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Mirkka Danielsbacka

GRANDPARENTAL INVESTMENTS AND FAMILY DYNAMICS IN CONTEMPORARY EUROPE

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ACADEMIC DISSERTATION

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"(T)he methodological rigor of sociology is likely to benefit evolutionary investigations, and the theoretical framework of evolutionary theory may widen the scope of hypotheses examined by sociologists. It is time to stop pointing fingers, and to start benefiting from each other."

Coall & Hertwig, 2010 pp. 42

Acknowledgements

My introduction to evolutionary research was Sarah Blaffer Hrdy's book *Mother Nature* (1999), which in 2008 was required reading for undergraduate family studies in social and public policy at the University of Helsinki. Before that, I would never have believed that I would be studying the subject of family, not to mention grandparenting, which both seemed somewhat boring for a postgraduate student doing her PhD on the Second World War. Evolutionary psychology and ecology, however, made me realize that the emotions attached to war and family are actually not so distant from each other.

The thesis at hand was begun almost accidentally and continued for a few years as a smaller project alongside my first dissertation, on Finnish war history. One reason for undertaking a second PhD was the opportunity it provided me to work on the Generational Transmission in Finland project, of which the second round began in 2011. I would like to thank the project leader of that time J.P. Roos, who welcomed me into the project, and also other Gentrans members Elina Haavio-Mannila, Hans Hämäläinen, Markus Jokela, Antti Karisto, Kathrin Komp, Karoliina Majamaa, Inka Pelkonen, Anna Rotkirch, Heikki Sarmaja and Antti Tanskanen for their fine collaboration. Without J.P. and the Gentrans team this thesis would probably never have been started.

Further, without my coauthors Markus Jokela, Anna Rotkirch and Antti Tanskanen the study would never have been completed. Thank you for your contributions! I truly hope that our collaboration continues in the future. I also thank Anna for being an excellent supervisor during the whole dissertation process, Markus for always answering my questions about statistical analysis, and of course Antti, for everything! Antti has coauthored all articles in this thesis and also many other papers not included in the study. Antti's second PhD thesis *Isovanhemmat, vanhempien lastenhankinta ja lasten hyvinvointi (Grandparents, Parents' Childbearing and Child Well-Being)* (2014) concerned the child and fertility outcomes of grandparental investment whereas the thesis at hand examines the reasons for differences between grandparents, and from the start our goal was that together these two doctoral theses would form a coherent empirical 'evolutionary grandparent studies' whole.

For most of the time that I have been working on this thesis I have been located in the discipline of social and public policy at the Department of Social Research, University of Helsinki. Special thanks goes to my postgraduate and Gentrans colleague Hans Hämäläinen, with whom Antti and I shared an office at the department in 2013–2015. I have also participated in post-graduate seminars on social and public policy, and some of the drafts of the articles in this thesis have been discussed there. Thank

you all who have commented on my work! In addition, I wish to thank Ann Buchanan for making the Involved Grandparenting and Child Well-Being Survey available as well as her helpful comments on article V. To Maiju Wuokko, my friend and colleague from the discipline of history, I owe my sincerest thanks for helping to deliver the printed version of the thesis to pre-examination while I was in research visit at the University of Oxford. Without Maiju's help I would not have been able to send the thesis on time.

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I am also very grateful to the reviewers of this thesis, David Coall and Thomas Pollet, whose insightful and constructive comments improved the work substantially. Many thanks for that! I also thank David for agreeing to be my dissertation opponent.

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Last but not least, I wish to thank my mother, my aunts, my cousins and their families, as well as my in-laws, all of whom I include in my family. Thank you for being there! I already thanked Antti for all he has done, but I will say it again: nothing would have succeeded without you. Thank you for being part of my life!

Taking into account the subject of this thesis, I wish to dedicate the work to the memory of my grandparents, in particular my paternal grandmother Eeva Danielsbacka, with whom I lived next door for most of my first 19 years of life.

Helsinki, April 2016
Mirkka Danielsbacka

Abstract

Mirkka Danielsbacka: Grandparental investments and family dynamics in contemporary Europe

Intergenerational relations have in recent decades become an integral part of both sociology and evolutionary research. These disciplines are, however, rarely in dialogue with each other. The present study is a social and public policy thesis, the main purpose of which is to combine theories from family sociology and evolutionary theory. Empirically, the study asks the following question: What factors are associated with the strengths and weaknesses of intergenerational relations, grandparental care and differences between types of grandparents? The thesis consists of five empirical articles and a summary chapter. The sub-studies were conducted with three large and representative surveys, which include respondents from 16 European countries. These datasets are the Survey of Health, Ageing and Retirement in Europe, the Involved Grandparenting and Child Well-Being Survey, and the Generational Transmissions in Finland data. The Methods used in the empirical articles are quantitative.

Article I tested and gained support for the existence of a biased grandparental investment pattern where the maternal grandmother invests the most, followed by the maternal grandfather, the paternal grandmother and finally by the paternal grandfather, who invests the least. In addition, the study showed that grandmothers as well as grandfathers invest preferentially in their daughters' children compared to their sons' if both options are available. Thus gender and lineage of a grandparent are important factors determining grandparental investment. Articles II and III examined family dynamics, especially between young couples and their parents-in-law, and detected a significant difference in emotional closeness as well as conflict proneness according to whether or not the couple had children. In general, women and men perceived their relationship with their own parents to be emotionally closer but also more conflict-prone than their relationship with their parents-in-law. Particularly for men, having children seemed to render the relationship with parents-in-law more similar to their relationship with their own parents. Article IV studied more closely the socio-ecological factors associated with grandparental investments, and showed that the effect of these factors tend to differ according to grandparents' sex and lineage. Finally, in article V the marital status of grandparents was found to be strongly associated with their investments in their grandchildren. Living without a spouse appeared to be more detrimental to grandfathers' than grandmothers' relationships with their grandchildren.

To conclude, intergenerational relations and grandparental investments are biased according to both gender and kin lineage and tend to favour

maternal kin. This can ultimately be accounted for by evolutionary explanations, especially sex-specific reproductive strategies and paternity uncertainty. In certain situations, and especially when taking into account in-law relations between parental and grandparental generations, contextual factors may restrict the typical associations between gender, lineage and grandparental investment behaviour. At the end of the summary chapter policy and practical implications of the results are discussed.

Tiivistelmä

Mirkka Danielsbacka: Isovanhempien investoinnit ja perhedynamiikka nykypäivän Euroopassa

Ylisukupolvisia suhteita on käsitelty paljon sekä sosiologisissa että evolutiivisissa tutkimuksissa. Vuoropuhelu tieteenalojen välillä on kuitenkin ollut vähäistä. Tämän väitöskirjan tavoitteena on sosiologisen ja evolutiivisen perhetutkimuksen yhdistäminen. Tutkimuksessa kysytään: Mitkä tekivät ovat yhteydessä ylisukupolvisten suhteiden vahvuuteen tai heikkouteen, hoivaavaan isovanhemmuuteen ja isovanhempityyppien (äidinäiti, äidinisä, isänäiti ja isänisä) eroihin? Tutkimus koostuu viidestä empiirisestä osa-artikkelista ja yhteenvetoluvusta. Osa-artikkeleissa on käytetty kolmea laajaa ja edustavaa kyselylomakeaineistoa, jotka sisältävät vastaajia yhteensä 16 Euroopan maasta. Aineistot ovat Survey of Health, Ageing and Retirement in Europe, the Involved Grandparenting and Child Well-Being Survey ja Sukupolvien ketju -aineistot. Aineistoja on analysoitu kvantitatiivisin menetelmin.

Artikkelissa I löydettiin tukea isovanhempien investointikaavalle, jonka mukaan äidinäiti investoi lapsenlapsiinsa eniten, seuraavaksi äidinisä ja isänäiti ja viimeisenä isänisä. Lisäksi isoäidit ja isoisät, joilla on lapsenlapsia sekä tyttären että pojan kautta, investoivat todennäköisemmin tyttärensä kuin poikansa lapsiin. Artikkeleissa II ja III tarkasteltiin perhesuhteita nuorten pariskuntien ja heidän vanhempiensa ja appivanhempiensa välillä. Miehet ja naiset kokivat omat vanhempansa appivanhempia läheisemmiksi mutta samalla heillä oli todennäköisemmin konflikteja omien vanhempiensa kuin appivanhempiensa kanssa. Lisäksi miehet, joilla oli lapsia, kokivat appivanhempansa läheisemmäksi kuin lapsettomat miehet. Isät ja äidit raportoivat lapsettomia todennäköisemmin ristiriidoista appivanhempiensa kanssa. Artikkelissa IV tutkittiin tarkemmin useita yksilö- ja perhetason muuttujia, jotka ovat yhteydessä isovanhempien investointeihin. Tulosten perusteella eräiden tekijöiden, kuten isovanhemman ja vanhemman siviilisäädyn, yhteys isovanhempien investointeihin vaihtelee isovanhempityypin mukaan. Lopuksi artikkelissa V tutkittiin tarkemmin isovanhempien siviilisäädyn yhteyttä isoäitien ja isoisien investointeihin. Eläminen ilman puolisoa oli yhteydessä erityisesti isoisien vähentyneeseen yhteydenpitoon lapsenlapsen kanssa ja todennäköisyyteen hoitaa lapsenlasta.

Yhteenvetona voidaan sanoa, että isovanhemman sukupuoli ja sukulinja määrittävät vahvasti ylisukupolvisia suhteita ja isovanhempien investointeja. Kun isovanhempityyppejä verrataan keskenään, äidin suvun merkitys korostuu. Perimmäinen syy tälle voi löytyä evolutiivisista selitysmalleista ja liittyä erityisesti sukupuolisidonnaisiin lisääntymisstrategioihin ja isyyden epävarmuuteen. Joissain tilanteissa, erityisesti tutkittaessa suhteita appivan-

hempiin, kontekstisidonnaiset tekijät voivat rajoittaa tai muokata (voimistaa tai heikentää) yhteyttä evolutiivisesti keskeisten muuttujien (sukupuoli ja sukulinja) ja isovanhemman käyttäytymisen välillä. Yhteenvetoluvun lopuksi keskustellaan tutkimustulosten käytännöllisistä ja perhepoliittisista vaikutuksista.

Contents

List of original publications

This thesis is based on the following articles which will be referred to in the text by their Roman numerals:

I Mirkka Danielsbacka, Antti O. Tanskanen, Markus Jokela, & Anna Rotkirch (2011). Grandparental child care in Europe: Evidence for preferential investment in more certain kin. *Evolutionary Psychology*, 9, 3–24.

II Mirkka Danielsbacka, Antti O. Tanskanen, & Anna Rotkirch (2015). Impact of Genetic Relatedness and Emotional Closeness on Intergenerational Relations, *Journal of Marriage and Family*, 77, 889–907.

III Mirkka Danielsbacka, Antti O. Tanskanen, & Anna Rotkirch (submitted). Parenthood and in-law conflict in contemporary Finland.

IV Mirkka Danielsbacka & Antti O. Tanskanen (2012). Adolescent grandchildren's perceptions of grandparents' involvement in UK. An interpretation from life course and evolutionary theory perspective. *European Journal of Ageing*, 9, 329–341.

V Mirkka Danielsbacka & Antti O. Tanskanen (2016). Grandfather involvement in Finland: Impact of divorce, re-marriage and widowhood. In: Buchanan, A. & Rotkirch, A. (eds.) *Grandfathers: Global Perspectives*. London: Palgrave Macmillan.

Key concepts

Family dynamics. Family dynamics refers here to the interaction between family members as well as varying relationships within a family. Family dynamics may include positive as well as negative emotions and interaction (i.e., helping, emotional closeness and conflicts) between family members. Family dynamics are studied here especially between grandparents and grandchildren, and between adult children and their parents and parents-in-law.

Grandparent type. The term "grandparent type" refers here to the role of grandparents according to their sex and lineage. The four possible types of grandparents are as follows: maternal grandmother, maternal grandfather, paternal grandmother and paternal grandfather.

Intergenerational relations. Intergenerational relations are specified in this study to mean relations between family generations. The three family generations studied are grandparents, parents and (grand)children. Intergenerational relations between family generations may mean a direct relationship and interaction between two generations, or a more complex relationship where, for instance, the middle generation (parents) mediates the relationship between grandparents and grandchildren.

Pattern of biased grandparental investment. Grandparental investment is used here as a general term for all conscious as well as unconscious investments grandparents make in their grandchildren directly or via the grandchildren's parents. These investments may include being in contact and spending time with grandchildren as well as giving them money, emotional support, care and practical help. The pattern of biased grandparental investment here denotes the common empirical finding that grandparent types invest differently in their grandchildren.

Socio-ecological context. Socio-ecological context is used here in a broad sense, referring to all social (intra- and interpersonal, such as socio-economic status) and ecological (environmental, such as cultural) contextual factors that might be associated with family relations.

1 Introduction

> *One winter morning, an elderly woman stood in the middle of a courtyard with two crutches. She had big old-fashioned eyeglasses, winter clothes, and a hat underneath which gray curly hair peered. She stepped dangerously back and forth in the slippery yard, and it looked like she was trying to decide whether or not it would be safe to move on to the slick pavement with her crutches. Suddenly a small red ball rolled to her feet. Three metres away from her stood a little child in his winter overalls and colourful beanie. The child encouraged the old woman to kick the ball towards him. Now it all made sense. Of course it was a grandmother playing with her grandchild. Kicking the ball was a bit difficult for the grandmother because she had to steady the crutches, but the child looked happy because he caught the ball. The play continued, and an old lady's daring movement in a slippery yard had been explained.*

Witnessing the story above begged the question of why grandparents are ready, even at the possible expense of their own health and well-being, to invest so much in their grandchildren, and why does it feel so natural to us? In the Nordic countries of Europe in particular grandparents are not needed (or obliged) as crucially for looking after their grandchildren on a daily basis as is the case in, for instance, Southern European countries where child day care services are scarcer (Fokkema, ter Bekke, & Dykstra, 2008; Hank & Buber, 2009; Igel & Szydlik, 2011; Karisto, Takala, & Haapola, 1998, 310; Millar & Warman, 1996). Nevertheless, grandparents in Nordic welfare states as well as in other parts of Europe invest much of their time and resources in their grandchildren. The starting point for this research is the above-described notion of the existence of caring grandparenthood. My primary interest, and thus the first question in this study is, however: What factors are associated with the strengths and weaknesses of intergenerational relations and a caring grandparenthood?

The second question arose from the notion that all grandparents are not in an equal position in relation to their grandchildren. As the story above indicates, grandmothers, rather than grandfathers, are often the ones who are involved in their grandchild's life. More precisely, it is usually the maternal grandmother who takes care of the grandchild and to whom grandchildren become most attached (e.g., Eisenberg, 1988; Euler & Weitzel, 1996; Griggs, Tan, Buchanan, Attar-Schwartz & Flouri, 2010; Pollet, Nettle & Nelissen, 2006; 2007; Scholl Perry, 1996; Smith, 1991). Even more interesting is the notion that the descending order of grandparental investment in most cases adheres to the following pattern: the maternal grandmother invests the most, followed by the maternal grandfather and paternal grandmother, whereas the paternal grandfather usually invests the

least, even in countries where there is no explicit preference for matri- or patrilineal family relations (see Coall & Hertwig, 2011 for review). Therefore the second question of my dissertation is why do grandparents differ from each other? Combined, these two questions direct the focus of this thesis to how different contextual factors, such as the geographical and emotional proximity between parental and grandparental generations or the marital status of grandparent and parent, are associated with biased grandparental investment patterns.

An obvious explanation for the difference between grandparent types is the age difference between grandparents: usually the maternal grandmother is the youngest and thus most likely to be still alive, whereas the paternal grandfather is usually the oldest and most likely to be either in the worst condition or already passed away (Coall & Hertwig, 2010; Strassmann & Garrard, 2011). In addition, age creates another inequality between grandparents. Increased life expectancy means that grandparents and grandchildren have more shared years of life than ever before (Coall & Hertwig, 2010), but the increase in shared years is distributed unequally among grandparents who differ according to gender and socioeconomic status (Tarkiainen et al., 2011; Therborn, 2013, 10–19, 49, 132–136). Thus, the age of a grandparent is an important variable to take into account when analysing biased grandparental investment.

At the same time, with the increase in shared years of life between grandparents and grandchildren, the number of grandchildren in the Western world has decreased, which means that the time spent with each grandchild may on average increase (Buchanan & Rotkirch, 2013; Coall & Hertwig, 2010). Due to this increase in life expectancy and decrease in the number of children, contemporary grandparents have all the potential to become a significant part of their grandchildren's lives. In European countries more than 80 per cent of adults aged 60–79 have at least one grandchild (Puur, Sakkeus, Põldma, & Herm, 2011), and thus grandparenthood is nowadays a significant phase of life among the majority of older Europeans.

Topically, the present study belongs to the field of family studies. The discipline of the thesis is social and public policy. Family and informal social relationships are an important part of, and resource for, human well-being: an obvious reason for why they have social policy relevance. Another reason is that in an era of retracting welfare state services there are growing demands to increase the responsibility of family members to take care of each other. How much support do family and extended kin actually provide each other, and how equally is this support distributed? The social policy aspect of the study is thus twofold. First, I examine grandparents as an asset – not a burden – which takes into account ageing people as providers of care and help. This contrasts with the common perception presenting older people as an economic and social burden (see Bengtsson, 2010; Christensen, Doblhammer, Rau, & Vaupel, 2009 for discussion). Second, I provide new

information on the reasons for the biases in family relations. If the responsibilities of families are supposed to increase, it is crucial to have information on which family members are least likely to receive support from other family members.

Theoretically, the present study adopts sociological and evolutionary approaches to grandparenting. These fields of research have previously been rather separate, and occasionally hostile to each other, but nowadays more interaction has developed. In addition to the division between sociological and evolutionary grandparent studies, evolutionary research on grandparenting can itself be further divided into two branches: evolutionary ecology and evolutionary psychology (Coall & Hertwig, 2010). The psychological and ecological branches have different focuses and sometimes methodologies, but share the same theoretical framework. Evolutionary ecology, also known as human behavioural ecology, is more interested in behavioural variation and, in our case, the impact and outcomes of grandparental investment and the life history approach to family life (see e.g., Lahdenperä, 2010; Lummaa, 2007; Nettle, Gibson, Lawson, & Sear, 2013; Tanskanen, 2014). Evolutionary psychology in turn is more interested in the psychological dispositions underlying human behaviour and, with regards to grandparenting, the factors shaping family attachments and biased grandparental investment (see e.g., Euler & Weitzel, 1996; Pashos & McBurney, 2008; Pollet et al., 2006; 2007). In this study, the focus is on the biased grandparental investment pattern and factors related to it.

This summary article proceeds as follows. First, I provide a detailed theoretical background for the subject of the thesis. I separately present both the evolutionary and sociological theories, and their predictions of grandparental support, its distribution and the factors affecting it. Second, I suggest a synthesis of these two perspectives. Third, I discuss previous results concerning biased grandparental investment, and highlight gaps in the research literature. This is followed by the aims of the thesis and a description of materials and methods used in the articles. Then I briefly summarize the results of each article and discuss how the results contribute to the aims of the thesis. Lastly, I make my final remarks concerning the conclusions of the thesis and suggest pathways for future studies.

