in mother-son than in mother-daughter dyads; 3) a mature personality of offspring (high Self-directedness and high Cooperativeness) partially mediated the transmission of warm parent–child relationship qualities; 4) the transmission of a high socioeconomic position from parents to children partly explained ideal cardiovascular health of offspring later in life; and 5) participants with a higher achieved SEP than their parents (who were upwardly mobile) had better cardiovascular health in adulthood than those who stayed on the same SEP level. Overall, the findings of this thesis indicate that the family environment not only recurs across generations but also influences cardiovascular health of the succeeding generation.

5.1 INTERGENERATIONAL TRANSMISSION OF PARENT–CHILD RELATIONSHIP QUALITIES

5.1.1 EXTENT OF TRANSMISSION

The qualities of the parent–child relationship – emotional warmth and acceptance – were found to be transmitted across generations. The transmission was present even after controlling for a wide range of similar contextual characteristics in both generations (e.g., age and gender, SEP, the number of children, and partnership status). Transmission was also domain-specific: children who experienced warmth in their relationship with their parents were likely to have an emotionally warm relationship with their own offspring. Similarly, participants experiencing acceptance in their relationship with parents were likely to be accepting parents when they had children of their own. Notably, the domains were not mutually predictive: emotional

warmth in one generation did not predict acceptance in the next one, nor did acceptance in the previous generation predict emotional warmth in the following one. In other words, transmission was present only in specific domains as opposed to a generally positive tone of the parent–child relationship.

The intergenerational transmission of qualities of the parent–child relationship were modest in extent, but on a similar level as found in previous studies (for a review, see Conger et al., 2009). The identified association of emotional warmth (effect size .18) was similar in magnitude to what has been reported (around .17-.40) (Lundberg, Perris, Schlette, & Adolfsson, 2000; Madden et al., 2015; Schneewind & Ruppert, 1998; Tanaka et al., 2009). The findings of this study add to the literature in showing that emotional warmth is likely to be transferred from parents to children when measured prospectively and similar contextual characteristics in both generations are controlled for. The intergenerational transmission of acceptance was low (effect size .06) and marginally significant, which raises the question of whether there is any such transmission. To the best of our knowledge, this was the first study to investigate the intergenerational transmission of a parent–child relationship characterized as accepting, and further studies are needed to ascertain whether acceptance is transmitted from parents to children. Given that acceptance is more likely than emotional warmth to be dependent on cultural changes in society, the finding may be dependent on the cultural context or historical time of the study. For example, the corporal punishment of children was prohibited in Finland in 1984, which could be reflected in the parenting and parent–child relationships of younger generations.

According to the psychosocial approach adopted in the present study, the transmission of relationship qualities across generations is likely to operate through the processes of social learning and early attachment (Van IJzendoorn, 1992). Although not investigated in this study, an alternative explanation is that quality of the parent–child relationship is heritable and may be simply attributable to the similar genetic composition that parents and offspring share. The heritability of maternal parenting quality (e.g., warmth, positivity, and control) was first demonstrated in the field of behavioural genetics (Kendler & Baker, 2007) and later in the candidate-gene studies focusing on dopamine, serotonin, oxytocin, and arginine vasopressin receptor genes (Mileva-Seitz, Bakermans-Kranenburg, & van IJzendoorn, 2016). Results based on behavioural genetics indicate a modest-to-moderate genetic impact on some dimensions of parenting (Kendler & Baker, 2007; Spinath & O'Connor, 2003), whereas the overall finding in the candidate-gene studies is that different genetic variants relate to diverse maternal behavioural endpoints (Lomanowska, Boivin, Hertzman, & Fleming, 2015; Mileva-Seitz et al., 2016). According to the most recent review of mechanisms in parenting, the transmission of parenting quality stems from similarities in genetics and in

environments (Mileva-Seitz et al., 2016). The exact mechanisms remain unclear, however. Given the complex nature of parenting behaviour, further studies on the transmission of parenting quality should take account of both psychosocial and genetic approaches.

5.1.2 MODERATING FACTORS OF TRANSMISSION

An understanding of the factors that may strengthen or reduce the transmission of parent–child relationship qualities may significantly improve the targeting of early interventions aimed at enhancing the well-being of at-risk families (Conger et al., 2009). This study focused on the moderating role of gender and personality in the transmission of parent–child relationship qualities. As far as gender as a moderator is concerned, the findings showed that the intergenerational transmission of acceptance was similar in mother-son and mother-daughter dyads, whereas the transmission of emotional warmth was stronger in mother-son (effect size .26) than in mother-daughter dyads (effect size .14). In other words, men who had an emotionally warm relationship with their mothers in childhood were more likely to transmit this emotional warmth to their own children than women experiencing the same level of maternal warmth in childhood. This finding is in line with the results of a previous study (Madden et al., 2015) demonstrating that a higher level of maternal affection was related to positive parenting behaviour among sons, but not daughters.

It has been suggested that girls and boys react differently to the same parenting quality, and that boys are particularly susceptible to the emotional atmosphere in the family (e.g., Davidov & Grusec, 2006). There is evidence, for instance, that maternal warmth predicts higher levels of peer-group acceptance along with the better regulation of positive affect among boys, but not girls (Davidov & Grusec, 2006). In contrast, an unfavourable emotional atmosphere within a family (i.e., divorce) has been linked to a higher incidence of externalizing problems in boys than in girls (Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001). It has also been reported that boys are more sensitive to maternal depressive symptoms in childhood with respect to their emotional regulation (Malone et al., 2004). As such, our findings are in line with previous research results indicating stronger links for mother–son dyads than for mother–daughter dyads in terms of emotional warmth (Davidov & Grusec, 2006; Madden et al., 2015), but do not align with studies reporting a stronger association among same-sex dyads (Belsky et al., 2005; Isley, O'Neil, Clatfelter, & Parke, 1999).

The hypothesized moderating role of the personality traits of offspring in the transmission of qualities of the parent–child relationships was based on prior knowledge (McCabe, 2014) where protective personality traits were suggested to strengthen the transmission of positive qualities. Nevertheless,

our analyses did not identify a moderating role of offspring temperament or character traits in the intergenerational transmission of either emotional warmth or acceptance. These results are preliminary, however, and more studies are needed to investigate this issue, based on the observed measures of qualities of the parent–child relationship.

5.1.3 EXPLANATORY PATHWAYS

The present study also examined the pathways underlying the intergenerational transmission of qualities of the parent–child relationship. The model of child competent development (Conger et al., 2009) was applied to explain the hypothesis that warm and accepting qualities of the parent–child relationship provides a basis for such development, which in turn is related to the child's own warm and accepting relationship later in life. In line with the hypothesis, the personality traits reflecting psychological maturity and competent development – Self-directedness and Cooperativeness – partially mediated the intergenerational transmission of positive qualities. High Self-directedness is characterized by a person's responsibility, the ability to adapt one's behaviour in accordance with individually chosen goals, and being in control of one's life. Cooperativeness, in turn, reflects the ability to express empathy and benevolence and to conceive of oneself as an integral part of society (Cloninger et al., 1993). Our findings indicate that children who experienced higher levels of parental acceptance and emotional warmth early in life are likely to develop more self-directed and cooperative traits as adults. This accords with previous studies showing that the development of a mature personality arises from secure, emotionally warm interaction with parents (Josefsson et al., 2013). Mature personality traits, in turn, were associated with more warm and supportive relationship qualities towards their own children. Given the various positive outcomes associated with a mature personality, such as marital stability and good relations with others (Hogan & Roberts, 2004), these environmental correlates may help parents to provide emotionally supportive quality of the parent–child relationship. Our findings are in line with those from two previous studies (Kitamura et al., 2009; Tanaka et al., 2009), which nevertheless were cross-sectional in design and relied on retrospective reports of parenting quality. Thus, our results provide a new prospective, longitudinal evidence, indicating that the character traits of offspring represent a pathway whereby certain qualities of the parent–child relationship are transmitted across generations.