2 Theoretical framework

There is a growing field of research about grandparents (Bengtson, 2001; Coall & Hertwig, 2010; Arber & Timonen, 2012). Grandparents and grandparenting have gained interest especially among sociological, psychological and evolutionary researchers. A disciplinary division, most visible in the small number of references made across disciplines, has long prevailed between these fields of study (Coall & Hertwig, 2011). More fruitful discussion and interaction between the disciplines has, however, gradually developed in recent years. The present study aims to continue this discussion and incorporate particularly sociological and evolutionary approaches into one frame that takes into account the biological as well as socio-ecological contextual factors attached to grandparenting. In their landmark paper, Coall and Hertwig (2010) described grandparental investment from both theoretical angles but did not provide empirical evidence using their own data for how these two fields can be merged. That challenge is the main inspiration for, and purpose of, this thesis.

One important and profound division between evolutionary and sociological explanations concerns how much each discipline is interested in ultimate reasons (the "why" questions), and proximate mechanisms (the "how" questions) (Tinbergen, 1963). Evolutionary researchers focus more on the possible ultimate explanations for certain results, often paying much less attention to proximate mechanisms, whereas sociologists pay attention to the proximate mechanisms, but at the same time often ignore ultimate explanations. Ultimate reasons concern the possible evolutionary function of a behaviour and why natural selection might have favoured a certain trait. Ultimate explanations ask *why* a behaviour (e.g., grandparental investment) exists in the species. Proximate explanations in turn describe the mechanisms triggering and enabling the behaviour, and are interested in *how* certain behaviour is expressed and what contextual factors are related to it (for a more detailed discussion of ultimate and proximate explanations, see Nettle et al., 2013; Scott-Phillips, Dickins, & West, 2011).

Concerning intergenerational relations, an ultimate explanation focuses on why kin help each other across generations. One may ask why caring grandparenthood exists in the first place, and what the evolutionary reason for biased grandparental investment is. In turn, the proximate questions may be interested in how different socio-ecological factors (e.g., emotional closeness or geographical distance) facilitate intergenerational helping behaviour. Ultimate and proximate approaches are complementary to each other, but it is still rare to conceptualize the theoretical frame of family studies with them or to combine them in empirical research (but see Tanskanen, 2014).

2.1 Intergenerational relations in evolutionary theory

In general, evolutionary theory seeks the fundamental reasons for kin support and emotional ties between relatives. The starting point for evolutionary family studies is to understand the human family as a reproductive system, characterized by cooperative breeding and alloparenting (Hrdy 1999; 2009; Sear, 2015). Cooperative breeding means that human's species-typical childrearing involves, in addition to the child's biological mother, other caretakers (so-called allomothers). These allomothers may include, for instance, the child's father, older siblings, grandparents, aunts and uncles.

The main explanatory power of an evolutionary approach is that it seeks to understand what motivates individuals to be supportive, and the reasons why the positive emotions towards close kin develop. The idea that there is some biological core in caring grandparenthood gains strong support from the analyses and reviews concerning pre-modern, traditional and contemporary human societies (e.g., Sear & Coall, 2011; Sear & Mace, 2008). The fact that researchers have found the occurrence of caring grandparenthood, for example in many primates, further highlights the possible evolutionary value of grandparental support (Euler, 2011).

Grandparental care is not a uniquely human phenomenon. Occasional caring grandmotherhood has been found among several primates, for instance wild chimpanzees and baboons (Collins, Busse, & Goodall, 1984; Nakamichi, Silldorff, Bringham, & Sexton, 2004; Paul, 2005; Wroblewski, 2008), elephants (Lee, 1987) as well as dolphins (Norris & Pryor, 1991), killer whales (e.g., Brent et al., 2015; Foster et al., 2012) and some birds (Richardson, Burke, & Komdeur, 2007). However, compared to other species, human grandparenting may have three unique features: the regularity of caring grandparents, the existence of a caring paternal grandfather, and the comparatively long post-menopausal lifespan of women (Euler, 2011).

Evolutionary research is based on Charles Darwin's theory of natural selection, which showed how inheritable traits serving reproduction are passed on to the next generations through selective reproduction (Darwin, 1859). Selection pressure can focus upon the physical body, but also upon emotions and social traits. Thus, in evolutionary psychology and ecology the central idea is that natural selection has shaped not only individuals' physical but also psychological traits and behavioural predispositions. The current understanding is that humans have lived most of their evolutionary history in small hunter-gatherer societies which probably had strong matri- and patrilineal ties, and that human evolution has been particularly rapid during the period 120,000–10,000 BCE (Fry, 2006), when most of the evolutionarily adapted behavioural traits of humans most likely evolved.

The evolution of caring grandmotherhood and its connection to the menopause and human females' long post-reproductive lifespans are under debate (Coall & Hertwig, 2010; Strassmann & Garrard, 2011). The so-called grandmother hypothesis assumes that, compared to several other animals, human females stop reproducing early in relation to their long lifespan because they can gain more fitness benefits by investing in their existing offspring than by reproducing themselves (Hawkes, 2003; Hawkes & Blurton-Jones, 2005; Lahdenperä, 2010). The grandmother hypothesis is closely linked to the human life-history theory and the trade-offs that grandmothers can make (Lummaa, 2007). However, others have stated that caring grandmotherhood and a long infecund lifespan might as well be by-products of evolution, meaning that the long post-reproductive lifespan could have evolved first, and caring grandmotherhood only afterwards (Broadfield, 2010; Kachel, Premo, & Hublin, 2011; Peccei, 2001; Zeller, 2004).

Regardless of the reasons for the long female post-reproductive lifespan, compelling empirical evidence exists showing that grandparents, and grandmothers in particular, have been "child saviours", in the true meaning of the word, in pre-modern societies (e.g., Sear & Mace, 2008; Lahdenperä et al., 2004) and continue to be that in more recent traditional societies (Hawkes, O'Connell, & Blurton Jones, 1997; Sear, Mace, & McGregor, 2000). For instance, in 17th and 18th century Finland the presence of a mother decreased her offspring's age at first birth, shortened offspring's first three birth intervals, and increased the survival of offspring's children (Lahdenperä et al., 2004). In contemporary traditional hunter-gatherer societies, the presence of grandmothers has, for instance, improved children's nutritional status and consequently increased the survival of grandchildren (Hawkes et al., 1997).

In contemporary Western countries with low levels of infant and child mortality, however, grandparents are rarely needed to keep children alive. Despite this, they may still make a difference in their children's reproductive decisions and their grandchildren's well-being. According to previous studies, grandparental involvement appears to be important for the well-being of the children especially in cases of family crisis such as parental death or divorce (e.g., Attar-Schwartz, Tan, Buchanan, Flouri, & Griggs, 2009; Dunifon, 2013; Sear & Coall, 2011). There is also evidence that in modern societies grandparents may have a positive influence on parental childbearing decisions (e.g., Tanskanen & Rotkirch, 2014; Tanskanen, Jokela, Danielsbacka, & Rotkirch, 2014; Waynforth, 2011) as well as grandchild well-being and development (e.g., Scholl Perry, 1996; Tanskanen & Danielsbacka, 2012).

The impact and outcomes of grandparental support measured as fitness benefits are not the subject of the present thesis. However, the evolutionary importance of caring grandparenthood creates a framework for the present study because it provides an ultimate reason for the question of why caring grandparenthood exists. It also creates a puzzle: Why do all grandparents not

invest equally in all their grandchildren given the possibility to gain fitness benefits by doing so? Why is there bias among grandparents?

Evolutionary theories behind the biased grandparental investment pattern

The evolutionary theories behind the biased grandparental investment pattern are rooted in Hamilton's (1964) kin selection theory and Trivers' (1972) parental investment theory. The reasons for the bias between grandparent types can be approached through hypotheses that are developed from sex-specific reproductive strategies, paternity uncertainty, and preferential investment in more certain kin.

Kin selection theory predicts that the closer the actual kin relationship is (i.e., the closer people have reason to believe that they are genetically related), the more people will provide altruistic help (Hamilton, 1964). By helping genetically related kin, especially in the descending line, it is possible to enhance one's inclusive fitness. Kin selection theory states that an individual can enhance his or her inclusive fitness by supporting his or her close relative's reproductive success (indirect fitness) at the expense of his or her own direct fitness. Hamilton formulated a mathematical derivation (Hamilton's rule) based on kin selection theory: $B*r > C$ where B means benefit, r the degree of relatedness, and C the costs. Hamilton's rule predicts that natural selection should favour investment in close kin: all other factors being equal, individuals should invest more in their close relatives than in other individuals. During the past 50 years Hamilton's kin selection theory has been widely studied and utilized within several disciplines, and its predictions have proven to be advantageous in understanding a wide range of behavioural phenomena (Abbot et al., 2011).

People have on average a 50 per cent chance of having the same genes as their children, and a 25 per cent chance of having the same genes as their grandchildren. In addition, due to the assessment of the reproductive value of the receiver, investments are predicted to go towards the younger generation (Hughes, 1988), and thus, according to kin selection theory, people should favour and invest in (all else being equal) their children and grandchildren over more distant relatives, older relatives and non-related friends.

However, in its original form, kin selection theory ignores affines (i.e., in-laws). In-laws who are genetically non-related family members are thus often approached by evolutionary researchers as similar to any other non-related friend or acquaintance (Burton-Chellew & Dunbar, 2011). Hughes (1988) first argued that, as an extension of inclusive fitness theory, in-laws, who are usually not closely genetically related become "inversely" genetically related to each other through common descendants. Thus, the shared genetic interest that may have influenced evolved psychological predispositions is not limited to genetic kin, and may also involve affines. This inverse genetic relatedness predicts that the relationship between in-laws should particularly

be affected by the existence of a descendant who will tie two formerly non-related kin together. This theme is examined in articles II and III.

The evolutionary anthropologist and biologist Robert Trivers (1972) applied Hamilton's general rule to parental behaviour. Trivers' **theory of parental investment** takes into account the investments that parents make in their offspring. The theory acknowledges that the investments made in one offspring may diminish investments in other offspring at the same time or in the future, and it also acknowledges the difference between the sexes regarding the amount and cost of the investment (i.e., females have a higher obligatory investment in each reproductive event). By investing in their offspring, parents can enhance their inclusive fitness. Parental investments are not necessarily distributed equally among all children. Due to the socio-ecological context and available resources, parents may allocate their investments to certain children only (e.g., those who are the most promising or those who need the assistance the most, see also the Trivers-Willard hypothesis [Trivers & Willard, 1973]). Children also compete with their siblings over parental resources, which may produce differences in the allocation of parental investments (Salmon & Hehman, 2014; 2015; Trivers, 1974).

Parental investment can be easily extended to grandparental investment, although to gain the same "advantage", grandparents should invest in a larger number of children than parents do (e.g., if parents invest in two children who have approximately 50 per cent chance of having the same genes, grandparents should invest in four children who each have approximately 25 per cent chance of having the same genes). Grandparental investment includes all support that grandparents channel to their offspring (e.g., child care help, emotional support, and financial assistance), and this support may be aimed directly at grandchildren or indirectly via their own children or their children's spouses (Euler, 2011).

Although the word "investment" sounds like an economic term, the evolutionary parental (or grandparental) investment theory refers to all resources (e.g., time, emotional support, care), not only the financial support parents can allocate to their offspring. It is also important to note that (grand)parental investments do not refer only to the conscious stakes but also the unconscious investments parents make in their children without even acknowledging them (Trivers, 2002). The unconscious nature of parental or grandparental behaviour is important to remember especially in the case of biased (grand)parental investment.

Humans typically exhibit **sex-specific reproductive strategies**. These stem from the fact that for women, a single offspring is more costly (due to pregnancy and lactation) than for men, and for this reason women invest principally more in children than men do (Trivers, 1972). Maternal investment is also more obligatory whereas paternal investment can be facultative. This is shown, for instance, in the fact that losing a mother is more detrimental to a child than losing a father, or some other carer (Sear &

Mace, 2008). Thus, in the ancestral past, females could maximize their inclusive fitness by maximizing their maternal care (Euler, 2011). Sex-specific reproductive strategies appear to be reflected in several evolved psychological dispositions, for instance making women on average more empathetic and caring towards their kin and towards young children (Rotkirch & Janhunen, 2010). Sex-specific reproductive strategies are an ultimate reason for the different allocation of care and resources provided by different grandparent types. For instance, a mother and her relatives would have an interest in the mother's long reproductive career, and thus maternal grandparents may allocate more resources to the well-being of a mother and grandchild.

Paternity uncertainty (also called relationship uncertainty) means that whereas women can be sure that the child they gave birth to is biologically related to them, men can never be one hundred per cent certain that the child is actually theirs. I will not consider here the modern possibility of surrogacy or modern gene tests which can confirm paternity at 99.9 per cent certainty, because most evolutionary traits of parental and grandparental behaviour have been shaped before modern medicine. In the case of grandparents, paternity uncertainty means that only the maternal grandmother has no relationship uncertainty, since she is certain that her daughter and her daughter's children are genetically related to her. Maternal grandfathers and paternal grandmothers have one kinship link with paternity uncertainty, while paternal grandfathers have two. Based on predictions derived from paternity uncertainty, grandparents would (all else being equal) typically unconsciously bias their investment in grandchildren following the differences in genetic certainty. Therefore, according to paternity uncertainty it is assumed that maternal grandmothers invest in their grandchildren the most, followed by maternal grandfathers and paternal grandmothers, while paternal grandfathers invest the least (Euler & Weitzel, 1996; Smith, 1988).

Paternity uncertainty does not directly explain the frequently documented difference between maternal grandfather and paternal grandmother. Maternal grandfathers are commonly found to invest more in their grandchildren than paternal grandmothers do, although both have the same genetic certainty regarding offspring. This is often explained by incidental exposure, meaning that maternal grandfathers increase their reported involvement due to their spouse, the maternal grandmother, who invests the most (Gaulin, McBurney, & Brakeman-Wartell, 1997; McBurney, Simon, Gaulin, & Geliebter, 2002; Pollet et al., 2006). The presence or absence of a spouse, and its influence on the relationship between grandmothers and grandchildren versus grandfathers and grandchildren, are investigated in articles IV and V.

Another theoretical explanation was presented by Laham and colleagues (2005), who argued that the difference between maternal grandfathers and paternal grandmothers can be explained by **preferential investment in more certain kin**. The preferential investment hypothesis predicts

grandparental investment to change according to the degree of genetic relatedness, but also according to the availability of other investment options as represented by the existence of grandchildren via sons or daughters. If women and men have children and grandchildren of both sexes they are expected to invest more in their daughter's children (uterine grandchildren) than their son's children (agnatic grandchildren). In the absence of grandchildren via a daughter, both sexes are expected to invest more in their son's children. Thus, in a typical case, maternal grandfathers would invest more because paternal grandmothers commonly have a more certain investment option available through a grandchild via a daughter. If more certain options are unavailable, similar investment levels are predicted by both the maternal grandfather and paternal grandmother. This assumption is tested in article I of the present study with a large, multinational and representative dataset.

As well, the asymmetric impact of X- and Y-chromosome inheritance may affect the bias in grandparental investment (Chrastil, Getz, Euler, & Starks, 2006). With respect to sex chromosomes, grandchildren are asymmetrically related to their maternal and paternal grandparents, meaning that grandparents may also allocate their investment according to the grandchild's sex. Studies concerning the asymmetric impact of X- and Y-chromosome inheritance have produced mixed results (see Chrastil et al., 2006; Rice, Gavrilets, & Friberg, 2010; Tanskanen, Rotkirch, & Danielsbacka, 2011). The hypotheses based on asymmetric sex chromosome relatedness are not examined in this thesis because only one of the datasets (British Involved Grandparenting survey) includes information on grandchild's sex and one article already exists with that data which found no systematic variation in grandparental investment in relation to the sex of the grandchild (Tanskanen et al., 2011).

To conclude, evolutionary theory provides a scientific basis for the reasons for the existence of caring grandparenthood. Hamilton's (1964) kin selection theory and Trivers' (1972) parental investment theory offer ultimate explanations for the questions of why humans favour their close kin over more distant kin or non-kin and why humans in general invest in their offspring (possibility to gain more benefits measured as inclusive fitness). In addition, Hughes (1988) provides an explanation for the in-law problem: relatives who are "inversely" related to each other through common descendant(s) are almost as close as genetic kin because they share a common reproductive interest in the future generations despite not having common ancestors. An extension of Hughes' hypothesis is an assumption that the birth of a child brings in-laws emotionally closer to each other as a response to an alteration in family composition. This prediction is more closely formulated in article II and is discussed at more length later in this summary.

The evolutionary framework has, however, its problems. Although kin selection theory underlines the phrase "all else being equal", which means

that other confounding variables (such as the health and age of a grandparent or the distance between grandparent and grandchild) should be taken into account, evolutionary researchers have not been so interested in the variables that affect grandparental investment other than lineage and gender. The starting point nowadays is that multivariate models are essential when studying biased grandparental investment. The background variables are, however, sometimes differently connected to the main explanatory variables (sex and lineage), and thus some of them (e.g., emotional closeness and marital status of a grandparent) at times deserve more attention than has been given in earlier evolutionary research (but see Pollet, Roberts, & Dunbar, 2013).

In addition, with regard to grandparental investments, evolutionary research often takes into account only the grandparent's view (investor's view). Studies on grandparental investment made from the evolutionary perspective do not normally consider the receiver's willingness to accept the investment. Trivers' (1974) parent-offspring conflict theory, which is an expansion of Hamilton's (1964) general theory, states that from the offspring's perspective it is always beneficial to receive as many of the parental resources as possible. Thus, based on this theory, one can predict that all grandparental investment should always be accepted. However, this is not the case. One reason for this could be that intergenerational relationships are not always between biological kin (parents and offspring) but also include in-laws. Secondly, the relations between biological kin (adult children and parents) may be poor.

2.2 Intergenerational relations in family sociology

Grandparenting is an important topic also in family sociology (e.g., Arber & Timonen, 2012; Sprey & Matthews, 1982). Despite the increasing interest over recent decades, the reasons for the existence of caring grandparenthood have been surprisingly little theorized within family sociology (but see rational choice theory: Friedman, Hechter, & Kreager, 2008). Family sociologists have approached intergenerational relations foremost as a product of emotions or social norms and attitudes (e.g., King & Elder, 1995; see also Fingerman, Hay, & Birditt, 2004; Lüscher & Pillemer, 1998) without asking why particular emotions and norms exist or how they develop.