Self-directedness and Cooperativeness of offspring together explained 16% of the intergenerational transmission of emotional warmth. This is a relatively high percentage, given that qualities of the parent–child relationship may depend on several factors, including contextual factors, genetic factors, and personality traits. Self-directedness (but not Cooperativeness) mediated the

transmission of acceptance, although this mediation became non-significant following adjustment for all contextual characteristics in both generations.

In addition to character traits representing psychological maturity, the years of education were also tested as a mediator in the transmission of parent–child relationship qualities. Included with character traits, Self-directedness and Cooperativeness were stronger mediators than the offspring's years of education. The mediation model revealed no mediating role of offspring education, which contradicts previous findings showing that child's academic achievements serve as a means in the transmission of positive parenting across generations (Neppl et al., 2009). Further studies should examine the mediating role of education and other socioeconomic resources in the transmission of parenting quality across generations.

5.2 INTERGENERATIONAL TRANSMISSION OF SOCIOECONOMIC POSITION AND IDEAL CARDIOVASCULAR HEALTH OF OFFSPRING

5.2.1 TRANSMISSION OF SOCIOECONOMIC POSITION AND IDEAL CARDIOVASCULAR HEALTH

The socioeconomic position of parents was found to play a role in offspring own SEP in adulthood (effect size is .28). These results are in line with those reported in a recent Finnish study showing that parental education, income and social class are likely to predict occupational status later in life (Erola et al., 2016).

The transmission of SEP across generations was further found to predict ideal cardiovascular health of offspring in adulthood. In other words, the role of parental SEP in future ideal cardiovascular health of offspring was partially transmitted through the offspring's own SEP in adulthood, which accounted for 33% of the association. Thus, the family socioeconomic environment during childhood was a predictor of socioeconomic position in adulthood, which in turn was associated with ideal cardiovascular health in middle age. Among the specific ideal CVH metrics, the transmission of SEP was especially important for such health behaviours as the level of physical activity and non-smoking. Overall, these findings imply that the intergenerational transmission of SEP is an underlying factor in the development of cardiovascular health over the life course.

Offspring SEP accounted for some of the association between parental SEP and adult ideal cardiovascular health, and it is obvious that other factors not measured in this study are also involved. Although the identification of

mechanisms explaining the association between early SEP and long-term ideal cardiovascular health of offspring was beyond the scope of this study, psychological, behavioural, and biological mechanisms are usually highlighted as explanatory factors in this association (Havranek et al., 2015). First, early family SEP may affect future cardiovascular health through its impact on mental health: living in adverse SEP conditions is linked to higher levels of depression and overall emotional distress, which in turn is related to a higher risk of developing cardiovascular diseases (Havranek et al., 2015; Miller, Chen, & Cole, 2009). Second, smoking, a poor diet, and a lack of physical activity – known behavioural risk factors for cardiovascular diseases – tend to be more prevalent among low-SEP individuals (Havranek et al., 2015), and may mediate the association of early SEP with later ideal CVH. Finally, a commonly proposed biological pathway involves the allostatic load, which is a marker of biological wear and tear on the body and represents the physiological response to adverse early-life conditions (Danese & McEwen, 2012; Taylor, 2010).

5.2.2 UPWARD SOCIAL MOBILITY AND IDEAL CARDIOVASCULAR HEALTH

Another goal was to examine the extent to which upward social mobility may mitigate the impact of a low SEP in childhood on ideal cardiovascular health in adulthood. Our findings demonstrated that people who had climbed the social ladder had better cardiovascular health in adulthood than those who stayed in lower SEP. Although upward mobility did have a mitigating role, it still did not reverse all the effects of parental SEP on future ideal cardiovascular health. It seems that early socioeconomic circumstances are likely to leave a permanent mark on future cardiovascular health, emphasizing the need for early-life prevention. Although not all previous studies report a protective role of upward mobility (e.g., Poulton et al., 2002), our results are in line with findings from Swedish prospective studies, according to which the upwardly mobile people have a lower risk of hypertension and cardiovascular mortality than individuals with a stable low SEP (Hogberg et al., 2012; Tiikkaja & Hemstrom, 2008). The similarity of our findings with these results from Sweden may be attributable to the similar educational and social structures of these Northern European countries, including free-of-charge secondary and university-level education, which may provide more opportunities for social mobility.

In line with previous prospective studies showing the long-term effect of the early psychosocial environment on cardiovascular health of offspring (e.g., Appleton et al., 2013; Pulkki-Råback et al., 2015), the present study also demonstrates the important role of parental SEP in adult SEP and ideal cardiovascular health. It should be noted, however, that the transmission of SEP and its role in CVH may be attributable to social selection, meaning that

that the traits and dispositions of parents influence their SEP and, at the same time, health of their children (Conger & Donnellan, 2007; Schofield et al., 2011). As such, individual differences that seem to influence parental SEP (e.g., personality and intelligence) may be passed on to offspring and influence their own SEP and health. Based on the present study, it is not possible to say whether social-selection processes lie behind the transmission of SEP. Nevertheless, given that both processes – social causation and social selection – usually go on at the same time (Conger & Donnellan, 2007; Schofield et al., 2011), one might assume that the processes involved in the transmission of SEP and its effects on future cardiovascular health are complex and extend beyond them. There is thus a clear need for further studies taking these two processes and their complex interplay into account.

5.3 METHODOLOGICAL CONSIDERATIONS

Few studies have examined intergenerational transmission in prospective research spanning two generations. The main strength of this study is its truly intergenerational design that fulfils the criteria presented by Thornberry (2016). These criteria include: 1) having prospective data from two generations; 2) having independent measures of the family environment, based on different reporters (i.e., G1 parents and G2 participants); 3) having comparable measures of qualities of the parent–child relationship and SEP in the first and the second generations, which in our case were collected at approximately the same ages during the assessment phases; 4) having detailed prospective data on G2 life-course development to study the mediating and moderating processes that account for intergenerational transmission. Moreover, the same set of questionnaires and SEP indicators was used in both generations to ensure measurement of the same constructs over time (Galobardes et al., 2007). A gold-standard measure of ideal cardiovascular health as defined by the AHA was used for the assessment of offspring. Hence, the findings contribute to the broader literature on this topic. Moreover, all the analyses were adjusted for a comprehensive list of control variables depending on the study design. The transmission of qualities in the parent–child relationship was controlled for similar contextual characteristics in both generations. The transmission of SEP and its role in ideal cardiovascular health of offspring was adjusted for childhood cardiovascular risk factors and chronic risk conditions, thereby eliminating the confounding influence of baseline health.

As with any other study, there are limitations to consider when interpreting the results of the present research. The main methodological limitation is the absence of genetic information on both generations. Clearly, information on shared genes and the interplay between genes and the early environment are of

particular importance in intergenerational studies given its potential to provide more clues about the transmission of qualities of the parent–child relationships and SEP (Conger et al., 2009). Given that children vary in their susceptibility to parenting (Pluess & Belsky, 2010), the intergenerational transmission of parent–child relationship qualities may be underestimated, especially among offspring who are susceptible to both negative and positive influences, and overestimated for less sensitive children. It is also possible that the shared genetic background may predict personality development among offspring, and thereby account for the transmission of parent–child relationship qualities across generations. Although the genetic component is known to be equally influential on both temperament and character traits (Gillespie, Cloninger, Heath, & Martin, 2003), previous studies have produced evidence that only character traits (i.e., Self-directedness and Cooperativeness), but not temperament traits, are predicted by maternal parenting qualities and are thus more likely to be environmentally determined (Josefsson et al., 2013). However, in the absence of genetically informative data, this remains to be examined in future studies.

A further consideration relates to the possibility of reverse causality between SEP and cardiovascular health. Some studies indicate that such an association may be attributable to poor health early in life, which in turn is related to lower educational achievements and income and thus to a low SEP in adulthood (Conley & Glauber, 2007; Kawachi et al., 2010). To mitigate the possibility of reverse causality, the participants' chronic health condition in childhood and early adulthood were controlled for, although that does not fully eliminate the possibility of reverse causation. In addition, given that most CVD risk factors are at least moderately heritable (Mozaffarian et al., 2016), the role of genetic risks should be accounted for in future studies.

There were some shortcomings with the measures in the study. The qualities of the parent–child relationship were measured on non-standardized scales. Although both the reliability and the construct validity of this measure were good, the findings should be replicated with standardized measures. Moreover, the measurement relied on parents' self-reports, not on observations by a third party. Although direct observations may provide a more accurate picture, it is nevertheless a costly method and not always practicable in long-term population-based studies spanning decades. Moreover, the measure of acceptance in the study indeed reflects the absence of low acceptance in the relationship, but not the presence of acceptance. Given that the absence of disadvantages is not an indicator of advantages (Seligman & Csikszentmihalyi, 2014), these findings should be repeated with measures reflecting positive parent-child relationships. It should be noticed, however, that there were not so many measures of parent–child relationship qualities oriented on positive side of the relationship in early 1980 when the Younf Finns Study began; therefore the measure of acceptance is limited to

this reverse-coded scale. Furthermore, qualities of the parent–child relationship were reported by mothers and not fathers in the first generation, because mothers were typically the primary caregivers at the time of the first data collection in 1980. However, having information from both mothers and fathers in the first generation would have provided better possibilities to test for the moderating role of gender in both generations. Therefore, future studies on the transmission of parent–child relationship qualities should include a more heterogeneous first-generation sample of both fathers and mothers.

Moreover, the SEP components (i.e., education, occupational status, income, and employment stability) were dichotomized to create a cumulative SEP score, which may have led to a loss of some information in the variables. The advantage of a cumulative score is, however, that no assumptions are made about the relative strengths of the multiple factors or their collinearity (Evans et al., 2013).

The considerable attrition in the 32-year follow-up study focusing on the transmission of SEP and its role in ideal cardiovascular health of offspring should also be acknowledged. If people dropped out of the study for some systematic reason, they might have introduced bias into the estimates. To compensate for this potential bias to some extent, we conducted the analyses with multiply imputed data: the findings were similar in direction and magnitude to those based on complete data.

It should be noted that, as with most intergenerational studies, the Young Finns Study was not planned from the outset to investigate the transmission of certain characteristics over generations. The original aim of the YFS was to explore the determinants of coronary heart disease in children and adolescents from various age groups and in different parts of the country (Raitakari et al., 2008; Åkerblom et al., 1991). Hence, it was intended to be representative of G2 participants (i.e., the index persons), but not for G1 and obviously not for G3. The latter could nevertheless be considered a methodological peculiarity of intergenerational studies rather than a limitation.

Finally, although an exceptionally large number of the same contextual characteristics in both generations was controlled for when studying the transmission of the parent–child relationship qualities, data about externalizing behaviour in childhood was available only for G2, not for G3. It is known that children's behaviour early in life may affect parent–child relationships and provoke certain parental reactions (e.g., Ganiban et al., 2011): parents may show more warmth and support towards more friendly and cooperative children, for example, which would result in a more pleasant relationship.

5.4 CONCLUSIONS AND PRACTICAL IMPLICATIONS

The results presented in this thesis contribute to the growing body of literature on the intergenerational transmission of a positive family environment and its role in offspring cardiovascular health. More specifically, the study provides prospective evidence of the transfer of qualities of the parent–child relationship and of socioeconomic position across generations. Moreover, it is the first study to show that the intergenerational transmission of higher SEP accounts for ideal cardiovascular health among offspring in adulthood. Potential practical implications are discussed below in the light of these findings, and directions for further research are outlined.

The results of this study show that warm and accepting qualities of the parent–child relationship are transmitted across generations. Men seem to be particularly susceptible to early maternal warmth, and were more prone than women to transmitting it to their own children. A further finding was that personality traits of offspring reflecting psychological maturity (Self-directedness and Cooperativeness) accounted to some extent for the transmission of emotional warmth across generations. People who had an emotionally warm relationship with their mothers early in life were likely to develop a mature personality in adulthood, and to have positive relationships with their offspring. Given that parental emotional warmth is related to a wide range of concurrent and long-term outcomes among offspring, including mental and physical health, as well as psychosocial and educational competence (e.g., Estrada et al., 1987; Jokela et al., 2007; Zhou et al., 2002), intervention programmes focused on the improvement of parent–child relationships could support positive physical and psychological outcomes of offspring in the short- and long-term. It has further been shown in previous studies that parenting-focused interventions predict warmer parenting attitudes in offspring whose mothers exhibited poor parenting quality at the beginning of the programme (Mahrer, Winslow, Wolchik, Tein, & Sandler, 2014). Therefore, family counselling and interventions focusing on parenting skills may help parents who experienced an unsupportive or emotionally distant relationship with their mothers early in life to modify and improve the quality of their own parenting. Such interventions could prevent the transmission of poor-quality parenting from parents to children, and increase the likelihood of positive child outcomes in subsequent generations. In Finland, this knowledge could be applied in maternity and child-health clinics during annual visits.

The study also showed that people who had high socioeconomic position in childhood were likely to have high SEP in adulthood, which in turn was related to better cardiovascular health later in life. These results have promising policy implications suggesting that the transmission of SEP may be an important predictor of ideal cardiovascular health, which should be addressed to improve

cardiovascular health on the population level. Moreover, people who achieved higher SEP than their parents were also likely to have better cardiovascular health than those with lower SEP. Supporting child from low-SEP families on their track to higher education may be beneficial for their long-term health. Even though education is free-of-charge in Finland, and theoretically all children have equal opportunities in terms of engaging in higher education, the opportunities are not equal in reality. Higher-SEP families are able financially to support their offspring, even in adulthood; they may give positive role models for continuing into higher education; and there may be cognitive and/or attitudinal factors that facilitate access to higher education. Thus, children who are deprived in terms of SEP should be the focus of educational encouragement. Moreover, given that the early family SEP still plays role in long-term health regardless of achieved SEP, prevention efforts should focus on early socioeconomic circumstances. However, as this was an observational study, randomized experimental trials are needed to investigate whether interventions directed at early-life or later-life circumstances will buffer against intergenerational chains of risk.

Although intergenerational studies focusing on the transmission of the family environment are emerging, many unanswered questions remain. Further research is needed to investigate the genetic component in the intergenerational transmission of parent–child relationship qualities, given that the biological transmission of specific genotypes may explain similarities in parent–child relationship qualities across generations. It would be of interest to identify gene-by-environment interactions that may amplify the transmission of supportive and positive parenting quality. Given that almost all research on such interactions thus far focuses on the prediction of psychopathology or illness, little is known about the factors that promote positive parent–child relationships. A particularly promising area for future research would be to explore the psychosocial, behavioural, biological, and epigenetic pathways linking the early family socioeconomic environment to long-term health outcomes. Identifying modifiable pathways may provide new clues for promoting cardiovascular health. Future studies should also examine how the effects of an early disadvantaged family environment can be mitigated to prevent the transmission of ill-being across generations, and to facilitate the achievement of ideal health for all regardless of family background.

6 REFERENCES

Acock, A. C. (2013). *Discovering structural equation modeling using Stata*. College Station, TX: Stata Press books.