Sociological models of intergenerational solidarity (e.g., Roberts, Richards, & Bengtson, 1991), ambivalence (Lüscher & Pillemer, 1998) and the hypothesis of intergenerational stake (Giarrusso, Stallings, & Bengtson, 1995) are intended to describe the relations between grandparents, parents, and grandchildren. The sociological life course perspective (e.g., Mayer, 2009; Settersten, 2003) as well as need and opportunity structures (Szydlik,

2008) have provided an increasingly nuanced picture of the factors related to the structure of intergenerational relations and support. From the viewpoint of ultimate and proximate reasons, one can understand several of these sociological explanations as the proximate causes that promote or lessen kin investment in modern societies. Sociological models or explanations can, however, rarely answer the question of why intergenerational relations are formed the way they are. The focus is often on contextual explanations that change over time, not on explanations which enhance our understanding of the function and evolution (as well as continuities and similarities) of intergenerational relations.

In sociological studies grandparent types are not always separated from each other. Nevertheless, many family sociologists acknowledge the importance of biological variables such as sex and lineage (see e.g., Chan & Elder, 2000; Giarrusso et al., 1995). One of the main explanations given for the different investments between grandmothers and grandfathers is the so-called kin keeper theory. The theory assumes that due to social norms and expectations, women are more inclined to take care of family relations than men, and thus the relations between grandmothers (maternal grandmothers particularly) and grandchildren develop more closely than those between grandfathers and grandchildren (Bracke, Christiaens, & Wauterickx, 2008; Chan & Elder, 2000; Dubas, 2001; Fingerman, 2004; Uhlenberg & Hammill, 1998).

The sociological focus on the emotional relations between parental and grandparental generations has raised the question of the parents' role as gatekeepers between grandparents and grandchildren (Robertson, 1975; Thompson & Walker, 1987). The role of parents as mediators highlights the importance of the quality of the dyadic parent–grandparent relationship. Unlike most evolutionary research, it takes into account that grandparents cannot take for granted the acceptance of their investment, which may be partly or wholly rejected by the parents of the grandchildren (Barnett, Scaramella, Neppl, Ontai, & Conger, 2010; Michalski, 2010; Pashos & McBurney, 2008).

Sociological models for intergenerational relations and the factors affecting them

The two main sociological models for the purpose of describing intergenerational relations are the intergenerational solidarity model and intergenerational ambivalence model. In addition, the intergenerational stake hypothesis describes the directions of the net flow of intergenerational support, and the sociological life course perspective describes, for instance, the effects of ageing on intergenerational relations.

The original **intergenerational solidarity model** included three dimensions of solidarity: normative, functional and structural (Bengtson, 1975). It was intended to represent different aspects of the bonds that tie

family members of different generations together. The model was criticized for its narrowness, and the fact that it did not specify the interrelationships between the dimensions (Atkinson, Kivett, & Cambell, 1986). As a result, Roberts, Richards, and Bengtson (1991) formulated a taxonomy for intergenerational solidarity which includes six dimensions: affectual solidarity (e.g., sentiments between family members), associational solidarity (e.g., contact frequency), consensual solidarity (e.g., agreement on values), functional solidarity (e.g., assistance), normative solidarity (e.g., filial and parental obligations) and structural solidarity (e.g., geographical distance). The last dimension actually refers to the opportunity structure for family interaction (see also Szydlik, 2008). In addition, Bengtson and Roberts (1991) tested the interrelatedness of these dimensions more thoroughly and found that the different dimensions may affect each other. The intergenerational solidarity model was constructed originally for the parent-child relationship but was later expanded to grandparent-grandchild relations (see Bengtson, 2001; Silverstein, Giarrusso, & Bengtson, 1998). The variables used in this thesis allow me to operate within the dimensions of affectual solidarity (articles II and III), associational solidarity (articles IV and V), functional solidarity (articles I, II, IV and V), and structural solidarity (articles I, II, III, IV, and V).

Empirical studies on intergenerational solidarity soon showed that older generations usually feel more affection and closeness towards the younger generation than vice versa. This led to the development of **the intergenerational stake hypothesis** (Giarrusso et al., 1995). It assumes that generations invest in interaction differently, because parents and grandparents are more concerned than children of the continuity of the family whereas children are more interested in gaining independence and autonomy (Hoff, 2007). It is not difficult to see the resemblance between the intergenerational stake hypothesis and the evolutionary notion of the receivers' reproductive value, which both predict that the net flow of the investment would be directed towards the younger generation.

The intergenerational solidarity model described above ignored the **ambivalent nature of kin relations**. It was therefore soon pointed out that relations between family members contain both positive and negative feelings (e.g., Lüscher 2002; Lüscher & Pillemer, 1998; Pillemer et al., 2007; Willson, Shuey, & Elder, 2003) and that the models describing intergenerational relations should take this into account. Conflicting and emotionally close relationships were not two alternative sides of intergenerational relations, but instead, it was argued, intergenerational relations generate both solidarity and conflict, and thus are ambivalent by nature (Lüscher & Pillemer, 1998). Lüscher and Pillemer (1998) divide the concept into two dimensions: contradictions at the level of social structure and contradictions at the subjective level. They also suggest three aspects of parent-adult child relationships that are likely to generate ambivalence: ambivalence between dependence and autonomy, ambivalence resulting

from conflicting norms regarding intergenerational relations, and ambivalence resulting from solidarity. In this thesis I will be able to operate with ambivalence at the subjective level (between the specific adult child-parent and adult child-parent-in-law dyads), and will suggest an evolutionary explanation for the ambivalent feelings between these dyads in article III.

The sociological **life course perspective** emphasizes that grandparental investment is bound to the place and time in which people are living (Elder & Kirkpatrick Johnson, 2003; Giele & Elder, 1998; Kemp, 2007; Settersten, 2003). Thus, it well describes, although it does not explain, the cultural differences in grandparental investment patterns related to the cultural variation of matri- and patrilocal kin systems. In addition, it emphasizes that each relationship between family members is influenced by other family relationships (Cox & Paley, 1997), and that the age and phase of life of each family member affect the relationships between them (Elder, 1994). The life course perspective also notes, as does the need and opportunity structure model, that kin support is connected to the receiver's needs and the giver's possibilities. For example, national family policies shape parents' demand for kin help with child care (Leitner, 2003). With its emphasis on age and life stage, the life course perspective comes close to biological life-history theory (Lummaa, 2007), which also states that age, life stage and environmental factors are important determinants in, for instance, the reproductive behaviour of humans.

Sociological theories explaining the biased grandparental investment pattern

The aforementioned models of intergenerational solidarity, ambivalence, intergenerational stakes and a life course perspective make no explicit predictions about the difference between the behaviours of different grandparent types and the investments they make. The sociological theories that aim to explain the biased grandparental investment pattern are the kin keeper theory and the theory of parents as gatekeepers. The kin keeper theory emphasizes the difference between grandmothers' and grandfathers' investments, whereas the notion of parents as gatekeepers or mediators between grandparent and grandchild takes into consideration the recipient's point of view, and thus points to the quality of the relationship between the parental and grandparental generations. In addition, based on rational choice theory, Friedman, Hechter and Kreager (2008) have formulated a theory of rational grandparents. According to it grandparents can allocate their investments in those grandchildren whom parent(s) they believe would support them when they are older and in need of support. Thus, grandparents can act as rational investors who expect their investment to be reciprocated to them at some point. This theoretical perspective is not examined in the present thesis. Testing the hypotheses created by the

rational choice theory would have required datasets constructed differently than those used in this study.

The kin keeper theory assumes that social norms encourage (and possibly also force) women to behave in a more caring way than men, and that consequently women are socialized as kin keepers, managing and maintaining relationship ties within families (Bracke et al., 2008; Dubas, 2001; Willson et al., 2003). Kin keeper theory predicts that due to this socialization, women are more prone than men to maintain contact with, provide support to, and take care of, their relatives. Thus, kin keeper theory provides similar predictions as sex-specific reproductive strategies which also state that, for women, investing in their offspring is more obligatory than for men, and that this also results in more evolved predispositions for women to keep in touch with their kin in general. The difference between kin keeper theory and sex-specific reproductive strategies is that the former understands kin relations mainly as a product of socialization, and the latter as an evolved predisposition.

The gatekeeping role of parents can emerge especially in cases of young (grand)children who cannot yet decide for themselves which grandparent they wish to spend time with (Matthews & Sprey, 1985; Sprey & Matthews, 1982). When parents guard access to a grandchild, they act as gatekeepers. This gatekeeping role of the middle generation also highlights the importance of the quality of the dyadic parent–grandparent relationship, which is why the perception of the relationship quality should be studied especially from the parental viewpoint (Thompson & Walker, 1987). Moreover, based on the kin keeper theory, mothers are assumed to take care of the children more than fathers, so it can be assumed that mothers may also decide who will have closer access to the child (Bracke et al., 2008). Often this person is the maternal grandmother, because the daughter-mother bond has proven to be the strongest of adult child-parent relations (Fischer, 1986; Hagestad, 1986; Rossi & Rossi, 1990). Here it is easy to see the similarity with the parental investment theory (Trivers, 1972): investing in offspring is more obligatory for women than for men, which is why ties between mothers and daughters have evolved to being so strong.

To conclude, intergenerational relations are understood as a very complex whole in sociological research. Sociologists have developed several models and different dimensions to describe the solidarity and ambivalence apparent in family relations. They have also developed, for instance, theories of intergenerational stake and women as kin keepers, which in fact make partly similar predictions as evolutionary theories. The advantage of the sociological approach is that it acknowledges various life situations as well as different cultural norms and socio-ecological circumstances which affect family dynamics, and also takes into account that the investments may not be automatically accepted.

However, the sociological framework has its disadvantages. Sociologists have not traditionally approached humans as biological species, although

many of their assumptions (e.g., the intergenerational stake hypothesis or women as kin keepers) produce the same predictions as evolutionary theories. The main problem is that in the sociological framework there is no coherent and explanatory macro-level theoretical frame for grandparental investment that would integrate all assumptions and hypotheses.

2.3 Differences and similarities in grandparenting: Why and how does socio-ecological context matter?

Human families are by nature very flexible. This means that human family members are sensitive to environmental cues, learn from experience, and may often facultatively adapt to the behavioural strategy for an existing situation, which tends to increase inclusive fitness (Barkow, 2006; Barrett, Dunbar, & Lycett, 2002). Compared with most other animals, human family systems are remarkably adaptable, including variation in subsistence, marriage and residence patterns (Sear, 2015). Nevertheless, the premises for the basic strategic decision patterns (conscious or unconscious) remain the same: they are often based on the outcomes of kin selection, life history trade-offs, sex-specific reproductive strategies, or the possibility of paternity uncertainty. The question that links evolutionary research to sociological family studies is thus related to the importance and effects of contextual factors.

The importance and effects of contextual factors are in part closely related to the beneficial influence of contemporary grandparents. Grandparents do not necessarily in every situation increase the child's wellbeing. For instance, in modern affluent societies the grandmaternal tendency to "spoil" grandchildren can lead to a child becoming obese (Tanskanen, 2013). Behaviour that in former societies probably helped to keep children alive (Hawkes et al., 1997), may nowadays result in unwanted outcomes. In addition, in low resource environments, grandparents – especially older ones – may not be providers of help but rather resource competitors with young and dependent children (Strassmann, 2011; Strassmann & Garrard, 2011).

The cultural context matters also in the case of biased grandparental investment. The most obvious way to show how this is true is to study patrilocal cultures, where, after marrying, a woman becomes part of her husband's kin (Kaptijn, Thomese, Liefbroer, & Silverstein, 2013). This usually means that a new couple will be living much nearer to the man's kin than the woman's, and thus future children will grow up in the presence of their paternal grandparents and most probably see their maternal grandparents only occasionally. This obviously affects which of the grandparents gets to become the closest to the grandchild (Pashos, 2000). In matrilocal populations, in turn, women more often than men stay with their own kin, and their husbands are the ones who change their location after

marriage (Leonetti, Nath, & Hehman, 2007; Sear, 2008). Naturally, in these formations the women's kin become closer to the offspring.

Other factors that may be associated with grandparental investment and that vary according to the socio-ecological context are geographical and emotional proximity between parental and grandparental generations; age of the grandparent, parent and child; socio-economic status of grandparent and parent; marital status of grandparent and parent; and the number of grandchildren and grandchildren sets. These variables may be similarly associated with grandparental investments in the case of all grandparents (e.g., the effect of grandparent's health or age), or the associations may vary according to sex, lineage or genetic relatedness (biological or in-law relationship) between parental and grandparental generations.

One theme is of particular interest: the emotions, more precisely emotional closeness, and the different understandings of emotional closeness in evolutionary and sociological research. In evolutionary research the emotional closeness between family members is often treated as a dependent variable, a measurement of an investment such as emotional support (Euler, Hoier, & Rohde, 2001; Euler & Michalski, 2008). In addition, the emotional closeness of a specific type of grandparent–parent relationship can be understood as a product of reproductive choices and their fitness consequences, shaped by gender and lineage (Euler, 2011; Euler & Michalski, 2008).

The other way to understand emotional closeness in evolutionary research is to treat it as a mediator of an association between genetic relatedness and kin investment. Important in this view is that emotional closeness may mediate the association differently according to the degree of genetic relatedness (Pollet et al., 2013). The so-called kinship premium hypothesis is based on kin selection theory, and states that kinship has its own unique connection to investments in close kin even after controlling for emotional closeness (Curry, Roberts, & Dunbar, 2013; Hackman, Danvers, & Hruschka, 2015). This means that emotional closeness alone cannot account for investment in close kin. People are, for instance, more willing to act altruistically towards their close relatives than their more distant relatives or non-related friends, even when emotional closeness is controlled for (Curry et al., 2013), and they may travel further to see closely related kin than more distantly related kin even when emotional closeness is taken into account (Pollet et al., 2013).

In sociological research, in turn, kin affection (a dimension of intergenerational solidarity) measured as emotional closeness or relationship quality has traditionally been understood as a main explanation for kin altruism (Chan & Elder, 2000). Thus, kinship itself would not have its own unique influence on intergenerational support; nor would its impact differ between kin members, as is assumed in the kinship premium hypothesis.

To conclude, evolutionary theory provides a solid scientific basis for the study of kin relations, explains coherently how and why they have evolved,

and creates a basis for the testable hypotheses that can be derived from the theory. The sociological theories, in turn, highlight proximate mechanisms and create “if” clauses for the evolutionary predictions because they take into account the changing contextual factors.

3 Previous findings on biased grandparental investment

Next, I review earlier research on biased grandparental investment and the factors associated with it. In this section I concentrate more on empirical findings and less on the theoretical explanations for the results, which were discussed above.

The biased grandparental investment pattern typically means that the maternal grandmother invests the most in a grandchild, followed by the maternal grandfather, then the paternal grandmother, and finally the paternal grandfather. This pattern has been confirmed in several studies and with a wide range of investment variables, including care provided during childhood, emotional closeness, relationship closeness, financial support and contact frequencies (see Bishop, Meyer, Schmidt, & Gray, 2009; Chrastil et al., 2006; Eisenberg, 1988; Euler et al., 2001; Euler & Michalski, 2008; Euler & Weitzel, 1996; Hoffman, 1979–1980; Jamison, Cornell, Jamison, & Nakazato, 2002; Kahana & Kahana, 1970; Laham, Gonsalkorale, & von Hippel, 2005; Matthews & Sprey, 1985; Pollet, Nelissen, & Nettle, 2009; Scholl Perry, 1996; Smith, 1991; Uhlenberg & Hammill, 1998).

The common finding that maternal grandfathers invest more than paternal grandmothers may be due to the preferential investment in more certain kin, because the latter grandparent often has a daughter's children to invest in as well. The two previous studies on this hypothesis have produced mixed results. Laham and colleagues (2005) found support for the preferential investment hypothesis with survey data encompassing almost 800 psychology students (grandchildren), whereas Bishop and colleagues (2009) found no support for the hypothesis with data from nearly 200 college students (grandchildren).

Although earlier studies include data from several contemporary societies, the individual studies usually encompass only one country, such as Germany (see Euler & Weitzel, 1996; Euler et al., 2001), the US (e.g., Uhlenberg & Hammil, 1998) or the UK (e.g., Pollet et al., 2009). In this thesis the biased grandparental investment pattern and preferential investment in more certain kin hypothesis are studied with a large amount of multinational data from several European countries, and the respondents are the grandparents themselves (article I).

Despite the convincing results from previous studies of biased grandparental investment, the main pattern can, as mentioned above, also vary due to cultural variation. For instance, Pashos (2000) showed that in contemporary rural Greece paternal grandmothers were more involved than maternal grandmothers. The cultural framework can thus promote a patrilateral rather than matrilateral bias in kin relations. In China, which has a predominantly patrilineal culture, Kaptijn and colleagues (2013) found a

grandparental investment bias towards the children of sons. Common to both of these studies is that the observed societies are patrilocal by nature or have a strong preference for patrilineal kin.

In the present thesis, the biased grandparental investment pattern is mainly examined in modern Western welfare states, which lack clear patrilocal living arrangements. Modern, and fairly equal, Western welfare states thus provide a good platform for the study of behavioural patterns in regard to intergenerational relations, because people may to a large extent choose the relatives they interact with.

Besides sex and lineage, other factors may also be related to grandparental investments. One relevant question is how considerable is the role of parents as gatekeepers between a grandparent and a grandchild (Robertson, 1975; Thompson & Walker, 1987). It is obvious that the gatekeeping role of parents is more substantial when children are small, although it is difficult to measure exactly how parents restrict grandparents' interaction with their grandchildren. One way to approach parental gatekeeping is to examine the quality of the relationship between adult children and aging parents and parents-in-law. Most studies have looked at the adult child-parent relationship (see e.g., Kaufman & Uhlenberg, 1998; Schwarz, Trommsdorff, Albert, & Mayer, 2005; Silverstein & Bengtson, 1997), but only a few have taken into consideration the adult child-parent-in-law relationship as well (but see Euler et al., 2001; Fingerman, 2004; Willson et al., 2003). Even rarer are studies concerning the association between emotional closeness and biased grandparental investment (but see Chan & Elder, 2000), although it is known that the quality of the relationship between parent and grandparent is strongly associated with that between grandparent and grandchild (Chan & Elder, 2000; Fingerman, 2004; King & Elder, 1995; Michalski & Shackelford, 2005; Uhlenberg & Hammill, 1998).

To conclude, it is highly probable that parents act as gatekeepers. In addition, it is known that the quality of the grandparent-grandchild relationship is associated with a parent's relationship quality with a grandparent. One study has also shown that a better relationship quality between parents and grandparents is associated with improved development among grandchildren (Scelza, 2011). It is still unclear how much of the emotional closeness actually explains biased grandparental investment.

With grandparental investment, the question is whether or not emotions explain all of the bias between grandparents. Evolutionary studies concerning the reproductive outcomes and reasons for grandparental investments tend to bypass the role of emotions in shaping these patterns (but see Euler et al., 2001; Michalski & Shackelford, 2005). The few evolutionary studies that have examined the association between emotional closeness and kinship investment have talked about the kinship premium, as described above. The concept denotes that although kin are typically closer to each other than non-kin, kin also help each other more than non-kin, irrespective of relationship closeness (Curry et al., 2013; Hackman et al.,

2015; Pollet et al., 2013). In article II, I examine the question of whether the perceived emotional closeness to parents and parents-in-law is associated with the grandparental investment received.