Appleton, A. A., Buka, S. L., Loucks, E. B., Rimm, E. B., Martin, L. T., & Kubzansky, L. D. (2013). A prospective study of positive early-life psychosocial factors and favorable cardiovascular risk in adulthood. *Circulation*, *127*(8), 905–912. doi:10.1161/CIRCULATIONAHA.112.115782

Bailey, J. a, Hill, K. G., Oesterle, S., & Hawkins, J. D. (2009). Parenting practices and problem behavior across three generations: Monitoring, harsh discipline, and drug use in the intergenerational transmission of externalizing behavior. *Developmental Psychology*, *45*(5), 1214–1226. doi:10.1037/a0016129

Bambs, C., Kip, K. E., Dinga, A., Mulukutla, S. R., Aiyer, A. N., & Reis, S. E. (2011). Low prevalence of "ideal cardiovascular health" in a community-based population: The heart strategies concentrating on risk evaluation (heart SCORE) study. *Circulation*, *123*(8), 850–857. doi:10.1161/CIRCULATIONAHA.110.980151

Bandura, A. (1977). *Social learning theory*. Retrieved from http://www.esludwig.com/uploads/2/6/1/0/26105457/bandura_socialle arningtheory.pdf

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, *55*(1), 83–96.

Belsky, J., Conger, R., & Capaldi, D. M. (2009). The intergenerational transmission of parenting: Introduction to the special section. *Developmental Psychology*, *45*(5), 1201–4. doi:10.1037/a0016245

Belsky, J., Jaffee, S. R., Sligo, J., Woodward, L., & Silva, P. A. (2005). Intergenerational transmission of warm-sensitive-stimulating parenting: A prospective study of mothers and fathers of 3-year-olds. *Child Development*, *76*(2), 384–396. doi:10.1111/j.1467-8624.2005.00852.x

Berlin, L. J., Appleyard, K., & Dodge, K. A. (2011). Intergenerational continuity in child maltreatment: Mediating mechanisms and implications for prevention. *Child Development*, *82*(1), 162–176. doi:10.1111/j.1467-8624.2010.01547.x

Bowlby, J. (1951). *Maternal care and mental health*. Geneva: World Health Organization: Monograph Series.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, *53*(1), 371–399. doi:10.1146/annurev.psych.53.100901.135233

Bynner, J. (2016). Institutionalization of life course studies. In M. J. Shanahan, J. T. Mortimer, & M. Kirkpatrick Johnson (Eds.), *Handbook of the Life Course* (pp. 27–58). Springer International Publishing.

Carroll, J. E., Gruenewald, T. L., Taylor, S. E., Janicki-Deverts, D., Matthews, K. A., & Seeman, T. E. (2013). Childhood abuse, parental warmth, and adult multisystem biological risk in the Coronary Artery Risk

Development in Young Adults study. *Proceedings of the National Academy of Sciences*, *110*(42), 17149–17153. doi:10.1073/pnas.1315458110
Carter, A. S., Garrity-Rokous, F. E., Chazan-Cohen, R., Little, C., & Briggs-Gowan, M. J. (2001). Maternal depression and comorbidity: Predicting early parenting, attachment security, and toddler social-emotional problems and competencies. *Journal of the American Academy of Child & Adolescent Psychiatry*, *40*(1), 18–26. doi:10.1097/00004583-200101000-00012
Carvalho, L. (2012). Childhood circumstances and the intergenerational transmission of socioeconomic status. *Demography*, *49*(3), 913–938. doi:10.1007/s13524-012-0120-1
Chen, E., Miller, G. E., Kobor, M. S., & Cole, S. W. (2011). Maternal warmth buffers the effects of low early-life socioeconomic status on pro-inflammatory signaling in adulthood. *Molecular Psychiatry*, *16*(7), 729–737. doi:10.1038/mp.2010.53
Chen, Z., & Kaplan, H. B. (2001). Intergenerational transmission of constructive parenting. *Journal of Marriage and Family*, *63*(1), 17–31. doi:10.1111/j.1741-3737.2001.00017.x
Chetty, R., Hendren, N., Kline, P., & Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics*, *129*(4), 1553–1623. doi:10.1093/qje/qju022
Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*(2), 233–255. doi:10.1207/S15328007SEM0902_5
Clark, A. M., DesMeules, M., Luo, W., Duncan, A. S., & Wielgosz, A. (2009). Socioeconomic status and cardiovascular disease: Risks and implications for care. *Nature Reviews Cardiology*, *6*(11), 712–722. doi:10.1038/nrcardio.2009.163
Cloninger, C., Przybeck, T., Svrakic, D., & Wetzel, R. (1994). *TCI—The Temperament and Character Inventory: A guide to its development and use*. St Louis (MO): Center for Psychobiology of Personality, Washington University.
Cloninger, C. R., Svrakic, D. M., & Przybeck, T. R. (2006). Can personality assessment predict future depression? A twelve-month follow-up of 631 subjects. *Journal of Affective Disorders*, *92*(1), 35–44. doi:10.1016/j.jad.2005.12.034
Cloninger, C. R., Svrakic, M. D., & Przybeck, R. T. (1993). A psychobiological model of temperament and character. *Archives of General Psychiatry*, *50*(12), 975–990. doi:10.1001/archpsyc.1993.01820240059008
Cohen, S., Janicki-Deverts, D., Chen, E., & Matthews, K. A. (2010). Childhood socioeconomic status and adult health. *Annals of the New York Academy of Sciences*, *1186*, 37–55. doi:10.1111/j.1749-6632.2009.05334.x
Collins, W. A., Maccoby, E. E., Steinberg, L., Hetherington, E. M., & Bornstein, M. H. (2000). Contemporary research on parenting: The case for nature and nurture. *American Psychologist*, *55*(2), 218–232. doi:10.1037//0003-066X.55.2.218
Conger, R. D., Belsky, J., & Capaldi, D. M. (2009). The intergenerational transmission of parenting: Closing comments for the special section.

Developmental Psychology, *45*(5), 1276–1283. doi:10.1037/a0016911
Conger, R. D., & Donnellan, M. B. (2007a). An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology*, *58*(1), 175–199. doi:10.1146/annurev.psych.58.110405.085551
Conger, R. D., & Donnellan, M. B. (2007b). An interactionist perspective on the socioeconomic context of human development. *Annual Review of Psychology*, *58*(1), 175–199. doi:10.1146/annurev.psych.58.110405.085551
Conger, R. D., Schofield, T. J., & Neppl, T. K. (2012). Intergenerational continuity and discontinuity in harsh parenting. *Parenting*, *12*(2–3), 222–231. doi:10.1080/15295192.2012.683360
Conley, D., & Glauber, R. (2007). Gender, body mass, and socioeconomic status: New evidence from the PSID. *Advances in Health Economics and Health Services Research*, *17*, 253–275.
Corak, M. (2006). Do poor children become poor adults? Lessons from a cross-country comparison of generational earnings mobility. In J. Creedy & G. Kalb (Eds.), *Dynamics of Inequality and Poverty (Research on Economic Inequality, Volume 13)* (pp. 143–188). Emerald Group Publishing Limited.
Cummings, E. M., & Cummings, J. S. (2002). Parenting and attachment. In M. H. Bornstein (Ed.), *Handbook of parenting: Vol 5. Practical issues in parenting* (2nd ed., pp. 35–58). Mahwah, NJ: Erlbaum.
Danese, A., & McEwen, B. S. (2012). Adverse childhood experiences, allostasis, allostatic load, and age-related disease. *Physiology & Behavior*, *106*(1), 29–39. doi:10.1016/j.physbeh.2011.08.019
Davidov, M., & Grusec, J. E. (2006). Untangling the links of parental responsiveness to distress and warmth to child outcomes. *Child Development*, *77*(1), 44–58.
de Haan, A. D., Prinzie, P., & Deković, M. (2009). Mothers' and fathers' personality and parenting: The mediating role of sense of competence. *Developmental Psychology*, *45*(6), 1695–1707. doi:10.1037/a0016121
Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptative processes. *Psychological Bulletin*, *110*(1), 3–25.
Elder Jr, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the life course* (pp. 3–19). Springer US.
Ensminger, M. E., & Fothergill, K. E. (2014). A decade of measuring SES: What it tells us and where to go from here. In M. H. Bornstein & R. H. Bradley (Eds.), *Socioeconomic status, parenting, and child development* (pp. 13–27). Routledge.
Erola, J., Jalonen, S., & Lehti, H. (2016). Parental education, class and income over early life course and children's achievement. *Research in Social Stratification and Mobility*, *44*, 33–43. doi:10.1016/j.rssm.2016.01.003
Estrada, P., Arsenio, W. F. ., Hess, R. D. ., & Holloway, S. D. (1987). Affective quality of the mother–child relationship: Longitudinal consequences for children's school-relevant cognitive functioning. *Developmental Psychology*, *23*(2), 210–215.
Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, *139*(6), 1342–1396.