Related to emotions and parenthood, studies have shown that changes in an adult child's parental status may influence his or her relationship to his or her own parents. The results from one small study supported the idea that a woman's relationship to her mother improves as she becomes a mother herself (Fischer, 1983). Other studies with more data, however, have not found a positive effect of parenthood on the relationship that adults have with their parents (see e.g., Lawton, Silverstein, & Bengtson, 1994), or the results are mixed (see Kaufman & Uhlenberg, 1998). The association between emotions and parenthood is examined more thoroughly in articles II and III.

In their classic study, Uhlenberg and Hammill (1998) described six factors related to grandparental investment, measured as frequencies of contact with a grandchild set and with US data. Their sample consisted of 4,629 grandparent-grandchild dyads, and they performed separate analyses for women and men. Their predictors of frequent or infrequent contact were (1) quality of the relationship between grandparent and parent of the grandchild set, (2) gender of grandparent, and (3) lineage of the grandchild set, which have all been discussed above, as well as (4) geographic distance, (5) number of grandchild sets and (6) marital status of the grandparent. They found that geographic distance was a strong predictor of contacts, which is a common result also in other studies (e.g., Pollet et al., 2006; 2007). The number of grandchild sets (i.e., the number of children with children) mattered to the extent that as the number of sets increased, the likelihood of frequent contact with any particular set decreased, which is also a common result (e.g., Coall, Meier, Hertwig, Wänke, & Höpflinger, 2009). In Uhlenberg and Hammill's (1998) study, grandparents' marital status was associated with the investments, meaning that married grandparents had the most frequent contacts with grandchildren, following those who were widowed, remarried and divorced, with the effect being particularly strong for grandfathers.

Although Uhlenberg and Hammill (1998) separated grandmothers from grandfathers, they did not distinguish grandparents by their lineage (maternal or paternal grandparent). Thus, as in most previous studies concerning factors related to grandparental investment, the four main grandparent types were not separated. The associations between socio-ecological factors and grandparental investment can differ not only by the sex of a grandparent, but also by lineage. This is why in article IV the associations between different background variables and grandparental investment are studied separately for each grandparent type.

As Uhlenberg and Hammill (1998) note, the effect of marital status may differ in cases of grandmothers and grandfathers, and, in particular, a divorce may be more detrimental to grandfathers' than grandmothers' contacts with grandchildren. Using data from several European countries,

Knudsen (2012) argued that based on the fact that ageing grandfathers more often have a partner at their side, they may gain a relative advantage from this because being married increases the probability of maintaining contacts with children and grandchildren for both grandfathers and grandmothers. In article V, I investigate more closely the associations between grandparents' marital status and grandparental investments.

4 Aims of the thesis

The theoretical aim of this thesis is to merge sociological and evolutionary family studies. In both disciplines, the topics and results are often similar, although the dialogue between the two fields is relatively recent. By merging these two research traditions together, I continue in the direction pointed out by several previous studies (see e.g., Coall & Hertwig, 2010; 2011; Euler & Weitzel, 1996; Pollet et al., 2006; 2007; Pollet et al., 2009).

I will not consider broader cultural comparisons, due to the fact that all of this dissertation's data are from industrialized Western societies (for the problems relating to this see Henrich, Heine, & Norenzayan, 2010). In most of the contemporary West, family culture is at the same time patri- and matrilineal, and no clear or explicit residence pattern by lineages exists (Sarmaja, 2003). Only in article I was it possible to compare grandparental investment patterns between different European countries. The studied countries also differ somewhat in relation to family cultures, although a clear preference for matri- or patrilocality cannot be indicated in any of them. More nuanced cultural norms and attitudes also fall outside the scope of this study (i.e., dimensions of normative solidarity and consensual solidarity [e.g., Roberts et al., 1991]). I will, however, consider several individual-level factors such as a parents' and grandparents' marital status as well as the quality of the relationship between parents and grandparents, in addition to socio-ecological factors (such as education and geographical distance) and their association with grandparental investments. In addition, I study mainly biological grandparenthood (for non-biological parenthood and grandparenthood see Coall, Hilbrand, & Hertwig, 2014; Pashos, Schwarz, & Bjorklund, 2016; Tanskanen, Danielsbacka, & Rotkirch, 2014; Segal, Norman, Graham, & Miller, 2015; Westphal, Poortman, & Van der Lippe, 2015).

The present study is cross-disciplinary. It is a social and public policy thesis using theories from family sociology and evolutionary theory. The two theoretical approaches used here, sociological and evolutionary, must be critically considered. Neither of them alone can explain all complex human family relations, and both approaches have some weaknesses. For instance, as presented above, evolutionary research usually takes into account only the investor's (here the grandparent's) point of view, although the acceptance of the investment often depends on the recipient's (in this case the parent's or grandchild's) willingness and possibility to receive it. The sociological approach, in turn, treats gender differences, for instance, mainly as products of social learning and norms, and has been reluctant to take into account predictions made by evolutionary theory. I argue that both theoretical approaches must be considered as complementary to each other, not as rival

explanations, and I provide empirical examples of how this can be accomplished.

As an operational tool I use the biased grandparental investment pattern. This allows me to investigate the factors that are associated with the intergenerational relations and investments, in what respects the relations are stable, and what alters them. By empirically studying grandparental investment from the perspective of each generation I gain an understanding from both the investor's and the receiver's perspectives. Thus the main theoretical question of this thesis is as follows:

> Q1) To what extent do relations between cross-generational family members in contemporary Europe appear to reflect evolved reproductive strategies, and in which respects are they shaped by socio-ecological contextual factors?

I study this question by empirically exploring more closely the intergenerational relations and biased grandparental investment pattern:

> Q2) What factors are associated with the strength or weakness of intergenerational relations?

> Q3) What factors in contemporary Western societies are associated with grandparental investments?

Different aspects of these questions are examined in the articles as follows (see Appendix, Table 1):

Article I: Will the biased grandparental investment pattern hold with a large amount of multinational and representative data and with a wide range of confounding variables controlled for? Will grandmothers and grandfathers prefer to allocate their investment to their daughter's children over their son's children if they have grandchildren via a daughter and a son?

Article II: Is parenthood associated with the adult child's emotional closeness toward his or her own parents and parents-in-law? Does the adult child's (parent's) emotional closeness toward his or her own parents or parents-in-law alter the biased grandparental investment pattern?

Article III: Does parenthood correlate with the adult child's conflicts with his or her own parents and parents-in-law?

Article IV: Do certain individual-level and socio-ecological factors have different effects on grandparental investments in the case of different grandparent types?

Article V: What is the effect of grandparents' marital status on their investment in grandchildren? Is the effect of marital status the same for both grandfathers and grandmothers?

5 Materials and Methods

The articles of this dissertation use three large-scale and representative survey data sources: the Survey of Health, Ageing and Retirement in Europe (SHARE), the Involved Grandparenting and Child Well-Being survey (Grandparent survey), and the Generational Transmissions in Finland (Gentrans) survey. The data were collected from respondents in 16 European countries.

SHARE is designed to collect longitudinal data on the process of Europeans' ageing (www.share-project.org). During SHARE's five waves over 85,000 older people from 20 European countries have been already interviewed. The target population consisted of all people born in 1956 or earlier speaking the official language of the country and not living abroad or in an institution. Data collection is based on a computer-assisted personal interview. In article I data from SHARE's second wave in 2006–2007 was used to study grandparental investment (measured by child care) from the grandparents' point of view.

The second wave of SHARE was carried out in thirteen European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, Poland, Spain, Sweden, Switzerland, The Czech Republic and The Netherlands) (Börsch-Supan, 2013; Börsch-Supan et al., 2008; Börsch-Supan et al., 2013). The total number of observations in SHARE's second implementation were 33,281 (44.3% men, 55.7% women). For the analyses in article I, I included only respondents who had at least one biological child and at least one grandchild not over 14 years old, and who had responded to the question about child care (n = 8,667, grandmothers n = 4,899, grandfathers n = 3,768). The data were constructed so that observations were the original respondent's (the grandparent's) children, resulting in a total of 22,264 observations (on average 2.6 children per respondent). The grandparental variable by lineage (maternal grandmother, maternal grandfather, paternal grandmother, paternal grandfather) in relation to each child was then specified for every grandparent-parent dyad. Because the data were clustered within kin lineages (i.e., data included more than one observation from the same respondent), Stata's statistical software cluster option was used to compute the standard errors.

To measure grandparental investment, the question concerning child care offered by grandparents was divided into two categories: 0 = have looked after the grandchild less often than almost every week, 1 = have looked after the grandchild almost daily or every week. Logistic regression was used to predict the dichotomously coded childcare provided by the grandparent. In addition to grandparental lineage and sex, I adjusted for age, self-reported health, education, partnership status, job situation, number of children and grandchildren, geographical distance to child, children's year of birth, and

country. In addition, to examine potential cultural differences the countries were grouped according to type of family policy regimes (Southern Europe: Spain, Italy and Greece; Eastern Europe: The Czech Republic and Poland; Central Europe: Switzerland, France, Germany, Austria and Belgium; Northern Europe: The Netherlands, Sweden and Denmark), and the models were fitted separately into these groups. The results were illustrated by calculating the predicted probabilities of childcare by kin lineage from the logistic regression models.

Grandparent survey is the first nationally representative sample of British and Welsh adolescents aged 11–16 (Buchanan & Flouri, 2008). The survey concentrates on adolescents' views of their relationships with their grandparents. The sample was recruited by GfK National Opinion Polls. Altogether 103 schools were randomly selected using probability proportionate-to-size sampling, which means that larger schools had a greater probability of being included in the final sample. Seventy schools returned the questionnaires (a response rate of 68%). In every selected school, the classes were randomly chosen. Respondents completed the questionnaire in a school classroom and the original sample included 1,566 adolescents. There were 1,488 respondents who had at least one living grandparent, and this was the sample used in the analyses. When filling in the grandparental questionnaire, respondents were asked to answer questions for only those grandparents who were still alive. I used the Grandparent survey in article IV where grandparenting and involvement (investment) from different grandparent types (e.g., maternal grandmother, maternal grandfather, paternal grandmother, and paternal grandfather) were explored from the adolescent grandchild's perspective.

Grandparental involvement was used as a dependent variable. It was formulated by summing up answers to six questions which measured different aspects of grandparents' involvement. The questions were as follows: "How often do your grandparents look after you? Do they get involved with things you like? Do they come to school or other events that are important to you? How often do you talk to them about problems you have? Can you talk to them about your future plans? Do they give you money or help in any other way?" Each question was assessed on a three-point Likert-type scale (ranging from 1 = never to 3 = usually) and each question was asked separately to each grandparent. On the scale of summed involvement variables a higher number meant greater involvement (scale 6–18) (Cronbach's alpha for maternal grandmother $\alpha = 0.79$, maternal grandfather $\alpha = 0.81$, paternal grandmother $\alpha = 0.79$, paternal grandfather $\alpha = 0.82$). As independent variables I used grandchild's (respondent's) sex, age, family structure (with whom the respondent lives most of the time), number of living grandparents, distance between grandparent and grandchild, grandparent's age, labour market status, marital status, health and number of grandchildren.

In article IV linear regression was used to study how different background variables were connected to grandparental involvement when all other background variables were controlled for. Linear regression models were formed and presented for each grandparent type separately to see more clearly the associations between the involvement and grandparent's characteristics.

Gentrans is a longitudinal survey designed to explore intergenerational family support between Finnish family generations (http://blogs.helsinki.fi/gentrans/). The target population of Gentrans is the Finnish baby-boomer generation (born 1945–50) and its adult children, baby boomers being the pivotal generation. The aim of the Gentrans project is to study the same persons over several decades in five-year periods. Gentrans data are used in articles II, III and V of this study. I used the second round of the survey (collected in 2012), which consists of 4,031 respondents (2,278 baby-boomers, 1,753 adult children; response rates 65% and 50%, respectively). Statistics Finland conducted two separate representative surveys in Finland (excluding Åland) in the spring of 2012 via postal mail. Respondents from the younger generation could also answer the questionnaire via the Internet. Only one person per household participated in the study (for a more specific description of the data see Danielsbacka et al., 2013). The Gentrans data allowed us to study biased grandparenting from the grandparents' and parents' points of view.

In article II I used the data from the younger generation to study the gatekeeping role of the middle generation. The emotional closeness felt by the respondent toward each parent and parent-in-law was used to assess the relationship quality. In two-stage analyses I first looked at whether the emotional closeness to one's own parents or parents-in-law differed if the respondent had children or not. For the analyses I selected respondents who had a partner. The selection resulted in 1,216 observations. Second, I explored to what degree emotional closeness affects the biased grandparental investment pattern (investment measured as received child care help). For the second analyses were selected respondents whose youngest child was 12 years old or younger (n = 938), and the data were reshaped to a long format so that the observations are about the original respondent's parents or parents-in-law, resulting in a total of 3,241 observations (on average 3.5 parents or in-laws per respondent). Clustering of the data was taken into account the same way as in the first article.

Logistic regression was used first to predict the emotional closeness the respondent felt towards his or her own parents and parents-in-law, and second to predict the received child care (0 = Less than 13 times, 1 = 13 times or more; in the Nordic countries frequent child care provision by grandparents, i.e., daily or weekly, is uncommon; see Hank & Buber, 2009) during the last 12 months from a specific grandparent when emotional closeness was controlled for. Analyses were conducted separately for women and men. In the first analyses I adjusted for respondent's year of birth,

parent's/in-law's year of birth, and geographical distance, and in the second analyses I adjusted for geographical distance, grandparent's year of birth, grandparent's health, respondent's marital status, respondent's year of birth, respondent's number of children, year of birth of the respondent's youngest child, respondent's working status, education and emotional closeness toward a particular grandparent.

Gentrans data were also used in articles III and V. Younger generation data were utilized in article III and older generation data in article V. In article III the research design was fairly similar to article II's second stage analyses. The difference was that the dependent variable in article III was conflicts (0 = No conflicts, 1 = Conflicts) between certain parent-parent-in-law dyads whereas in article II it was emotional closeness. As in article II, the main independent variable measured whether the respondent has children or not. Analyses were conducted separately for women and men. Logistic regression was used to predict the likelihood of conflicts, and the results were presented as predicted probabilities of conflicts by parenthood status and separately for each parent/in-law dyad. In the analyses I controlled for respondent's age, education, health, geographical distance to parent/in-law, contacts with parent/in-law, age of parent/in-law, and parent's/in-law's health as reported by the respondent.

Article V used the older generation data from the Gentrans surveys. In this article I looked in more detail at the effects of marital status on grandparental investments. For the analyses I selected respondents who had grandchildren (n = 1,441). The grandparental investment was measured by contact frequencies with a grandchild (ranging from 0 = Never to 4 = Several times a week), and whether the grandparent had looked after the grandchild within the last 12 months. Both of these investment questions were asked separately to four of the respondents' oldest children and the grandchild sets of these specific children. The main independent variable was grandparents' marital status, which included four categories (never divorced, divorced, widowed and remarried). For the purpose of the analyses, the data were reshaped into a long format form so that the observations could be viewed from the perspective of the original respondent's child. In the case of contact frequencies, linear regression analysis was used as a method, and in the case of child care the method was logistic regression. Analyses were conducted separately for men and women. In all of the analyses I adjusted for lineage, geographical distance, grandparent's health, grandparent's working status, grandparent's education, grandparent's perceived financial situation, the number of children and grandchildren, and emotional closeness to one's own child.

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The data used in these articles are nationally representative, and include several investment variables as well as several background variables for the

parental and grandparental generations. In many previous studies of grandparental investments the data have been small in number and/or non-representative (e.g., Bishop et al., 2009; Chan & Elder, 2000; Laham et al., 2005). The results from the different datasets used here are not entirely comparable, but the idea is to shed light on grandparenting from different angles (countries as well as respondents: grandparents, parents and grandchildren), and in order to improve the comparability I presented the results derived from the logistic regression models as predicted probabilities, as suggested by Mood (2010). I could not adjust for exactly the same control variables in every article because of the data structure. For instance, only in article IV was it possible to control for the sex of the grandchild. Additionally, reviewers of the articles have suggested their own revisions, which have sometimes shifted the focus of articles from the main purpose of this thesis.

Three different datasets were used because it was important to see whether the biased grandparental investment pattern would be valid in different European countries. Although I do not compare countries that culturally are extremely different from each other, the European countries do differ with regard to family policy regimes as well as family obligations, both of which may influence grandparental investments (Hank & Buber, 2009; OECD family database, 2014). The intention was also to investigate the differences between grandparents from all three generations' perspectives (Hagestad, 2006), which would not have been possible with only one of the datasets used here.

6 Results and Discussion

In **article I**, which concerned older Europeans, the main aim was to test the hypotheses of biased grandparental investment pattern and preferential investment in more certain kin with numerous and representative data. The results of the study provide support for the prevalence of the biased grandparental investment pattern in Europe and its different regions (Southern Europe, Eastern Europe, Central Europe and Northern Europe). Grandparental investment was measured as a provision of child care. Maternal grandmothers were most likely to provide child care at least on a weekly basis (20.1% probability) followed by maternal grandfathers (17.6%), paternal grandmothers (13.9%) and paternal grandfathers (11.7%), while a wide range of possible confounding variables were controlled for. This is in line with many previous studies (e.g., Euler & Weitzel, 1996; Pollet et al., 2006; 2007; Pollet et al., 2009), and also with the theoretical prediction made on the basis of paternity uncertainty.

Article I also tested the preferential investment in more certain kin hypothesis, which was supported for the first time with multinational and representative data (for preferential investment hypothesis in the case of aunts and uncles see Tanskanen & Danielsbacka, 2015). Previous studies of preferential investment in more certain kin in the case of grandparental investments have been conducted with a small and/or non-representative amount of data (Bishop et al., 2009; Lahan et al., 2005). The results from article I show that if paternal grandmothers had no preferential investment options (i.e., grandchildren via a daughter) the difference between investments made by paternal grandmothers and maternal grandfathers disappears (MGF: 20.9%, PGM: 20.6%), while clear differences between maternal grandmothers and paternal grandmothers (18.1% vs. 11.1%) as well as maternal grandfathers and paternal grandfathers (15.7% vs. 9.6%) were apparent if paternal grandparents had a more preferable investment option available. Thus, according to these findings, the common result that maternal grandfathers invest more in grandchildren than paternal grandmothers is partly due to the fact that paternal grandmothers usually also have grandchildren via a daughter and may prefer to invest in their daughter's children over their sons'. Because I found a clear and consistent variance of grandparental investment reported by grandparents themselves, the results also indicate that grandparents are not so unreliable as respondents as some researchers have claimed, on the basis that they may wish to present themselves as equal investors in all children (e.g., Euler et al., 2001).

What I could not further explore in article I was the role of incidental exposure, i.e., the effect of the existence of a spouse on the amount of investment (as investigated in articles IV and V) and the gatekeeping role of the parental generation (as analysed in article II), both of which may explain

some of the bias in grandparental investment (Euler & Michalski, 2008; Robertson, 1975). Article I also offered only the grandparents' perspective on the investment behaviour, which means that parents' and grandchildren's perspectives are lacking.

Thus, in **article II** concerning younger adult couples in Finland, the main aim was to study the biased grandparental investment pattern from the parents' viewpoint, and to shed light especially on the gatekeeping role of parents. In article II I first investigated the associations between parenthood and perceived emotional closeness to one's own parents and parents-in-law. Second, I tested the effect of perceived emotional closeness on receiving child care from grandparents across and within lineage lines. The results (stage 1) show parenthood to be associated with women's emotional closeness to their own mothers and men's emotional closeness to their parents-in-law. It appears that parenthood may bring couples closer to the woman's kin. This is in line with a previous finding that the quality of the relationship between the daughter and mother improves when a grandchild arrives (Fischer, 1981). However, no other studies have found a positive effect of parenthood on the relationship that adults have with their parents (see e.g., Lawton et al., 1994), or the results are mixed (see Kaufman & Uhlenberg, 1998).

Our results partially support the hypothesis based on Hughes' (1988) notion of the inverse relatedness of in-laws. Because of the shared reproductive interest in the future generation, the in-laws as well as parents may be emotionally closer to the couple with children than to a childless couple. In our study emotional closeness associated with parenthood status, only for daughter and mother and for son-in-law and mother-in-law or father-in-law. Thus, parental emotions do not straightforwardly follow Hughes' (1988) predictions of shared reproductive interests. Instead, the feelings parents have toward their own parents and their parents-in-law may be, at least partly, the products of sex-specific reproductive strategies (Euler, 2011). Having a child may enhance the perceived closeness to maternal grandparents because they, the maternal grandmother in particular, have the highest interest in the well-being of the grandchild. One could also claim that the closer attachment to maternal grandparents is due to the fact that the mother and father simply see them more often than paternal grandparents.

The results from article II's analyses (stage 2) showed, as expected, that frequent grandchild care was most likely received from maternal grandmothers. This biased grandparental investment pattern remained robust, even after controlling for perceived emotional closeness, when the analysis was restricted to include only biological kin (that is, women and men who answered only for their own parents). However, when women answered for their own parents and parents-in-law, after controlling for emotional closeness, the difference in child care provision between one's own mother and one's mother-in-law disappeared. The same analysis for men revealed that after controlling for emotional closeness the difference in received child care between one's own mother and one's mother-in-law was accentuated.

Thus, emotional closeness does shape the biased grandparental investment pattern, but differently for kin and in-laws. These results are in line with a previous sociological study (Chan & Elder, 2000) showing with data from grandchildren in rural Iowa, USA, that the matrilineal advantage in intergenerational kin relations reflects lineage differentials. The authors explained the resulting bias in grandparental investments by the notion of existing matrilineal bias in the parent-grandparent relation (maternal grandparents are closer to the couple than paternal grandparents), and by the kin-keeping role of mothers. Thus the closeness of the parent-grandparent relationship was used as an explanation for grandparental investments in grandchildren. The evolutionary reason for preferring one grandparent over others may, however, be that parents measure (probably unconsciously) the trustworthiness and motivation of a child minder.

One limitation of article II was the narrowness of the relationship quality measurement (emotional closeness), which measured only the positive aspects of the family relationship. Family relations also include conflicts and are often ambivalent by nature (Lüscher & Pillemer, 1998). Thus, in **article III** I tested whether having a child is associated with conflicts with own parents and/or parents-in-law in Finland.

In article III the results indicate that for both sexes, couples reported more conflicts with their own parents than with in-laws. Second, having children was associated with an increased likelihood of conflicts with parents-in-law, but not with one's own parents. The finding that adult children had more conflicts with their parents than their in-laws is contrary to previous findings by Euler and colleagues (2001), which stated that the relationship quality between parents and in-laws is worse than that between parents and their own parents. At first look, the results of article III seem to contradict the findings from article II, which detected a closer relationship with one's own parents than with in-laws. However, as sociological studies of ambivalent family relationships often imply (e.g., Willson et al., 2003), love, care and closer relationships can also bring more conflicts. Thus, emotional closeness and conflicts are not necessary contradictory (see also Coall et al., 2014). Altogether, this indicates that the conflict variable I have analysed does not measure the most severe types of family conflicts (see Salmon & Hehman, 2014 for discussion) but rather the overall sensitivity to conflicts in particular relationships, which may be an indicator of a strong and not poor relationship.

Moreover, our results support the prediction that parenthood may be differently associated with conflicts in relation to one's own parents and in-laws. Having children makes in-laws indirectly related to each other, and consequently, conflict proneness in in-law relations also approaches that between biological kin. Thus, in this regard the results point in the same direction as those from article II, and also support the prediction of Hughes (1988) that in-laws are treated more like kin than non-related individuals (see also Burton-Chellew & Dunbar, 2011). However, as both articles point

out, the in-law relationship is more contingent on the existence of a common descendant than the adult child–parent relationship is. This result is in accordance with Fischer (1983), who states that the mother-in-law–daughter-in-law relationship deteriorates more than daughter–mother relationship as a consequence of having children. Fischer (1983) also located as the most frequent source of irritation in the mother-in-law–daughter-in-law relationship the issues surrounding the young children.

Finally, I further explored the reasons for conflicts with in-laws in article III, assuming they would have something to do with young children and child care. The additional analyses were therefore restricted to those respondents who had children. The analyses showed that a higher amount of child care provision was related to having frequent conflicts only between daughter-in-law and mother-in-law when a wide range of other variables, for instance the age of the youngest (grand)child, contact frequencies with parents and parents-in-law, and distance to parents and parents-in-law, were controlled for.

Article I investigated biased grandparental investment from the grandparents' viewpoint, and articles II and III concentrated on the parents' perceptions. In **article IV** the main aim was to explore the biased grandparental investment pattern from the grandchild's perspective. At the same time, article IV analysed more closely which socio-ecological factors were associated with each grandparent's investment, in England and Wales. Several hypotheses, including for instance the incidental exposure hypothesis, were tested in this article. In addition, the article compared predictions made by evolutionary research and the sociological life course perspective.

First, article IV explored the amount of grandparental investment reported by adolescents. The results followed the predicted pattern: the maternal grandparent was reported to invest the most, followed by maternal grandfather, paternal grandmother and paternal grandfather. Interestingly, if all grandparents were alive, the maternal grandmother's investment was even higher in relation to the other grandparents.

Second, article IV focused more closely on separate grandparents and showed with four linear regression models which factors were associated with each grandparent's investment. The grandchild's age, grandparent's health, grandparent's labour force participation and distance between a grandparent and grandchild were factors that were similarly associated with investments in relation to all grandparents. Older grandchildren received less grandparental investments than younger ones, which accords with previous studies (e.g., Dench & Ogg, 2003). The further the distance was between grandparent and grandchild, the less the grandchild received investments, which is rather self-evident and supports the previous findings (e.g., Hank & Buber, 2009; Pollet et al., 2006; 2007). Grandparents who were working part time or not at all invested more in grandchildren than those working full

time. In addition, grandparents who were in better health invested more than those in poorer health.

Not all background variables were similarly attached to investments in the case of different grandparent types. Marital status mattered only for grandfathers, whereas the family structure of a grandchild had opposite effects in relation to maternal and paternal grandparents. Grandchild's sex, grandparent's age, number of grandchildren and number of living grandparents all mattered, but only with respect to some grandparents.

Grandfathers who were not married with the grandmother of a grandchild invested in their grandchildren less than married grandfathers. This is in accordance with the incidental exposure hypothesis, which states that grandfathers' investments in grandchildren are partly dependent on the investments made by grandmothers (grandfathers are incidentally exposed to them), so the absence of a spouse should matter more for grandfathers than grandmothers (Euler, 2011; Euler & Michalski, 2008). In addition, remarrying was associated with a lower level of investments only in the case of maternal grandfathers.

Marital status of a grandchild's parents was differently associated with maternal and paternal grandparents' investments depending on with whom the child resided. As one would expect, single parents' children reported less investment from non-residential parents' parents, which accords with previous results (Lussier, Deater-Deckard, Dunn, & Davies, 2002; Westphal et al., 2015). The results concerning the grandchild's sex were mixed and weak. Only in the case of maternal grandmothers did girls report more investment, which does not lend unequivocal support to any predictions made by evolutionary theory or the life course approach (Chrastils et al., 2006; Dubas, 2001). Results concerning grandparent's age showed that with every grandparent (except maternal grandfathers), those in their fifties or below invested more in their grandchildren than grandparents in their sixties. Contrary to previous results (Smith, 1991; Elder & Conger, 2000), the number of grandchildren had no dilution effect on the investments made by grandparents. Neither did the number of living grandparents. Actually, both factors (number of grandchildren and living grandparents) were positively associated with grandparental investments: maternal grandfathers and paternal grandparents were found to invest more if they had more than one grandchild, and maternal grandmothers invested more if all four of the child's grandparents were alive.

Many of the findings in article IV are consistent with previous studies on the factors associated with grandparental investment (e.g., Uhlenberg & Hammill, 1998; Pollet et al., 2006; 2007; Pollet et al., 2009), but the main advantage of this study is that we have analysed each grandparent type separately and with several background variables. What we discovered was that although grandparents and the amount of their investment do differ according to factors other than sex and lineage only, some of the background

variables were differently associated with the investments in relation to grandparent's sex and lineage.

In **article V** concerning Finnish grandparents who belong to the baby boomer generation, I wanted to shed more light on the incidental exposure hypothesis which was briefly touched on in article IV. In article V I studied more closely the effects of marital disruption (divorce, widowhood and remarriage) on grandparental investment with data gathered from grandparents themselves. Although it is well-known that divorce and remarriage influence family relations (Kaufman & Uhlenberg, 1998), only few studies have explored grandmothers' and grandfathers' investment following their own marital disruption (but see King, 2003). In this article, I found that although divorce as well as remarriage was associated with reduced investments among grandmothers and grandfathers, it did so especially in the case of grandfathers (both contacts and child care) compared to married (never-divorced) grandfathers. Most dramatic was the reduction in child care provided by grandfathers: 83 per cent of grandfathers who were married with the child's grandmother reported providing child care at least once during the last 12 months whereas only 58 per cent of remarried and 53 per cent of divorced grandfathers reported doing so. In addition, among married (never-divorced) and divorced grandparents, the grandmothers invested significantly more than the grandfathers. This result is consistent with studies showing that marital disruption has more negative effects for men than for women in relation to kin support (King, 2003; Knudsen, 2012; Uhlenberg & Hammil, 1998).

Thus older men tend to suffer much more in terms of grandchild contacts if they lose their spouse (that is the grandmother of their grandchildren), which is consistent with the incidental exposure hypothesis. However, our results indicate that the reason for loneliness appears to be significant. Divorced and remarried men may have lower levels of contact with their grandchildren than widowed men because the ex-spouse (that is, the grandmother of the grandchild) may compete with them for time with the grandchildren. In the case of widowed grandparents, this competition does not exist.

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The results of the five sub-studies summarized above show that as long as grandparental investments are studied among genetically related kin, the investments will prove biased according to the grandparents' sex and lineage, and to favour the maternal side of the kin. Whether it was the grandparents who were asked about the investments (article I), parents who answered for their own parents (article II), or the grandchildren (article IV), no identified factors confounded the common pattern where the maternal grandmother invests the most followed by maternal grandfather, paternal grandmother and paternal grandfather. Only when in-laws were methodically taken in to

account did the pattern alter (article II). Thus, in contemporary Western societies the amount of grandparental investment seems to be systematically structured by two reproductively relevant variables, namely sex and lineage. I have explained the solidness of the biased grandparental investment pattern with ultimate evolutionary reasons stemming from sex-specific reproductive strategies and paternity uncertainty.

As was presented at the beginning of this summary, certain demographic factors may also play a role in the bias between grandparental investments by different grandparent types. The senescence hypothesis states that the grandparental investment pattern (maternal grandmothers invest the most and paternal grandfathers the least), could be due to the younger age of maternal grandmothers compared to other grandparent types. The maternal grandmother's demographic advantage is that among grandparents she is the one most likely not to be deceased (Strassmann & Garrard, 2011). This demographic advantage can be controlled for, for instance, by exploring the investments when all grandparents are alive, as was done in article IV. It turned out that if all grandparents were alive, the maternal grandmother actually stood out even more, and thus the demographic advantage alone cannot be the main reason for this commonly found pattern. In addition, in all five articles the age of the grandparent is either controlled for, or, due to the data structure, varies only little (that is, in the Gentrans survey where all grandparent respondents are between 62 and 67 years old). Controlling for the age of a grandparent does not remove the difference between them nor does adjusting the grandparents' health, which was also done in every article here.

In addition to the robustness of the biased grandparental investment pattern in contemporary European societies, this thesis also indicates that the gatekeeping role of the parents does exist, and that it may become visible through the quality of the dyadic relationship between a parent and a grandparent. One of the main results of the thesis is that intergenerational relations between one's own kin and one's in-laws differ from each other, are differently associated with the existence of (grand)children (articles II and III), and that the emotional closeness toward one's own kin and in-laws alter the biased grandparental investment pattern (article II). A hypothesis that can be formed on the grounds of the results of articles II and III is that having children (i.e., the existence of grandchildren) may increase the matrilineality of family relations in contemporary Western societies without any clear matri- or patrilineal cultural preferences, such as Finland.

Due to the different attachments to one's own kin and in-laws, parents act as gatekeepers. Interestingly, the attachment to one's own kin does not lead fathers to favour their own kin as childminders in the same way it does with mothers (see also Chan & Elder, 2000). The reason for this is probably at least partly connected to the evolved psychological mechanisms affecting the intergenerational family relations. First, in-laws do become inversely related after the birth of a (grand)child, which may affect the relationship between

them, as the results of articles II and III imply. Second, due to the effects of sex-specific reproductive strategies, parents may assess maternal grandparents as more trustworthy as childminders than paternal grandparents. Third, maternal grandparents, and maternal grandmothers in particular, may, due to their evolutionary interests in their grandchild's well-being, offer to take care the child(ren) more often than paternal grandparents, which creates an habituation effect for parents, and for this reason a closer relationship between parents and maternal grandparents develops.

Other factors besides a grandparent's sex and lineage do matter in intergenerational relations and in the case of grandparental investments. Although most of these factors (except the aforementioned in-law relationship) do not alter the biased grandparental investment pattern, some of the background variables of grandparents and parents are differently associated with the investments in the case of grandmothers and grandfathers or between lineage lines. Article IV implied and article V supported the notion that living without a spouse is more detrimental to grandfathers' than grandmothers' relationships with their grandchild(ren). Due to the increased rates of divorce in Western societies, the effect of divorce on intergenerational relations is becoming a more and more important subject.

7 Conclusions: Towards an evolutionary family sociology

This thesis has investigated grandparental investments and family dynamics in contemporary Europe. My purpose was to shed light on the reasons for the well-known differences between grandparent types and the investments they make in their grandchildren. In addition, I explored the connection between family dynamics especially related to in-laws, and grandparental investments. The theoretical framework of the study was drawn from family sociology and evolutionary theory. I believe these disciplines to be not contradictory, but rather to provide mutually supportive perspectives on human families although their explanatory structure operates on different levels. The main theoretical question was as follows: To what extent do relations between cross-generational family generations in contemporary Europe appear to reflect evolved reproductive strategies, and in which respects are they shaped by socio-ecological contextual factors?

To answer this question I have investigated with empirical data how relevant evolutionary and socio-ecological variables are associated with intergenerational relations and grandparental investments. The broad answer to the first question is that, according to this study, some matters in family relations, such as the robustness of the pattern of biased grandparental investments, appear to reflect evolved reproductive strategies very strongly. Sex and lineage of a grandparent create the same pattern regardless of how many possibly confounding variables are controlled for. However, on certain occasions contextual factors may override (restrict) or modify (increase or decrease) the association between variables connected to the evolved reproductive strategies (such as sex and lineage) and grandparental investment behaviour.

Earlier studies suggest that strong patrilocality or patrilineal preference is one contextual factor that may override the effects of sex-specific reproductive strategies and paternity uncertainty (Lahdenperä et al., 2004; Kaptijn et al., 2013; Pashos, 2000). In patrilocal societies, the emotional options for attachment to maternal kin do not have an opportunity to develop, and at the same time fathers' certainty of their fatherhood is enhanced. Normative cultural pressure may restrict and restrain behaviour based on evolved predispositions, as it allows only certain emotional options to develop. In contemporary Western societies the biased grandparental investment pattern is, however, remarkably solid, as is also presented in this thesis. This indicates that as long as people may freely choose with whom they interact, evolutionary factors connected to sex-specific reproductive strategies and paternity uncertainty will play a significant role in intergenerational family relations. Thus, the influence of evolved and universal behavioural predispositions and predictions made by evolutionary

theory may become even more important in contemporary societies than they were in former strongly normative and restrictive ones. As always, it is still important to recall that the evolutionary origins of a certain behaviour do not make that behaviour right or wrong in a moral sense. The advantage of understanding the evolutionary origins of a certain behaviour is that only by investigating as many reasons as possible for the biases in family relations can we understand and assess their consequences.

Although our evolved psychological and behavioural predispositions influence, for instance, the existence of grandparental care and the difference between grandparent types, they do not determine contemporary family dynamics. With that said, it is still evident that evolved traits do not just "set the frame" but also shape the behaviour of family members, and profoundly affect how individuals feel towards their kin (Hrdy 1999; 2009). Our capacity to respond to different environmental cues and learn from experience does not invalidate the importance of evolved psychological predispositions. For instance, as presented above, there exist certain basic factors in grandparenting and intergenerational relations that have probably evolved through natural selection, and which may explain why specific patterns in family relations are enduring, appear in different countries, and vary over time.

Based on evolutionary theory it is possible to predict how and why certain changes at the contemporary cultural, societal and individual levels play a different role in the case of men and women or paternal and maternal kin. It can be assumed, as in articles IV and V, that due to sex-specific reproductive strategies divorce will have a more detrimental effect on older men's than older women's relationships with their grandchildren. Moreover, evolutionary theory and the notion of reproductive value provides testable hypotheses and explanations for the commonly found downward direction of kin investments, which means individuals are more prone to invest in their offspring (i.e., relatives in descending generations) than their parents (i.e., relatives in ascending generations) (e.g., Hoff, 2007).

As I have argued throughout this summary, in an empirical sense evolutionary and sociological approaches create partly overlapping predictions about intergenerational relations, and their empirical results are usually not contradictory to each other but rather mutually supportive. For instance, in articles I and II both the kin keeper theory and sex-specific reproductive strategies were supported, but as article I showed, the paternity uncertainty and preferential investment in more certain kin explained the commonly found difference between maternal grandfathers and paternal grandmothers. One way to use evolutionary and sociological approaches together is to treat evolutionary theory as a macro theory that creates universal hypotheses allowing at the same time cultural and individual variation. This variation is due to the social, environmental and cultural factors (socio-ecological context), which change over time and place, as both

the sociological life course approach (e.g., Settersten, 2003) and evolutionary life-history theory (e.g., Lummaa, 2007; Sear, 2015) suggest.