doi:10.1037/a0031808
Folsom, A. R., Yatsuya, H., Nettleton, J. A., Lutsey, P. L., Cushman, M., & Rosamond, W. D. (2011). Community prevalence of ideal cardiovascular health, by the American Heart Association definition, and relationship with cardiovascular disease incidence. *Journal of the American College of Cardiology*, *57*(16), 1690–1696. doi:10.1016/j.jacc.2010.11.041
Galobardes, B., Lynch, J., & Smith, G. D. (2007). Measuring socioeconomic position in health research. *British Medical Bulletin*, *81–82*(1), 21–37. doi:10.1093/bmb/ldm001
Galobardes, B., Shaw, M., Lawlor, D., Lynch, J., & Smith, G. (2006). Indicators of socioeconomic position (part 1). *Journal of Epidemiology and Community Health*, *60*(1), 7–12.
Galobardes, B., Smith, G. D., & Lynch, J. W. (2006). Systematic review of the influence of childhood socioeconomic circumstances on risk for cardiovascular disease in adulthood. *Annals of Epidemiology*, *16*(2), 91–104. doi:10.1016/j.annepidem.2005.06.053
Ganiban, J. M., Ulbricht, J., Saudino, K. J., Reiss, D., & Neiderhiser, J. M. (2011). Understanding child-based effects on parenting: Temperament as a moderator of genetic and environmental contributions to parenting. *Developmental Psychology*, *47*(3), 676–692. doi:10.1037/a0021812
Gillespie, N. A., Cloninger, C. R., Heath, A. C., & Martin, N. G. (2003). The genetic and environmental relationship between Cloninger's dimensions of temperament and character. *Personality and Individual Differences*, *35*(8), 1931–1946. doi:10.1016/S0191-8869(03)00042-4
Harper, S., Lynch, J., & Smith, G. D. (2011). Social determinants and the decline of cardiovascular diseases: Understanding the links. *Annual Review of Public Health*, *32*, 39–69. doi:10.1146/annurev-publhealth-031210-101234
Havranek, E. P., Mujahid, M. S., Barr, D. a., Blair, I. V., Cohen, M. S., Cruz-Flores, S., … Yancy, C. W. (2015). Social determinants of risk and outcomes for cardiovascular disease. A scientific statement from the American Heart Association. *Circulation*, *132*(9), 873–898. doi:10.1161/CIR.0000000000000228
Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York: Guilford Press.
Heinonen, K., Räikkönen, K., & Keltikangas-Järvinen, L. (2003). Maternal perceptions and adolescent self-esteem: A six-year longitudinal study. *Adolescence*, *3*(152), 669–687.
Hintsanen, M., Kivimäki, M., Hintsa, T., Theorell, T., Elovainio, M., Raitakari, O. T., … Keltikangas-Järvinen, L. (2010). A prospective cohort study of deficient maternal nurturing attitudes predicting adulthood work stress independent of adulthood hostility and depressive symptoms. *Stress: The International Journal on the Biology of Stress*, *13*(5), 425–434. doi:10.3109/10253891003692753
Hogan, R., & Roberts, B. W. (2004). A socioanalytic model of maturity. *Journal of Career Assessment*, *12*(2), 207–217. doi:10.1177/1069072703255882
Hogberg, L., Cnattingius, S., Lundholm, C., Sparen, P., & Iliadou, A. N. (2012). Intergenerational social mobility and the risk of hypertension. *Journal of*

Epidemiology & Community Health, *66*(6), 1–6. doi:10.1136/jech.2010.130567
Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. doi:10.1080/10705519909540118
Isley, S. L., O'Neil, R., Clatfelter, D., & Parke, R. D. (1999). Parent and child expressed affect and children's social competence: Modeling direct and indirect pathways. *Developmental Psychology*, *35*(2), 547–560. doi:10.1037/0012-1649.35.2.547
Johnson, J. G., Liu, L., & Cohen, P. (2011). Parenting behaviours associated with the development of adaptive and maladaptive offspring personality traits. *The Canadian Journal of Psychiatry*, *56*(8), 447–456.
Jokela, M., Keltikangas-Järvinen, L., Kivimäki, M., Puttonen, S., Elovainio, M., Rontu, R., & Lehtimäki, T. (2007). Serotonin receptor 2A gene and the influence of childhood maternal nurturance on adulthood depressive symptoms. *Archives of General Psychiatry*, *64*(3), 356–360. doi:10.1016/S0084-3970(08)70869-7
Josefsson, K., Jokela, M., Hintsanen, M., Cloninger, R. C., Pulkki-Råback, L., Merjonen, P., … Keltikangas-Järvinen, L. (2013). Parental care-giving and home environment predicting offspring's temperament and character traits after 18 years. *Psychiatry Research*, *209*(3), 643–651. doi:10.1016/j.psychres.2013.01.007
Jäntti, M. (2009). Mobility in the United States in comparative perspective. *Focus*, *26*, 38–42.
Kallio, J. M., Kauppinen, T. M., & Erola, J. (2016). Cumulative socio-economic disadvantage and secondary education in Finland. *European Sociological Review*, *32*(5), 649–661. doi:10.1093/esr/jcw021
Katainen, S., Räikkönen, K., & Keltikangas-Järvinen, L. (1997). Childhood temperament and mother's child-rearing attitudes : Stability and interaction in a three-year follow-up study. *European Journal of Personality*, *11*(4), 249–265. doi:10.1002/(SICI)1099-0984(199711)11:4<249::AID-PER289>3.0.CO;2-Y
Katainen, S., Räikkönen, K., & Keltikangas-Järvinen, L. (1998). Development of temperament: Childhood temperament and the mother's child-rearing attitudes as predictors of adolescent temperament in a 9-year follow-up study. *Journal of Research on Adolescence*, *8*(4), 485–509.
Kawachi, I., Adler, N. E., & Dow, W. H. (2010). Money, schooling, and health: Mechanisms and causal evidence. *Annals of the New York Academy of Sciences*, *1186*(1), 56–68. doi:10.1111/j.1749-6632.2009.05340.x
Keltikangas-Järvinen, L. (2002). Psychology and the risk for cardiovascular disorder: A developmental perspective. In C. Bäckman, L & von Hofsten (Ed.), *Psychology at the turn of the millennium: Vol. 1. Cognitive, biological, and health perspectives* (pp. 335–353). Hove: Psychology Press/Taylor & Francis.
Keltikangas-Järvinen, L., Kivimäki, M., & Keskivaara, P. (2003). Parental practices, self-esteem and adult temperament: 17-year follow-up study of four population-based age cohorts. *Personality and Individual Differences*, *34*(3), 431–447. doi:10.1016/S0191-8869(02)00064-8
Kendler, K. S., & Baker, J. H. (2007). Genetic influences on measures of the