The sociological approach is thus crucial to understanding contemporary societies and all of the social, demographic, cultural and economic variables that are important today. A sociological perspective also acknowledges the relative weight these variables may gain in regard to intergenerational relations. For instance, divorce rates in Western countries are nowadays rising and the number of blended families is consequently growing, which will affect intergenerational relations as was shown in article V of this study (see also Coall et al.; 2014; Pashos et al., 2016; Tanskanen et al., 2014). Contemporary Western societies also have become more and more equal in relation to gender, and this may have partly created a new cultural niche for caring fathers and grandfathers. All articles in this thesis show that a great number of grandfathers are involved in their grandchildren's lives in contemporary societies, and that they may even be more involved than grandmothers, as is often the case in regards to maternal grandfathers and paternal grandmothers. Gender equality and the growing cultural acceptance of caring fatherhood has, however, not yet affected matrilineal bias in intergenerational relations, and it remains to be seen whether it will override or modify the influence of sex-specific reproductive strategies and paternity uncertainty. Evolved strategies may also respond to this new cultural environment, and due to that, the roles of fathers, and grandfathers, may become even more relevant.

This thesis had a twofold social and public policy aim. I have studied older people (grandparents) as providers of help instead of treating them as a social and economic burden. From this aspect, grandparents can clearly be seen as child and family saviours (Herlofson & Hagestad, 2012). It would thus be appropriate to make the value and importance of grandparents visible also in family policy. The question remains how much grandparents themselves gain from being active family supporters measured in terms of their own health or well-being benefits (for positive outcomes see Arpino & Bordone 2014; Danielsbacka & Tanskanen, 2016; Hughes, Waite, La Pierre, & Luo 2007; but see Baker & Silverstein 2008; 2012 for negative outcomes), and what happens when grandparents become too old and may act as resource competitors with grandchildren (Strassmann, 2011; Strassmann & Garrard, 2011).

The other aspect of the study's policy relevance concerns the fact that in an era of diminishing publicly provided welfare services (Kvist, Fritzell, Hvinden, & Kangas, 2012) there are growing demands to increase the responsibility of family members to provide care to each other. The question is to what extent family and extended family actually provide informal support to each other and how equally this support is distributed. The results of this study offer, above all, information on the reasons for unequal family support. It is self-evident that in the case of family support those who do not have living family members are in an unequal position compared to those

who do. However, as has been shown in this thesis, interaction and help between family members is distributed unequally according to certain fairly stable structures. For instance, paternal grandparents are less likely to be involved in their grandchildren's lives and take care of them. On the one hand, this may socially isolate elderly paternal grandparents, and on the other, it may produce growing strains on the maternal grandparents.

In addition, as shown in article V, divorced and lonely older men have the highest risk of losing contact with their grandchildren. Because good family relations are consistently shown to be an important part of human well-being (e.g., Post, 2005), it is crucial to pay attention to the gendered effects of marital disruption. Overall, with grandparental divorce, the effects of the divorce on grandparent–grandchild relations should be noted in the same way as in parental separation.

This thesis has several strengths. For instance, the results are based on large and representative datasets, which may make the results more generalizable compared to many previous studies that have used small-scale and non-representative samples (see Henrich et al., 2010 for discussion). With these data it was possible to investigate several evolutionary and sociologically relevant factors which supported the theoretical cross-disciplinary of the thesis. Moreover, the data provided an opportunity to control for several potential confounding variables. The study has, however, certain limitations as well. First is the cross-sectional nature of the data. Particularly the questions posed in articles II and III would have required longitudinal data. Unfortunately, in the Gentrans surveys the questions concerning the relationship quality between adult children and their parents and in-laws were only asked in the second round surveys, not the first round. Consequently, in the first stage analyses in article II, it was not possible to discern with any certainty between the two explanations for the results: ultimate (increase in closeness due to sex-specific reproductive strategies) and proximate (increase in closeness due to time spent together). Thus there is a need for longitudinal studies on how the quality of the relationship between adult children and their parents and parents-in-law change after having a child. This same limitation applies to article III: the analyses are cross-sectional, and to investigate the actual shift in the parent or in-law relationship due to having a child one would need longitudinal data. In addition, it would have been ideal to have data on the length of the couples' relationships, because the longer they have been together, the longer is their history with their parents-in-law, and this can affect conflict occurrence (Voland & Beise, 2005) as well as emotional closeness.

Second, as mentioned above, all of the study's data are from contemporary Western industrialized countries. I could not have compared different cultural areas or family systems, which makes the results presented here applicable only to modern Europe (see Henrich et al., 2010 for discussion). However, as has been stated in this summary, modern welfare states may actually create a fairly good platform for the study of

evolutionarily formed behavioural predispositions because they are not strictly confined by norms or cultural practices which would explicitly favour certain grandparent types or matri- or patrilineal kin, for instance.

As is often the case, the present study might have opened more questions than it answered. First, as was mentioned in the limitations of the thesis, longitudinal studies are needed to determine whether the emotions towards one's parents and parents-in-law actually change due to the birth of a child (as the cross-sectional results in articles II and III indicated). The results from previous studies have been mixed (Fischer, 1981; Lawton et al., 1994; Kaufman & Uhlenberg, 1998), and do not take into account the relations between in-laws or are nor measures of how conflict proneness will change as a consequence of having a child (but see Fischer, 1983 who studied the subject in a small dataset). It would be also worth studying whether parents' feelings toward their own children or children-in-law change after they become grandparents.

Second, longitudinal data of investments given and received would also be needed to examine the reciprocity of grandparental investments. Do older grandparents receive more help from children and grandchildren whom they had invested in more than from children and grandchildren whom they had invested in less or not at all?

Third, the one subject that has not been studied in contemporary societies is the effect of resource competition in the grandparent–grandchild relationship (for effects of resource competition in subsistence societies see Strassmann, 2011; Strassmann & Garrard, 2011). However, it is well-known that grandparental investment or presence do not always benefit grandchildren (see Coall & Hertwig, 2010 for review). Future studies are needed to show in what kinds of circumstances grandparents have a harmful impact and when they start to compete with grandchildren over (parental) resources?

I do believe that the answer to these and many other questions is best found not just by investigating them from different angles and with the help of theories derived from family sociology or evolutionary theory, but through evolutionary family sociology, an approach that self-evidently and equally takes into account our evolved reproductive strategies, as well as the social and cultural nature of complex human family relations. Future family studies are encouraged to use an evolutionary family sociology approach.

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Appendix 1. Technical details of data, hypotheses, research questions, and variables used in the articles I–V.

	Article I	Article II	Article III	Article IV	Article V
Data	SHARE	Gentrans	Gentrans	Involved grandparenting	Gentrans
The data collection year	2006-2007	2012	2012	2007	2012
Respondent	Grandparent	Parent	Parent	Grandchild	Grandparent
Sample size	13,566	1,216/938	1,202	1,488	1,441
Hypotheses or research questions	H1) Maternal gm most often provide child care for their grandchildren, followed by maternal gf, paternal gm, and paternal gf H2) Maternal gf and paternal gm provide child care the same amount if the paternal gm does not have gc via a daughter H3) Women who have gc via a daughter and son will look after the child of the daughter more H4) Men who have gc via a daughter and son will look after the child of the daughter more	H1) Respondents who have children report being closer to their parents and their parents-in-law compared to couples with no children H2) Controlling for emotional closeness to their own parents as reported by parents will not alter the overall biased gp investment H3) Controlling for emotional closeness to their own parents and parents-in-law as reported by parents alters the grandparental investment pattern, increasing the investment from parents-in-law	H1) Adult children more likely have conflicts with their parents-in-law than with their own parents H2a) Parents less likely have conflicts with their parents-in-law compared to childless couples H2b) Parents more likely have conflicts with their parents-in-law compared to childless couples	Several hypotheses, most importantly: H1) From gc's viewpoint MGM is most involved followed by MGF, PGM, PGF H2) Divorce on gp or p level reduces the involvement from paternal side gps	H1) Married gps most involved, followed by widowed, remarried and divorced H2) Effects of marital status stronger for gfs than gms
Investment/ dependent variable	Child care provided	Emotional closeness Child care received	Conflicts	Grandparental involvement (includes six investment variables)	Contact frequencies Child care provided
Main independent variables	Grandparent's sex and lineage	Whether the respondent has children or not Lineage	Whether the respondent has children or not	Grandchild's age Grandchild's sex Family structure Number of living gps Geographical distance Grandparent's age Grandparent's labour market status Grandparent's marital status Grandparent's health Number of grandchildren	Marital status
Confounders	Grandparent's age Grandparent's self-reported health Grandparent's education Grandparent's partnership status Grandparent's job situation Number of children Number of grandchildren Geographical distance to child Children's year of birth Country	Respondent's age Respondent's marital status Number of children Age of the youngest child Respondent's working status Respondent's education Emotional closeness toward a particular gp Geographical distance Parent's/in-law's age Parent's/in-law's health	Respondent's age Respondent's education Respondent's health Geographical distance Contacts with parent/parent-in-law Age of the parent/parent-in-law Parent's/parent-in-law's health (+) Age of the youngest child (+) Number of grandparents of the child		Lineage Geographical distance Grandparent's health Grandparent's working status Grandparent's education Grandparent's perceived financial situation Number of children Number of grandchildren Emotional closeness to one's own child
Methods	Two-level logistic regression Predicted probabilities	Logistic regression Two-level logistic regression Predicted probabilities	Logistic regression Predicted probabilities (+) Ordered logistic regression	Linear regression	Two-level linear regression Adjusted means Two-level logistic regression Predicted probabilities

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Original Article

Grandparental Child Care in Europe: Evidence for Preferential Investment in More Certain Kin

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Abstract: Theories of kin selection and parental investment predict stronger investment in children and grandchildren by women and maternal kin. Due to paternity uncertainty, parental and grandparental investments along paternal lineages are based on less certain genetic relatedness with the children and grandchildren. Additionally, the hypothesis of preferential investment (Laham, Gonsalkorale, and von Hippel, 2005) predicts investment to vary according to available investment options. Two previous studies have tested this hypothesis with small samples and conflicting results. Using the second wave of the large and multinational Survey of Health, Ageing and Retirement in Europe (SHARE), collected in 2006–07, we study the preferential investment hypothesis in contemporary Europe based on self-reported grandparental provision of child care. We predict that 1) maternal grandmothers provide most care for their grandchildren, followed by maternal grandfathers, paternal grandmothers and last by paternal grandfathers; 2) maternal grandfathers and paternal grandmothers provide equal amounts of care when the latter do not have grandchildren via a daughter; 3) women who have grandchildren via both a daughter and a son will look after the children of the daughter more; and 4) men who have grandchildren via both a daughter and a son will look after the children of the daughter more. Results support all four hypotheses and provide evidence for the continuing effects of paternity uncertainty in contemporary kin behavior.

Keywords: child care, grandparental investment, kin selection, paternity uncertainty, relationship certainty, matrilaterality, grandparents, grandchildren

Introduction

Grandparental attachment in humans is a universally found psychological disposition that promotes care and other investments in grandchildren (Hrdy, 2009). In contemporary industrialized societies, increasing life expectancy and wealth provide grandparents with many new opportunities to participate in their grandchildren's life (Bengtson, 2001). While grandparenting is often characterised by altruism and mutual benefit to giver and recipient, it also includes intergenerational conflicts and preferential treatment of kin. Grandparental investment in grandchildren varies between maternal and paternal kin, typically (but not always) so that maternal kin provide more assistance. This study investigates the prevalence and reasons for biases in grandparental child care provision in contemporary Europe by testing the hypothesis of preferential investment in genetically more certain kin (Laham et al., 2005).

Grandmaternal care has increased child survival in many societies and may thus have been favored by natural selection (e.g., Lahdenperä, Lummaa, Helle, Tremblay, and Russell, 2004; see Coall and Hertwig, 2010 for discussion). The positive impact of especially maternal grandmothers on grandchild survival has been shown for many pre-modern (e.g., Jamison, Cornell, Jamison, and Nakazato, 2002; Voland and Beise, 2002) and developing societies (e.g., Gibson and Mace, 2005; Sear, Mace, and MacGregor, 2000; for reviews see Sear and Mace, 2008; Strassman and Kurapati, 2010). Grandparental investment may be defined as an extension of parental investment: It includes all actions and characteristics of grandparents that increases the fitness of the grandchild and detracts from resource spending in other areas of reproductive importance (Trivers, 1972) or related to survival, development and maintenance (Clutton-Brock, 1991). However, unlike parental investment, grandparental investment typically does not incur a cost to individual fitness since grandparents are often post-reproductive (Rice, Gavrilets, and Friberg, 2010).

Unlike parental investment, which is rarely refused by the recipient, grandparental investment may be partly or wholly rejected by the parents of the grandchildren or by the grandchildren themselves. The question of grandparental access to grandchildren should ideally be distinguished from grandparental willingness to invest, a fact which complicates measurements of investment (Barnett, Scaramella, Neppl, Onta, and Conger, 2010; Pashos and McBurney, 2008).

The proximate mechanisms eliciting grandparental investment are not clear but appear to include emotional closeness and psychological and physiological resemblance. Grandparental investment in developed countries is often measured as the types and amounts of physical, social, emotional, caring and financial resources offered to a grandchild, directly or via its parents. The social and economic importance of contemporary grandparenting is only beginning to be charted and its current evolutionary relevance is subject to debate (see Coall and Hertwig, 2010 and responses). Bias in contemporary investment, especially when not culturally prescribed, may serve as an important clue to the origins and functions of grandparenting in evolutionary history (Pashos and McBurney, 2008).

Other factors besides genetic certainty naturally affect patterns of grandparental child care in modern societies (see Euler and Michalski, 2008). Geographical distance

between grandparent and grandchild has a strong influence on the frequency of child care provided (Hank and Buber, 2009). The number of children and grandchildren is also related to the amount of care provided by grandparents (Smith, 1991). The grandparent's age and health, position on the labour market, partnership status (Guzman, 2004; Hank and Buber, 2009) and educational level might also be influential factors. Younger grandchildren typically need child care more often than do older ones. Furthermore, national family policies shape the demand for kin assistance with child care (Leitner, 2003). Contemporary European family policy systems stretch – broadly speaking – from the most extensive Nordic welfare state system to Southern Europe, where day care services and family benefits are often limited and wage working parents need more informal assistance with child care (Haavio-Mannila and Rotkirch, 2009; Lewis, Campbell, and Huerta, 2008). The intensity of grandparental child care follows these welfare regimes. Grandparents in Northern Europe provide some kind of child care more frequently, while grandparents in Southern Europe provide regular care of a grandchild most often (Fokkema, ter Bekke, and Dykstra, 2008; Hank and Buber, 2009).

Discriminative grandparental solicitude

Paternity uncertainty was first proposed as the evolutionary explanation for differential grandparenting (Dawkins, 1989/1976). Males in several species are affected by evolutionary pressures to invest in offspring as a function of paternity certainty (Platek and Shackelford, 2006). Actual nonpaternity rates for humans vary between populations and have been estimated to between two to three percent in contemporary industrialized societies (Anderson, 2006; Bellis, Hughes, Hughes, and Ashton, 2005; Voracek, Haubner, and Fisher, 2008). Contemporary men preferentially invest resources in children to whom they are likely to be related genetically based on facial or odor resemblance (Alvergne, Faurie, and Raymond, 2009; Anderson, Kaplan, and Lancaster, 1999; Burch and Gallup, 2000; Daly and Wilson, 1982). The psychological dispositions of parents and grandparents may also reflect the conditions in our evolutionary past, when nonpaternity rates were probably higher (Gaulin, McBurney, and Brakeman-Wartell, 1997; Hoier, Euler, and Hänze, 2001).

Paternity certainty in grandparenting, where it is also called relationship certainty, means that grandparents would bias investment in grandchildren following the differences in genetic certainty. Only the maternal grandmother has no relationship uncertainty, since she is certain that her daughter and her daughter's children are genetically related to her (by an average of 0.5 for the daughter and 0.25 for her grandchild). Maternal grandfathers and paternal grandmothers have one kinship link with paternity uncertainty, while the paternal grandfather has two. Therefore the hypothesis of *discriminative grandparental solicitude* predicts that maternal grandmothers invest in their grandchildren the most, followed by maternal grandfathers and paternal grandmothers who invest equally, while paternal grandfathers invest the least (Euler and Weitzel, 1996). This pattern has been confirmed in several studies and for a wide range of grandparent–grandchildren variables, including care provided during childhood, emotional closeness, relationship closeness, financial support, and contact frequencies (see Bishop, Meyer, Schmidt, and Gray, 2009; Chrastil, Getz, Euler, and Stark, 2006; Eisenberg, 1988; Euler, Hoier, and Rohde, 2001; Euler and

Michalski, 2008; Euler and Weitzel, 1996; Hoffman, 1980; Jamison et al., 2002; Kahana and Kahana, 1970; Laham et al., 2005; Scholl Perry, 1996; Smith, 1991; Uhlenberg and Hammill, 1998; for more exact models and genetic estimates depending on expected paternity uncertainty and also on the asymmetric impact of X- and Y-chromosome inheritance, see Chrastil et al., 2006, and Rice et al., 2010).

However, a study of 18th and 19th century Finns and Canadians found no difference in fitness benefits associated with maternal and paternal grandmothers (Lahdenperä et al., 2004), and Alexander Pashos (2000) showed urban and rural Greece paternal grandmothers to be more involved than maternal grandmothers under certain circumstances. Thus family structure, cultural traditions and ecological conditions may strengthen, moderate or override the influence of paternity certainty, depending on the sex and lineage of grandparent (see Sarmaja, 2003).

The preferential investment hypothesis

One problem with the hypothesis of discriminative grandparental solicitude is that maternal grandfathers are commonly found to invest more in their grandchildren than paternal grandmothers do, although they both have the same genetic certainty regarding offspring. This is often explained by incidental exposure, meaning that maternal grandfathers increase their reported involvement due to their spouse, the maternal grandmother, who invests the most (see Gaulin et al., 1997; McBurney, Simon, Gaulin, and Geliebter, 2002; Pollet, Nettle, and Nelissen, 2006). However, Laham et al. (2005) studied reported exposure rates and found greater differences by grandparental sex than within the grandparental couple. Grandchildren were more exposed to grandmothers than to grandfathers, and there was no evidence for a greater exposure of maternal grandfathers compared to paternal grandmothers. Instead, Laham et al. (2005) argue that the difference between maternal grandfathers and paternal grandmothers can be explained by *preferential investment in more certain kin*. This refined hypothesis of discriminative grandparental investment allows for ecological and situational adjustments. The preferential investment hypothesis predicts grandparental investment to change according to the degree of genetic relatedness, but also according to the availability of other investment alternatives as represented by the existence of grandchildren by sons or by daughters. If women and men have children and grandchildren of both sexes they are expected to invest more in their daughter's children (uterine grandchildren) than their son's children (agnatic grandchildren). In the absence of uterine grandchildren, both sexes are expected to invest more in their son's children. Thus, in the case of a typical child, maternal grandfathers would invest more because paternal grandmothers have a more certain investment option through another, uterine grandchild. If more certain outlets are unavailable, similar investment levels are predicted by the maternal grandfather and the paternal grandmother.