environment: A systematic review. *Psychological Medicine*, *37*(5), 615. doi:10.1017/S0033291706009524
Kerr, D. C. R., Capaldi, D. M., Pears, K. C., & Owen, L. D. (2009). A prospective three generational study of fathers' constructive parenting: Influences from family of origin, adolescent adjustment, and offspring temperament. *Developmental Psychology*, *45*(5), 1257–1275. doi:10.1037/a0015863
Kitamura, T., Shikai, N., Uji, M., Hiramura, H., Tanaka, N., & Shono, M. (2009). Intergenerational transmission of parenting style and personality: Direct influence or mediation? *Journal of Child and Family Studies*, *18*(5), 541–556. doi:10.1007/s10826-009-9256-z
Kittleson, M. M., Meoni, L. A., Wang, N.-Y., Chu, A. Y., Ford, D. E., & Klag, Michael, J. (2006). Association of childhood socioeconomic status with subsequent coronary heart disease in physicians. *Archives of Internal Medicine*, *166*(21), 2356–2361. doi:10.1001/archinte.166.21.2356
Kokko, K., & Pulkkinen, L. (2000). Aggression in childhood and long-term unemployment in adulthood: A cycle of maladaptation and some protective factors. *Developmental Psychology*, *36*(4), 463–472. doi:10.1037//0012-1649.36.4.463
Krieger, N., Williams, D. R., & Moss, N. E. (1997). Measuring social class in US public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health*, *18*(1), 341–378.
Kuh, D., Ben-Shlomo, Y., Lynch, J., Hallqvist, J., & Power, C. (2003). Life course epidemiology. *Journal of Epidemiology & Community Health*, *57*(10), 778–783. doi:10.1136/jech.57.10.778
Labarthe, D. R., Kubzansky, L. D., Boehm, J. K., Lloyd-Jones, D. M., Berry, J. D., & Seligman, M. E. P. (2016). Positive cardiovascular health. *Journal of the American College of Cardiology*, *68*(8), 860–867. doi:10.1016/j.jacc.2016.03.608
Laitinen, T. T., Pahkala, K., Venn, A., Woo, J. G., Oikonen, M., Dwyer, T., … Juonala, M. (2013). Childhood lifestyle and clinical determinants of adult ideal cardiovascular health. *International Journal of Cardiology*, *169*(2), 126–132. doi:10.1016/j.ijcard.2013.08.090
Lawlor, D., Leary, S., & Davey Smith, G. (2009). Theoretical underpinning for the use of family-based studies in life course epidemiology. In D. Lawlor & G. Mishra (Eds.), *Family matters: Designing, analysing and understanding family-based studies in life-course epidemiology* (pp. 13–38). New York: Oxford University Press.
Lloyd-Jones, D. M., Hong, Y., Labarthe, D., Mozaffarian, D., Appel, L. J., Van Horn, L., … Rosamond, W. D. (2010). Defining and setting national goals for cardiovascular health promotion and disease reduction: The American Heart Association's strategic impact goal through 2020 and beyond. *Circulation*, *121*(4), 586–613. doi:10.1161/CIRCULATIONAHA.109.192703
Lloyd-Jones, D. M., Hong, Y., Labarthe, D., Mozaffarian, D., Appel, L. J., Van Horn, L., … Rosamond, W. D. (2010). Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. *Circulation*, *121*(4), 586–613. doi:10.1161/CIRCULATIONAHA.109.192703
Lomanowska, A. M., Boivin, M., Hertzman, C., & Fleming, A. S. (2015).

Parenting begets parenting: A neurobiological perspective on early adversity and the transmission of parenting styles across generations. *Neuroscience*. doi:10.1016/j.neuroscience.2015.09.029
Lovejoy, M. C., Graczyk, P. A., O'Hare, E., & Neuman, G. (2000). Maternal depression and parenting behavior. *Clinical Psychology Review*, *20*(5), 561–592. doi:10.1016/S0272-7358(98)00100-7
Lundberg, M., Perris, C., Schlette, P., & Adolfsson, R. (2000). Intergenerational transmission of perceived parenting. *Personality and Individual Differences*, *28*(5), 865–877. doi:10.1016/S0191-8869(99)00144-0
Maccoby, E. E. (1980). *Social development: Psychological growth and the parent - child relationship*. New York: Harcourt Brace Jovanovich. Retrieved from http://library.wur.nl/WebQuery/clc/200111
Maccoby, E. E. (2000). Parenting and its effects on children: On reading and misreading behavior genetics. *Annual Review of Psychology*, *51*, 1–27.
MacDonald, K. (1992). Warmth as a developmental construct: An evolutionary analysis. *Child Development*, *63*, 753–773. doi:10.1111/j.1467-8624.1992.tb01659.x
Maclagan, L. C., & Tu, J. V. (2015). Using the concept of ideal cardiovascular health to measure population health. *Current Opinion in Cardiology*, *30*(5), 518–524. doi:10.1097/HCO.0000000000000210
Madden, V., Domoney, J., Aumayer, K., Sethna, V., Iles, J., Hubbard, I., … Ramchandani, P. (2015). Intergenerational transmission of parenting: Findings from a UK longitudinal study. *The European Journal of Public Health*, *25*(6), 1030–1035. doi:10.1093/eurpub/ckv093
Mahrer, N. E., Winslow, E., Wolchik, S. A., Tein, J.-Y., & Sandler, I. N. (2014). Effects of a preventive parenting intervention for divorced families on the intergenerational transmission of parenting attitudes in young adult offspring. *Child Development*, n/a-n/a. doi:10.1111/cdev.12258
Makkonen, T., Ruoppila, I., Rönkä, T., Timonen, S., Valvanne, L., & Österlund, K. (1981). *Operation family (Child report, No. A 34)*. Mannerheim League of Child Welfare, Helsinki.
Malone, P. S., Lansford, J. E., Castellino, D. R., Berlin, L. J., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2004). Divorce and child behavior problems: Applying latent change score models to life event data. *Structural Equation Modeling: A Multidisciplinary Journal*, *11*(3), 401–423. doi:10.1207/s15328007sem1103_6
Marmot, M., Allen, J., Bell, R., Bloomer, E., & Goldblatt, P. (2012). WHO European review of social determinants of health and the health divide. *The Lancet*, *380*(9846), 1011–1029. doi:10.1016/S0140-6736(12)61228-8
McCabe, J. E. (2014). Maternal personality and psychopathology as determinants of parenting behavior: A quantitative integration of two parenting literatures. *Psychological Bulletin*, *140*(3), 722–750. doi:10.1037/a0034835
Melchior, M., Moffitt, T. E., Milne, B. J., Poulton, R., & Caspi, A. (2007). Why do children from socioeconomically disadvantaged families suffer from poor health when they reach adulthood? A life-course study. *American Journal of Epidemiology*, *166*(8), 966–974. doi:10.1093/aje/kwm155
Merjonen, P., Pulkki-Råback, L., Lipsanen, J., Lehtimäki, T., Rontu, R., Viikari, J., … Keltikangas-Järvinen, L. (2011). Development of adulthood

hostile attitudes: Childhood environment and serotonin receptor gene interactions. *Personal Relationships*, *18*(2), 184–197. doi:10.1111/j.1475-6811.2010.01321.x

Metsäpelto, R.-L., & Pulkkinen, L. (2003). Personality traits and parenting: neuroticism, extraversion, and openness to experience as discriminative factors. *European Journal of Personality*, *17*(1), 59–78. doi:10.1002/per.468

Mileva-Seitz, V. R., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2016). Genetic mechanisms of parenting. *Hormones and Behavior*, *77*, 211–223. doi:10.1016/j.yhbeh.2015.06.003

Miller, G., Chen, E., & Cole, S. W. (2009). Health psychology: Developing biologically plausible models linking the social world and physical health. *Annual Review of Psychology*, *60*(1), 501–524. doi:10.1146/annurev.psych.60.110707.163551

Mozaffarian, D., Benjamin, E. J., Go, A. S., Arnett, D. K., Blaha, M. J., Cushman, M., … Turner, M. B. (2016). Heart disease and stroke statistics—2016 update. *Circulation*, *133*(4), e38–e360. doi:10.1161/CIR.0000000000000350

Murray, E. T., Mishra, G. D., Kuh, D., Guralnik, J., Black, S., & Hardy, R. (2011). Life course models of socioeconomic position and cardiovascular risk factors: 1946 Birth Cohort. *Annals of Epidemiology*, *21*(8), 589–597. doi:10.1016/j.annepidem.2011.04.005

Neppl, T. K., Conger, R. D., Scaramella, L. V., & Ontai, L. L. (2009). Intergenerational continuity in parenting behavior: Mediating pathways and child effects. *Developmental Psychology*, *45*(5), 1241–1256. doi:10.1037/a0014850

OECD. (2015). PISA 2015 Results. Retrieved from http://www.compareyourcountry.org/pisa/country/FIN

Oikonen, M., Laitinen, T. T., Magnussen, C. G., Steinberger, J., Sinaiko, A. R., Dwyer, T., … Raitakari, O. T. (2013). Ideal cardiovascular health in young adult populations from the United States, Finland, and Australia and its association with cIMT: The international childhood cardiovascular cohort consortium. *Journal of the American Heart Association*, *2*(3), 1–11. doi:10.1161/JAHA.113.000244

Oshino, S., Suzuki, A., Ishii, G., & Otani, K. (2007). Influences of parental rearing on the personality traits of healthy Japanese. *Comprehensive Psychiatry*, *48*(5), 465–469. doi:10.1016/j.comppsych.2007.04.008

Patterson, G. R. (1998). Continuities—a search for causal mechanisms: Comment on the special section. *Developmental Psychology*, *34*(6), 1263–1268. doi:10.1037/0012-1649.34.6.1263

Pluess, M., & Belsky, J. (2010). Differential susceptibility to parenting and quality child care. *Developmental Psychology*, *46*(2), 379–390. doi:10.1037/a0015203

Pollitt, R. A., Rose, K. M., & Kaufman, J. S. (2005). Evaluating the evidence for models of life course socioeconomic factors and cardiovascular outcomes: A systematic review. *BMC Public Health*, *5*(1), 1–13. doi:10.1186/1471-2458-5-7

Poulton, R., Caspi, A., Milne, B. J., Thomson, W. M., Taylor, A., Sears, M. R., & Moffitt, T. E. (2002). Association between children's experience of socioeconomic disadvantage and adult health: A life-course study. *The*

Lancet, *360*(9346), 1640–1645. doi:10.1016/S0140-6736(02)11602-3
Power, C., Atherton, K., Strachan, D. P., Shepherd, P., Fuller, E., Davis, A., … Stansfeld, S. (2007). Life-course influences on health in British adults: Effects of socio-economic position in childhood and adulthood. *International Journal of Epidemiology*, *36*(3), 532–539. doi:10.1093/ije/dyl310
Power, C., & Hertzman, C. (1997). Social and biological pathways linking early life and adult disease. *British Medical Bulletin*, *53*(1), 210–221. doi:10.1093/oxfordjournals.bmb.a011601
Power, C., Hyppönen, E., & Davey Smith, G. (2005). Socioeconomic position in childhood and early adult life and risk of mortality: A prospective study of the mothers of the 1958 British Birth Cohort. *American Journal of Public Health*, *95*(8), 1396–1402. doi:10.2105/AJPH.2004.047340
Power, C., Kuh, D., & Morton, S. (2013). From developmental origins of adult disease to life course research on adult disease and aging: Insights from birth cohort studies. *Annual Review of Public Health*, *34*(1), 7–28. doi:10.1146/annurev-publhealth-031912-114423
Prinzie, P., Stams, G. J. J. M., Deković, M., Reijntjes, A. H. A., & Belsky, J. (2009). The relations between parents' Big Five personality factors and parenting: A meta-analytic review. *Journal of Personality and Social Psychology*, *97*(2), 351–362. doi:10.1037/a0015823
Pulkki-Råback, L., Elovainio, M., Hakulinen, C., Lipsanen, J., Hintsanen, M., Jokela, M., … Keltikangas-Jarvinen, L. (2015). Cumulative effect of psychosocial factors in youth on ideal cardiovascular health in adulthood: The Cardiovascular Risk in Young Finns Study. *Circulation*, *131*(3), 245–253. doi:10.1161/CIRCULATIONAHA.113.007104
Pulkki-Råback, L., Elovainio, M., Kivimäki, M., Raitakari, O. T., & Keltikangas-Järvinen, L. (2005). Temperament in childhood predicts body mass in adulthood: The Cardiovascular Risk in Young Finns Study. *Health Psychology*, *24*(3), 307–315. doi:10.1037/0278-6133.24.3.307
Pulkki, L., Keltikangas-Järvinen, L., Ravaja, N., & Viikari, J. (2003). Child-rearing attitudes and cardiovascular risk among children: Moderating influence of parental socioeconomic status. *Preventive Medicine*, *36*(1), 55–63. doi:10.1006/pmed.2002.1125
Pulkkinen, L., Nygren, H., & Kokko, K. (2002). Successful development: Childhood antecedents of adaptive psychosocial functioning in adulthood. *Journal of Adult Development*, *9*(4), 251–265. doi:10.1023/A:1020234926608
Putallaz, M., Costanzo, P. R., Grimes, C. L., & Sherman, D. M. (2001). Intergenerational continuities and their influences on children's social development. *Social Development*, *7*(3), 389–427. doi:10.1111/1467-9507.00074
Raby, K. L., Lawler, J. M., Shlafer, R. J., Hesemeyer, P. S., Collins, W. A., & Sroufe, L. A. (2015). The interpersonal antecedents of supportive parenting: A prospective, longitudinal study from infancy to adulthood. *Developmental Psychology*, *51*(1), 115–123. doi:10.1037/a0038336
Raitakari, O. T., Juonala, M., Ronnemaa, T., Keltikangas-Jarvinen, L., Rasanen, L., Pietikainen, M., … Viikari, J. S. (2008). Cohort profile: The Cardiovascular Risk in Young Finns Study. *International Journal of Epidemiology*, *37*(6), 1220–1226. doi:10.1093/ije/dym225

Reforms, E. P. (2010). A Family affair: Intergenerational social mobility across OECD countries. In P. C. Padoan (Ed.), *Economic Policy Reforms 2010: Going for Growth* (pp. 166–183). OECD - Organisation for Economic Co-operation and Development.