The hypothesis of preferential investment in more certain kin was first tested with survey data from 787 psychology students. The students were asked to rate their emotional closeness to each of their biological grandparent on a "feeling thermometer" from 0 (cold or negative feelings) to 100 (warm or positive feelings) and to report how often they had seen each grandparent beginning from early childhood. On average, students felt somewhat closer to their maternal grandfather than to their paternal grandmother, although both rated

around 75 "degrees" and the difference was not statistically significant for students who had all four grandparents alive. However, the presence of cousins on either side affected emotional proximity, which was explained by both the diffusion effect (a grandparent having more grandchildren to invest in, regardless of the impact of relationship certainty) and preferential investment in genetically more certain kin. The gap in emotional closeness was biggest when the maternal grandfather had no other uterine grandchildren (making his score almost 80 "degrees") while the paternal grandmother had uterine grandchildren (making her score around 72) (Laham et al., 2005). In a recent study, Bishop et al. (2009) studied 193 college students who have all four grandparents alive. This study considered a wide range of different forms of investment. The results showed discriminative grandparental support according to kin lineage but did not find diminishing differences between maternal grandfathers and paternal grandmothers when the latter had no better investment outlets, as the preferential investment hypothesis predicts.

Alternative explanations

There are two other main explanations for biased grandparenting: women's stronger disposition to care (*the sex effect*) and matrilineal kin ties (*the matrilateral effect)*. These explanations partly overlap with and partly challenge the hypotheses of discriminative grandparental solicitude and preferential investment. First, due to many factors including pregnancy, lactation, paternity uncertainty and cultural traditions, humans typically exhibit sex-specific reproductive strategies where women invest more in children than do men. This appears to be reflected in several evolved psychological dispositions, for instance making women on average more empathetic and caring towards their kin and towards young children (Rotkirch and Janhunen, 2010). The gender difference is especially clear for the measure we use in this study, direct care for children, which women provide more than men do in all known societies. The sex effect predicts that kin, and especially female kin, invest more resources in their female than male relatives, irrespective of lineage, because women are more often in charge of the children and because women are (or are perceived to be) more reliable and efficient parents. For instance, Euler and Weitzel (1996) explained higher care by maternal grandfathers, as compared to paternal grandmothers, as a combination of paternity uncertainty and sex specific reproductive strategies.

Second, humans appear to have cultural or psychological predispositions that favor helping patterns through maternal kin. A matrilateral effect may have developed either as a proximate mechanism for paternity uncertainty, or as an alternative, ultimate reason for biased grandparental investment (Gaulin et al., 1997; Pashos and McBurney, 2008). Given higher maternal than paternal investment, parents often contribute most to their fitness by helping their daughter with child care, and the daughter in turn is likely to have the major responsibility for her children. Thus both the grandparental and parental generation may be inclined to favor matrilateral assistance. This pattern has received empirical support, especially in studies of aunts and uncles (McBurney et al., 2002). Regarding grandparents, the matrilateral effect predicts that maternal grandparents will invest more than paternal grandparents (see Euler and Weitzel, 1996).

Compared with theories stressing paternity certainty, the sex and matrilateral effects are more sensitive towards the motivations of the parental generation vis-à-vis their own

parents. For instance, they predict that mothers of young children, being typically responsible for child care arrangements, are most inclined to seek help from their own mothers (sex effect) or parents (matrilateral effect). Unfortunately empirical tests of paternity certainty, the sex effect and the matrilateral effect often tend to overlap and evidence for one can often also be interpreted as evidence for the other (Pashos, 2000). Below, we aim to compare these alternative explanations when possible.

Measure and hypotheses

Both previous studies of the preferential investment hypothesis (Bishop et al., 2009; Laham et al., 2005) have used small and unrepresentative data where grandparental investment is investigated from the grandchildren's point of view. The present study uses a large multinational and representative survey where the respondents are the grandparents. We measure grandparental investment as child care provided when the child's parents are absent.

We test four hypotheses which are linked to the paternity uncertainty and the preferential investment hypothesis. We measure grandparental investment as child care provided and reported by grandparents to their adult children. Child care is an investment of time and care into a grandchild. It can be seen as a more direct investment than simply spending time with a grandchild (Laham et al., 2005) and definitely as a more direct investment than mere contacts between a grandparent and a grandchild. Child care is also a form of investment that exists in both subsistence societies and modern welfare states (Dawkins, 1989/1976; Euler and Michalski, 2008; Hrdy, 2009).

As outlined above, the preferential investment hypothesis generates four testable predictions:

> H1) Maternal grandmothers most often provide care for their grandchild, followed by the maternal grandfather and then by the paternal grandmother, while the paternal grandfather provides least care.
> H2) Maternal grandfathers and paternal grandmothers provide child care with the same intensity, if the paternal grandmothers do not have a grandchild via a daughter.
> H3) Women who have a grandchild via both a daughter and a son will look after more the child of the daughter.
> H4) Men who have a grandchild via both a daughter and a son will look after more the child of the daughter.

Our hypotheses also partly test for sex effects and matrilateral effects. In contrast to the preferential investment hypothesis, the sex effect hypothesis predicts higher female care provision, so both types of grandmothers should invest more than grandfathers do (H1) and paternal grandmothers should provide more child care than maternal grandfathers do in all circumstances (H2). The sex effect hypothesis coincides with the preferential investment hypothesis for H3 and H4, where both predict that grandparents prefer caring for the daughter's children (or alternatively, that the daughter will solicit more help from her own parents). The matrilateral hypothesis predicts that maternal grandparents will look after the

grandchild more than will paternal grandparents, consistent with H1, H3 and H4 but contrary to H2, where it instead predicts higher investment by the maternal grandfather in all cases.

Table 1. Summary of theoretical explanations and hypotheses for differential grandparental investment

	Preferential investment	**Sex effect**	**Matrilateral effect**
Main claim	Paternity uncertainty biases grandparental investment towards the genetically most certain available grandchildren	Sex-specific reproductive strategies and cultural traditions make women more likely to provide child care and to interact with female kin	Due to paternity uncertainty and/or sex-specific reproductive strategies, kin help follows the maternal line more than the paternal line
H1 Child care varies by degree of probable genetic relatedness: MGM > MGF > PGM > PGF	+	- (grandmothers are always expected to invest more than grandfathers do)	+
H2 MGF and PGM invest equally, if PGM lack uterine grandchildren	+	- (grandmothers are always expected to invest more than grandfathers do)	- (MGF are expected to invest more than PGM do)
H3 Having a choice between uterine and agnatic grandchildren, women invest more in the former	+	+	+
H4 Having a choice between uterine and agnatic grandchildren, men invest more in the former	+	+	+

Note: MGM = Maternal grandmother, MGF = Maternal grandfather, PGM = Paternal grandmother, PGF = paternal grandfather

Materials and Methods

The data we used in our study is the second wave of the Survey of Health, Ageing and Retirement in Europe (SHARE) which was collected in 2006–2007. The target population consists of all people born in 1956 or earlier who are speaking the official language of the country and do not live abroad or in an institution, such as a prison, during the entire fieldwork period, plus their spouses/partners independent of age.

The SHARE data collection is based on a computer-assisted personal interview. The aim of the SHARE survey project is to collect longitudinal data of Europeans' ageing process. The data includes variables measuring the respondents' physical health, mental well being, financial situation and social support. The second wave of SHARE was carried out in thirteen European countries (Austria, Germany, Sweden, Netherlands, Spain, Italy, France, Denmark, Greece, Switzerland, Belgium, The Czech Republic, and Poland).

The total number of participants in the SHARE second wave dataset is 33,281, of whom 44.3% are men and 55.7% are women. For the present study, we included only respondents who have a biological child/children, at least one grandchild who is not over 14 years old, and who have responded to the question about child care (n = 8,667, grandmothers n = 4,899, grandfathers n = 3,768). The present dataset was constructed so that observations are the original respondent's (the grandparent's) children, resulting in a total of 22,264 observations (on average 2.6 children per respondent). The grandparental variable by lineage (maternal grandmother, maternal grandfather, paternal grandmother, paternal grandfather) vis-à-vis each child was then determined for every grandparent-parent dyad.

Four additional variables were generated for hypotheses 2, 3 and 4. The first variable contrasts maternal grandfathers who have only uterine grandchildren with paternal grandmothers who have only agnatic grandchildren (H2). The second variable contrasts those maternal grandfathers who have only uterine grandchildren with paternal grandmothers who have both agnatic and uterine grandchildren (H2). The third variable includes only those grandmothers who have both agnatic and uterine grandchildren (H3), and the fourth variable includes grandfathers who have both uterine and agnatic grandchildren (H4).

All grandparents were first asked whether they had looked after their grandchildren during the time since the last interview (longitudinal respondents) or during the last twelve months (new respondents) without the presence of the parents. The grandparents were then asked how often they looked after their grandchildren (since the last interview/during the last twelve months). The alternatives were almost daily, almost every week, almost every month and less often. Grandparents were asked separately about providing child care to the children of each of their adult children. We categorized our dependent variable, the frequencies of looking after a particular grandchild, into two categories: 0 = less often than almost every week, 1 = almost daily or every week. This is because we are interested especially in frequently provided grandparental childcare, which we interpret to indicate a stronger investment in a grandchild than only occasionally provided child care (see also Hank and Buber, 2009).

Logistic regression was used to predict the dichotomously coded childcare provided

by the grandparent. We first fitted models with only the grandparental indicator and age of the grandparent included as independent variables. To assess the role of grandparent's background characteristics, we then further adjusted for grandparent's self reported health, education, partnership status, job situation, number of children and grandchildren, geographical distance to child, children's year of birth and country (see Table 2). To examine potential cultural differences, we grouped the countries according to type of family policy regimes (Southern Europe: Spain, Italy and Greece; Eastern Europe: the Czech Republic and Poland; Central Europe: Switzerland, France, Germany, Austria and Belgium; Northern Europe: Netherlands, Sweden and Denmark) and fitted the models separately in these groups. The results were illustrated by calculating the predicted probabilities of childcare by kin lineage from the logistic regression models. Grandparental indicator variables were treated as categorical variables in all models.

Table 2. Descriptive statistics

Grandparent (%)	**% / mean**	***n***
Maternal grandmother	28.4	6199
Maternal grandfather	21.4	4663
Paternal grandmother	28.3	6188
Paternal grandfather	21.9	4786
Grandparent's year of birth (mean)	1941	8666
Grandparent's years of education (mean)	10	8381
Grandparent's self reported health (%)		
Excellent	8.5	733
Very Good	16.9	1465
Good	37.8	3274
Fair	26.8	2324
Poor	10.0	869
Grandparent's partnership status (%)		
Living with a spouse/partner	71.5	6194
Living as a single	28.5	2472
Grandparent's job situation (%)		
Working	20.1	1730
Other	79.9	6898
Grandparent's number of children (mean)	2.6	8667
Grandparent's number of grandchildren (mean)	3.7	8667
Grandparent's distance to child (%)		
Living in the same household	10.0	2178
In the same building	4.8	1041
Less than 1 kilometer away	13.3	2893
Between 1 and 5 kilometers away	18.3	4002
Between 5 and 25 kilometers away	23.0	5009
Between 25 and 100 kilometers away	13.7	2979

Between 100 and 500 kilometers away	10.8	2349
More than 500 kilometers away	2.9	635
More than 500 kilometers away abroad	3.4	735
Children's year of birth (mean)	1969	21836
Country		
Southern Europe:		
Spain	6.4	555
Italy	9.2	797
Greece	6.6	573
Eastern Europe:		
Czechia	8.5	734
Poland	10.1	879
Central Europe:		
Switzerland	3.8	331
France	9.1	795
Germany	6.6	574
Austria	4.2	363
Belgium	9.7	842
Northern Europe:		
Netherlands	9.3	806
Sweden	8.6	744
Denmark	7.8	674

Results

Hypothesis 1

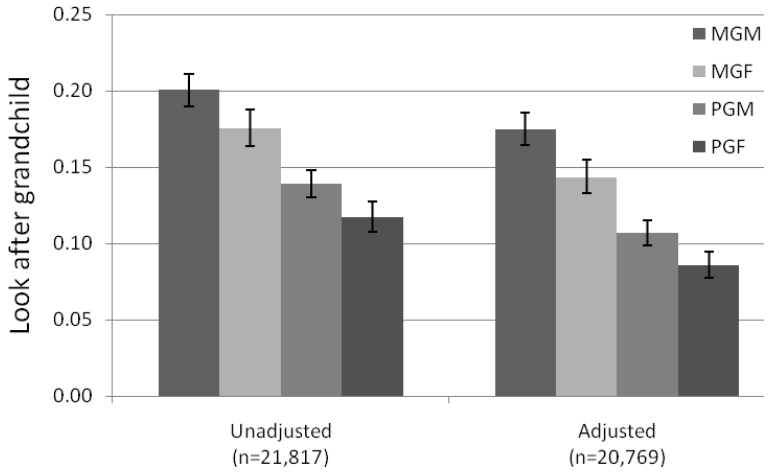
We first investigate the general hypothesis of discriminative grandparental investment. The predicted probabilities of grandparental child care in Europe follow the expected pattern (Table 3, Figure 1). Maternal grandmothers (MGM) have the highest probability to look after their grandchildren, followed by maternal grandfathers (MGF), then by paternal grandmothers (PGM) and finally paternal grandfathers (PGF).

Table 3. Logistic regression models (odds ratios and standard errors) predicting grandparental care by lineage

Unadjusted					
	All	Southern Europe	Eastern Europe	Central Europe	Northern Europe
PGF	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
MGF	1.61‡ (0.10)	1.43† (0.17)	1.54† (0.23)	1.92‡ (0.20)	1.47† (0.21)
PGM	1.22‡ (0.07)	1.08 (0.13)	1.44† (0.20)	1.21 (0.13)	1.26 (0.17)
MGM	1.89‡ (0.11)	1.93‡ (0.22)	2.08‡ (0.28)	1.91‡ (0.19)	1.68‡ (0.23)
Adjusted					
PGF	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
MGF	1.79‡ (0.12)	1.66‡ (0.20)	1.73‡ (0.27)	2.09‡ (0.23)	1.53† (0.23)
PGM	1.28‡ (0.08)	1.01 (0.13)	1.33* (0.20)	1.37† (0.15)	1.23 (0.18)
MGM	2.26‡ (0.14)	1.89‡ (0.24)	2.34‡ (0.33)	2.52‡ (0.27)	2.02‡ (0.29)

Note: MGM = Maternal grandmother, MGF = Maternal grandfather, PGM = Paternal grandmother, PGF = paternal grandfather, * $p < 0.05$, † $p < 0.01$, ‡ $p < 0.001$

Figure 1. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage.

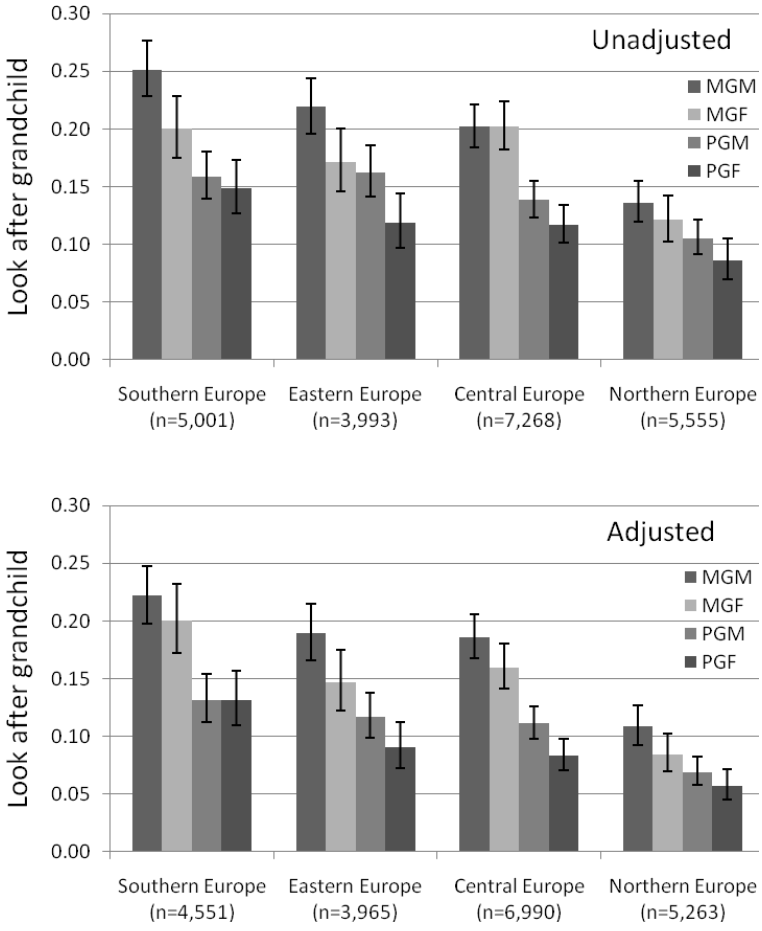


Note: MGM = Maternal grandmother, MGF = Maternal grandfather, PGM = Paternal grandmother, PGF = paternal grandfather

Table 3 and Figure 2 show the predicted probabilities of the differences in grandparental investment in child care in four different European family policy regimes (Southern Europe: Spain, Italy and Greece; Eastern Europe: the Czech Republic and Poland; Central Europe: Switzerland, France, Germany, Austria and Belgium; Northern Europe: Netherlands, Sweden and Denmark). Grandparental child care varies from the

most extensive care provision found in Southern Europe to Eastern Europe, then to Central Europe and finally to Northern Europe, where grandparents have the smallest probabilities to look after their grandchildren. However, despite this variation, in all four European regimes grandparental investment varies by maternal and paternal lineage.