Reti, I. M., Samuels, J. F., Eaton, W. W., Bienvenu III, O. J., Costa Jr., P. T., & Nestadt, G. (2002). Influences of parenting on normal personality traits. *Psychiatry Research*, *111*(1), 55–64. doi:10.1016/S0165-1781(02)00128-2

Rimal, R. N. (2003). Intergenerational transmission of health: The role of intrapersonal, interpersonal, and communicative factors. *Health Education & Behavior*, *30*(1), 10–28. doi:10.1177/1090198102239256

Roberts, B. W., & Mroczek, D. (2008). Personality trait change in adulthood. *Current Directions in Psychological Science*, *17*(1), 31–35. doi:10.1111/j.1467-8721.2008.00543.x

Rutter, M. (1998). Some research considerations on intergenerational continuities and discontinuities: Comment on the special section. *Developmental Psychology*, *34*(6), 1269–1273. doi:10.1037/0012-1649.34.6.1269

Ryff, C. D., Dienberg Love, G., Urry, H. L., Muller, D., Rosenkranz, M. A., Friedman, E. M., … Singer, B. (2006). Psychological well-being and ill-being: Do they have distinct or mirrored biological correlates? *Psychotherapy and Psychosomatics*, *75*(2), 85–95. doi:10.1159/000090892

Schaefer, E. S. (1959). A circumplex model for maternal behavior. *The Journal of Abnormal and Social Psychology*, *59*(2), 226–235. doi:10.1037/h0041114

Schlette, P., Brändström, S., Eisemann, M., Sigvardsson, S., Nylander, P.-O., Adolfsson, R., & Perris, C. (1998). Perceived parental rearing behaviours and temperament and character in healthy adults. *Personality and Individual Differences*, *24*(5), 661–668. doi:10.1016/S0191-8869(97)00229-8

Schneewind, K. A., & Ruppert, S. (1998). *Personality and family development: An intergenerational longitudinal comparison*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Schofield, T. J., Conger, R. D., Donnellan, M. B., Jochem, R., Widaman, K. F., & Conger, K. J. (2012). Parent personality and positive parenting as predictors of positive adolescent personality development over time. *Merrill-Palmer Quarterly*, *58*(2), 255–283. doi:10.1353/mpq.2012.0008

Schofield, T. J., Martin, M. J., Conger, K. J., Neppl, T. M., Donnellan, M. B., & Conger, R. D. (2011). Intergenerational transmission of adaptive functioning: A test of the interactionist model of SES and human development. *Child Development*, *82*(1), 33–47. doi:10.1111/j.1467-8624.2010.01539.x

Schüz, B. (2017). Socio-economic status and theories of health behaviour: Time to upgrade a control variable. *British Journal of Health Psychology*, *22*(1), 1–7. doi:10.1111/bjhp.12205

Seligman, M.E. Csikszentmihalyi, M. (2014). Positive psychology: An introduction. In *Flow and the foundations of positive psychology* (pp. 279–298). Springer Netherlands.

Serbin, L. A., & Karp, J. (2004). The intergenerational transfer of psychosocial risk: Mediators of vulnerability and resilience. *Annual Review of*

Psychology, *55*(1), 333–363. doi:10.1146/annurev.psych.54.101601.145228
Serbin, L., & Karp, J. (2003). Intergenerational studies of parenting and the transfer of risk from parent to child. *Current Directions in Psychological Science*, *12*(4), 138–142. doi:10.1111/1467-8721.01249
Shaffer, A., Burt, K. B., Obradović, J., Herbers, J. E., & Masten, A. S. (2009). Intergenerational continuity in parenting quality: The mediating role of social competence. *Developmental Psychology*, *45*(5), 1227–1240. doi:10.1037/a0015361
Shanahan, M. J., Mortimer, J. T., & Kirkpatrick Johnson, M. (2016). Introduction: Life Course studies – trends, challenges, and future directions. In M. J. Shanahan, J. T. Mortimer, & M. Kirkpatrick Johnson (Eds.), *Handbook of the Life Course* (pp. 1–23). Springer International Publishing. doi:10.1007/978-3-319-20880-0_1
Sirniö, O. (2016). *Constrained life chances: Intergenerational transmission of income in Finland*. University of Helsinki.
Slopen, N., Chen, Y., Guida, J. L., Albert, M. A., & Williams, D. R. (2017). Positive childhood experiences and ideal cardiovascular health in midlife: Associations and mediators. *Preventive Medicine*, *97*, 72–79. doi:10.1016/j.ypmed.2017.01.002
Slopen, N., Goodman, E., Koenen, K. C., & Kubzansky, L. D. (2013). Socioeconomic and other social stressors and biomarkers of cardiometabolic risk in youth: A systematic review of less studied risk factors. *PLoS ONE*, *8*(5), e64418. doi:10.1371/journal.pone.0064418
Smith, C. A., & Farrington, D. P. (2004). Continuities in antisocial behavior and parenting across three generations. *Journal of Child Psychology and Psychiatry*, *45*(2), 230–247. doi:10.1111/j.1469-7610.2004.00216.x
Smith, G. D., Hart, C., Blane, D., & Hole, D. (1998). Adverse socioeconomic conditions in childhood and cause specific adult mortality: Prospective observational study. *BMJ*, *316*(7145), 1631–1635. doi:10.1136/bmj.316.7145.1631
Spinath, F. M., & O'Connor, T. G. (2003). A behavioral genetic study of the overlap between rersonality and rarenting. *Journal of Personality*, *71*(5), 785–808. doi:10.1111/1467-6494.7105004
StataCorp. (2013). Stata: Release 13. Statistical Software. TX: StataCorp LP.: College Station.
Staudinger, U. M., & Kunzmann, U. (2005). Positive adult personality development. *European Psychologist*, *10*(4), 320–329. doi:10.1027/1016-9040.10.4.320
Steinberg, L., Lamborn, S. D., Dornbusch, S. M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development*, *63*(5), 1266–1281. doi:10.1111/j.1467-8624.1992.tb01694.x
Stewart-Brown, S. L., Fletcher, L., & Wadsworth, M. E. J. (2005). Parent-child relationships and health problems in adulthood in three UK national birth cohort studies. *The European Journal of Public Health*, *15*(6), 640–646. doi:10.1093/eurpub/cki049
Tanaka, M., Kitamura, T., Chen, Z., Murakami, M., & Goto, Y. (2009). Do parents rear their children as they were reared themselves? Intergenerational transmission of parental styles (warmth and control)

and possible mediation by personality traits. *The Open Family Studies Journal*, *2*, 82–90.
Taylor, S. E. (2010). Mechanisms linking early life stress to adult health outcomes. *Proceedings of the National Academy of Sciences*, *107*(19), 8507–8512. doi:10.1073/pnas.1003890107
Thornberry, T. P. (2016). Three generation studies: Methodological challenges and promise. In M. J. Shanahan, J. T. Mortimer, & M. Kirkpatrick Johnson (Eds.), *Handbook of the life course* (pp. 571–596). Springer International Publishing. doi:10.1007/978-3-319-20880-0_25
Tiikkaja, S., & Hemstrom, O. (2008). Does intergenerational social mobility among men affect cardiovascular mortality? A population-based register study from Sweden. *Scandinavian Journal of Public Health*, *36*(6), 619–628. doi:10.1177/1403494808090635
Uhlenberg, P., & Mueller, M. (2003). Family context and individual weil-being. In J. T. Mortimer & M. J. Shanahan (Eds.), *Handbook of the life course* (pp. 123–148). US: Springer.
Van IJzendoorn, M. H. (1992). Intergenerational transmission of parenting: A review of studies in nonclinical populations. *Developmental Review*, *12*(1), 76–99. doi:10.1016/0273-2297(92)90004-L
Vauhkonen, T., Kallio, J., Kauppinen, T. M., & Erola, J. (2017). Intergenerational accumulation of social disadvantages across generations in young adulthood. *Research in Social Stratification and Mobility*, *48*, 42–52. doi:10.1016/j.rssm.2017.02.001
Wells, E. (1980). Behavioral patterns of children in school. *Vitality Health Statistics*, *113*.
World Health Organization. (1948). Preamble to the constitution of the WHO as adopted by the International Health Conference, New York, 19–22 June 1946. Geneva: WHO.
Zhou, Q., Eisenberg, N., Losoya, S. H., Fabes, R. A., Reiser, M., Guthrie, I. K., … Shepard, S. A. (2002). The relations of parental warmth and positive expressiveness to children's empathy-related responding and social functioning: A longitudinal study. *Child Development*, *73*(3), 893–915. doi:10.1111/1467-8624.00446
Åkerblom, H. K., Uhari, M., Pesonen, E., Dahl, M., Kaprio, E. A., Nuutinen, E. M., … Viikari, J. (1991). Cardiovascular risk in Young Finns. *Annals of Medicine*, *23*(1), 35–39. doi:10.3109/07853899109147928