Figure 2. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage and country group



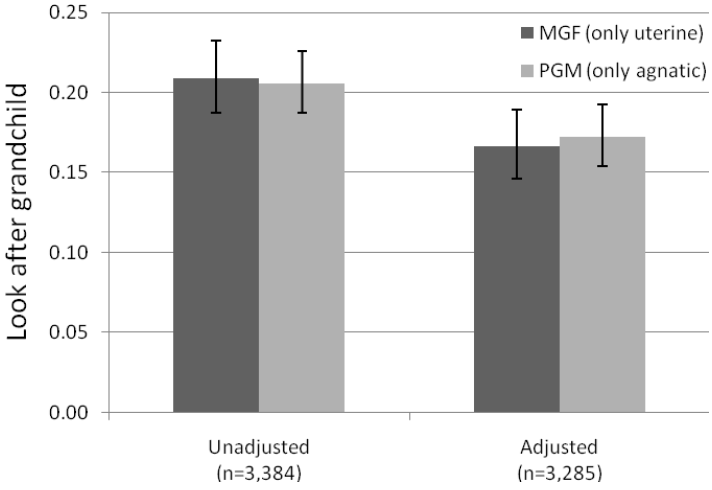
Note: MGM = Maternal grandmother, MGF = Maternal grandfather, PGM = Paternal grandmother, PGF = paternal grandfather

Hypothesis 2

Next, we examine the preferential investment hypothesis by studying how alternative investment options affect care provision. We compare grandparents with

predicted equal amounts of investment, i.e., maternal grandfathers who have only uterine grandchild(ren) (via a daughter) and those paternal grandmothers who have only agnatic grandchild(ren) (via a son). The results are presented in Figure 3 and show that the predicted probabilities support the preferential investment hypothesis. The difference in predicted probability to provide child care is small and not statistically significant (unadjusted OR = 0.98, SE = 0.09, p = .852; adjusted OR = 1.04, SE = 0.11, p = .689) between maternal grandfathers and paternal grandmothers when the latter do not have a preferential kin (grandchild via daughter) to invest in.

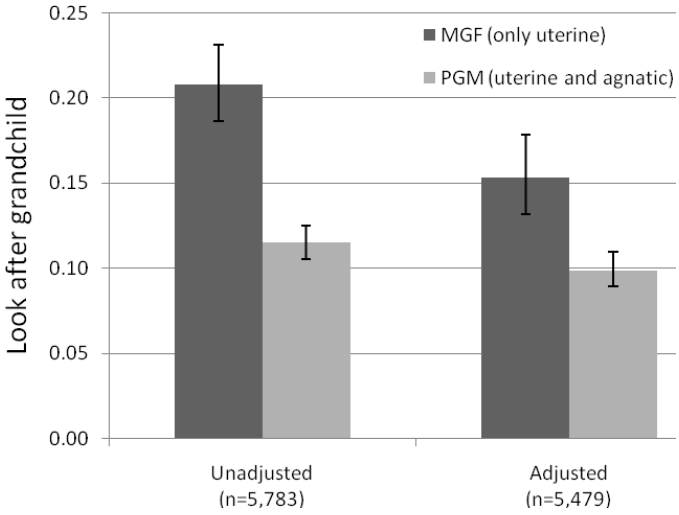
Figure 3. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage



Note: MGF (only uterine) = Maternal grandfather with only uterine grandchild(ren), PGM (only agnatic) = Paternal grandmother with only agnatic grandchild(ren).

Second, we investigate the opposite possibility, that is, care provision when preferential kin does exist. Figure 4 shows child care provision by those maternal grandfathers who have grandchild(ren) only via a daughter versus those paternal grandmothers who have grandchild(ren) via both daughter and son. The predicted probabilities support our hypothesis: men who have only uterine grandchildren look after the child more than do women who have both agnatic and uterine grandchildren (unadjusted OR = 0.50, SE = 0.04, $p < 0.001$; adjusted OR = 0.60, SE = 0.06, $p < 0.001$).

Figure 4. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage

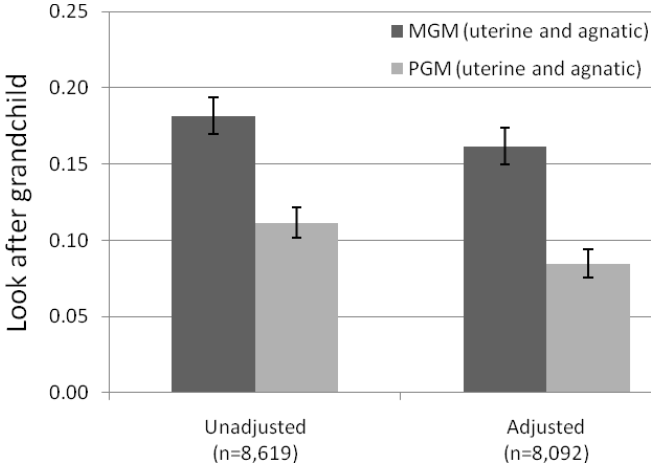


Note: MGF (only uterine) = Maternal grandfather with only uterine grandchild(ren), PGM (uterine and agnatic) = Paternal grandmother with both uterine and agnatic grandchildren.

Hypothesis 3

According to our third hypothesis women who have both uterine and agnatic grandchildren will provide more care to the child of the daughter. Figure 5 presents women who have a grandchild via both a daughter (maternal grandmothers) and a son (paternal grandmothers). The predicted probabilities follow our third hypothesis, as women with both uterine and agnatic grandchildren are more likely to look after the former compared to the latter (unadjusted OR = 1.76, SE = 0.11, $p < 0.001$); adjusted OR = 2.08, SE = 0.14, $p < 0.001$).

Figure 5. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage

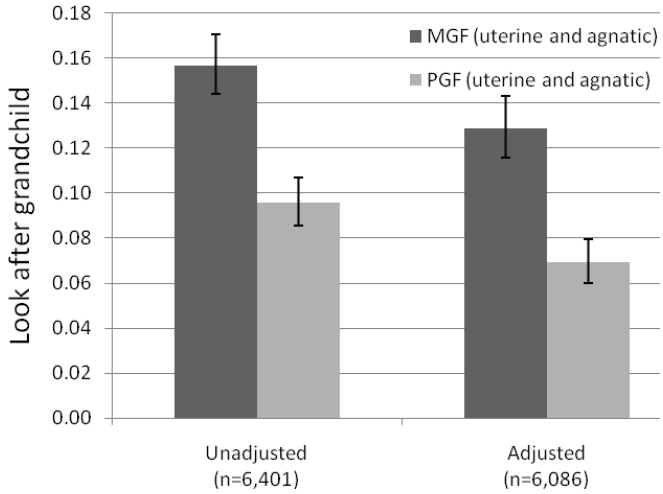


Note: MGM (uterine and agnatic) = Maternal grandmother with both uterine and agnatic grandchildren, PGM (uterine and agnatic) = Paternal grandmother with both uterine and agnatic grandchildren.

Hypothesis 4

Finally, we tested the effects of the preferential investment hypothesis on grandfathers. Figure 6 shows men who have a grandchild via both a daughter (maternal grandfathers) and a son (paternal grandfathers). The predicted probabilities are in line with our fourth hypothesis, predicting that maternal grandfathers look after the grandchild more than do paternal grandfathers (unadjusted OR = 1.76, SE = 0.13, $p < 0.001$; adjusted OR = 1.99, SE = 0.17, $p < 0.001$).

Figure 6. Grandparental care (predicted probabilities and 95% confidence intervals) by lineage



Note: MGF (uterine and agnatic) = Maternal grandfather with both uterine and agnatic grandchildren, PGF (uterine and agnatic) = Paternal grandfather with both uterine and agnatic grandchildren.

Discussion

We have examined grandparental child care provision in 13 contemporary European countries. Our aim was to test the hypothesis of discriminative grandparental solicitude and its refined version, the hypothesis of preferential investment in more certain kin. When possible, we also tested two alternative explanations for discriminative grandparental care, namely, the sex effect of women being more inclined to child care provision than men and the matrilateral effect of kin assistance following the mother's lineage rather than the father's. In all our analyses we controlled for several variables (grandparent's year of birth, self-reported health, years of education, partnership status, job situation, number of children and grandchildren, geographical distance to child, children's year of birth and country) which did not substantially change the outcome.

In agreement with most other studies of contemporary grandparenting (see Coall and Hertwig, 2010), we found that maternal grandmothers are most likely to look after the grandchild (20.1% probability of looking after the child at least about once a week), followed by maternal grandfathers (17.6%), paternal grandmothers (13.9%), and paternal grandfathers (11.7%). We conclude that grandparental investment conceptualized as child care in the absence of the child's parents follows the general pattern of discriminative grandparental solicitude (Euler and Weitzel, 1996). This is in line with the matrilateral effect but contradicts the sex effect, which predicts grandmothers to provide care more than grandfathers in each category of grandparents.

Second, we tested whether maternal grandfathers and paternal grandmothers provide childcare with the same intensity if the latter do not have a grandchild via daughter. Our analysis clearly supports this preferential investment hypothesis (Laham et al., 2005). When women do not have more genetically certain investment outlets, the difference between investment by paternal grandmothers and maternal grandfathers disappears and they "match" each other to a surprisingly high degree (MGF: 20.9%, PGM: 20.6%). This finding contradicts the results predicted by both the sex effect and the matrilateral effect. It provides the most unequivocal support for the preferential investment hypothesis compared with other explanations.

Finally, we further tested the preferential investment hypotheses by studying whether women and men who have both agnatic and uterine grandchildren will provide care for the child of the daughter more. Our results support also these two hypotheses, with maternal grandmothers being more likely than paternal grandmothers (18.1% vs. 11.1%) and maternal grandfathers more likely than paternal grandfathers to (15.7% vs. 9.6%) to look after the children at least once a week. Both results can also be interpreted as support for the sex effect hypothesis and the matrilateral effect hypothesis, since they measure preferential investment in daughters compared to sons.

The present study has several advantages. The large, multinational and population-based sample provides a strong setting to examine grandparental care in different parts of Europe. Data of grandparental care was reported by the grandparents themselves, not by grandchildren (as Bishop et al., 2009) or by grandchildren retrospectively (as Laham et al., 2005). It has been argued that grandparents are not the ideal source of information, as they may wish to present themselves as equal investors in all children (see Euler and Weitzel, 1996; Euler et al., 2001; Laham et al., 2005). Our findings do not support this assumption, as we observed clear and consistent variance of grandparental assistance provided to different children of the grandparent.

Hank and Buber (2009) have analysed grandparental child care in Europe with data from the first wave of SHARE. Their findings are consistent with our results, which are based on the second wave of SHARE, although they focus on the differences between countries, not between grandparents. These authors emphasize that the differences between European countries can be explained by women's (in this case, grandmother's) participation in the labour market and the availability of institutional child care, which both are more common in Northern than in Southern Europe. They also suggest that cross-national differences may be explained by different household co-residence traditions (Hank and Buber, 2009). In Southern Europe three-generational co-residence is more common than in Northern or Central Europe, and consequently, grandparental child care is more intense in the South. We adjusted for country, grandparent's job situation, geographical distance to the adult child (which includes those living in the same household), among other factors. However, these adjustments did not change the discriminative logic of grandparental child care, which prevails despite the varying intensity of provided child care across European family policy regimes.

Unfortunately, our data does not include information on the sex of the grandchild. Therefore we could not test for the variation in grandparental solicitude between grandsons and granddaughters. Some recent studies (see Chrastil et al., 2006; Fox, Sear, Beise,

Ragsdale, Voland, and Knapp, 2010; Rice et al. 2010; see also Euler, in press) suggest that asymmetric sex chromosome inheritance, and especially the different degrees of X-relatedness between a grandparent and a grandchild, can explain why women of paternal kin sometimes invest more in children than maternal kin.

Future studies should test whether contemporary grandparents increase their inclusive fitness by looking after grandchildren (see Coall and Hertwig, 2010 for review; see also Kaptijn, Thomese, van Tilburg, and Liefbroer, 2010). As SHARE is panel data, it is also possible to test the effect of the incidental exposure more reliably than with snapshot data (see Laham et al., 2005). In addition, other measures of grandparental investment besides child care, such as economic transfers, emotional support, and assistance during crisis situations such as divorce and illness merit investigation. Finally, the role of parents as solicitors and gatekeepers of grandparental care need to be better assessed (see Michalski, 2010). Paternal grandparents may wish to provide more child care and other investment than what the child's parents grant them access to do. In that case, the relations between parents and daughter-in-law in particular would regulate grandparental investment, regardless of relationship certainty. Only by measuring also parental attitudes could the relative impact of grandparental willingness to invest and parental willingness to receive help be ascertained.

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II

Journal of Marriage and Family

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Impact of Genetic Relatedness and Emotional Closeness on Intergenerational Relations

Both emotional closeness and genetic relatedness are known to influence helping behavior between family generations, yet few studies have explored them together. The authors investigated the associations between (a) parenthood and perceived emotional closeness toward own parents and parents-in-law and (b) emotional closeness and receiving child care from grandparents across and within lineage lines. The data include information on the 8 dyads of possible parent–grandparent relations from a nationally representative survey of young adults in Finland (born 1962–1990, sample N = *1,216). The results show that parenthood was associated with women's emotional closeness to their own mothers and men's emotional closeness to their parents-in-law. Maternal grandmothers provided the most grandchild care. After controlling for emotional closeness, the difference in child care provision between one's own mother and one's mother-in-law disappeared for women but was accentuated in men. Thus, emotional closeness shapes intergenerational relations differently for kin and in-laws.*

Intergenerational family relations, especially grandparenting, have attracted increasing attention among both family sociologists and evolutionary scientists in recent years (e.g., Arber & Timonen, 2012; Coall & Hertwig, 2010). Grandparents are "child saviors" in the sense that their importance for child survival and development has been demonstrated in several studies. In premodern populations the presence of grandparents, and of maternal grandmothers in particular, has contributed to grandchild survival (e.g., Hawkes, O'Connell, & Blurton Jones, 1997; Sear, Mace, & McGregor, 2000), whereas in contemporary developed societies grandparents affect the well-being and development of grandchildren (e.g., Scholl Perry, 1996; Tanskanen & Danielsbacka, 2012). Having a close and supportive grandparent may be especially valuable during crises in the grandchild's life, such as the severe illness of a family member or parental divorce (e.g., Attar-Schwartz, Tan, Buchanan, Flouri, & Griggs, 2009; Dunifon, 2013; Sear & Coall, 2011). Grandparents who provide regular care for their grandchildren are also called "mother saviors" because they help parents of small children to combine work and family life, especially in countries with little provision of formal child care (Herlofson & Hagestad, 2012; Igel & Szydlik, 2011). In countries where the public child care system is extensive, grandparents may also be described as "family saviors" because they provide valuable financial and practical backup support to the whole family when needed (Hagestad, 2006;

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Herlofson & Hagestad, 2012). Previous findings suggest that the supportive role of grandparents is quite important for the parental generation. For instance, in contemporary affluent societies grandparental support may, in addition to helping with everyday logistics, boost parental fertility (Aassve, Meroni, & Pronzato, 2012; Tanskanen, Jokela, Danielsbacka, & Rotkirch, 2014; Tanskanen & Rotkirch, 2014; Thomese & Liefbroer, 2013).

Grandparenting is of particular interest for family sociologists and human evolutionary scientists. Often, these two fields converge in their findings. Nevertheless, the approaches differ substantially in their explanatory framework (Sear & Coall, 2011). Evolutionary researchers focus on the possible ultimate explanations for the results, often ignoring or paying much less attention to proximate mechanisms, whereas family sociologists have studied the proximate mechanisms, often ignoring ultimate explanations. *Ultimate explanations* are concerned with the possible evolutionary function of a certain behavior (i.e., why this behavior exists in this species) whereas *proximate explanations* describe the mechanisms triggering and enabling the behavior (see Nettle, Gibson, Lawson, & Sear, 2013; Scott-Phillips, Dickins, & West, 2011). Concerning intergenerational relations, an ultimate explanation is concerned with why kin help each other across generations, whereas a proximate question can ask how emotional closeness facilitates such helping behavior. Although it is obvious that the two approaches are complementary, it is still rare to combine them in family studies.

The aim of this study was to better assess the dynamics of intergenerational relations and support by taking into account both ultimate and proximate explanations of intergenerational relations. We aimed to contribute to the integration of evolutionary research and family sociology by paying attention to the interplay between genetic relatedness and emotional closeness. In an empirical sense, we wished to improve our understanding of the connections between grandparental involvement and intergenerational relations. Although emotions are well known to influence family relations, including intergenerational relations, the emotional closeness between a couple and their parents is an understudied topic, especially from the adult children's perspective (Willson, Shuey, & Elder, 2003).

We investigated how genetic versus affine relatedness, emotional closeness, and becoming a parent shape intergenerational relations in contemporary Finland. The study included the full set of possible parent–grandparent relations, taking into account gender and lineage and thus involving eight different dyads: four between biological kin and four between in-laws. First, we investigated how being a mother or a father compared to not having children is associated with emotional closeness between the parental and the grandparental generations. Second, we studied how the perceived emotional closeness between the parental and the grandparental generations affects the proportional share of grandparental care provided to grandchildren.

Background

Shared Reproductive Interest Between Parents and Grandparents

The starting point for evolutionary family studies is to understand the human family as a reproductive system, characterized by cooperative breeding. According to this viewpoint, the ultimate explanation for the existence of intergenerational relations stems from William Hamilton's (1964) *theory of inclusive fitness*, which predicts that, all else being equal, the closer the degree of assumed genetic relatedness among relatives the more people are willing to invest in each other. Investing in closely genetically related kin, especially in the descending line, is likely to enhance an individual's inclusive fitness, that is, the proportion of genes passed on to the next generation. Behaviors that have a genetic basis and enhance inclusive fitness can be favored by natural selection.

Humans share, on average, 50% of their genes with their children and 25% of their genes with their grandchildren. Thus, the theory of inclusive fitness predicts altruistic behavior not only between parents and children but also between grandparents and grandchildren. Shared genetic interest is, however, not limited to biological kin. In humans it can also involve affines (i.e., in-laws). Affines differ from genetically related kin in that they are usually related through marriage only. Nevertheless, through possible common descendants (i.e., grandchildren, nieces, nephews, etc.) affines become inversely genetically related to each other. Although they do not share common recent ancestors, they still

have a shared reproductive interest in future generations (Burton-Chellew & Dunbar, 2011; Hughes, 1988). Thus, altruistic helping is predicted to be greater among affines than among other non-kin. However, actual studies comparing kin and affines are very scarce.

Cooperative breeding means that our species-typical childrearing involves not only the child's biological mother (e.g., Hrdy, 1999, 2009). Other caretakers, or *allomothers*, may include, for instance, the child's father, older siblings, grandparents, aunts, and uncles, depending on the social, cultural, and ecological context. Evolutionary researchers argue that shared reproductive interest with kin members in part encourages cooperative breeding behavior and explains which relatives invest most in young children (e.g., Euler, 2011; Hrdy, 2009).

Although family sociologists acknowledge the importance of biological variables such as sex and lineage, they have approached intergenerational relations mainly as a product of emotions such as love and attachment or dislike and resentment (e.g., King & Elder, 1995; see also Fingerman, Hay, & Birditt, 2004, and Luescher & Pillemer, 1998, about ambivalent relationships). From an evolutionary viewpoint, these emotions can be seen as proximate mechanisms. They do not explain why intergenerational exchange exists (i.e., they do not provide an ultimate explanation), but they suggest how a certain behavior is ensured or enhanced (Michalski & Shackelford, 2005). Thus, even the quality of a specific type of grandparent–parent relationship can be understood as the product of reproductive choices and their fitness consequences, shaped by gender and lineage (Euler & Michalski, 2008). It is important to notice that ultimate explanations need not involve conscious action on the individual level. People do not think about "spreading their genes" but follow specific cues that may, often through different emotions, encourage a certain kind of behavior (Hrdy, 1999, p. 114; see below for examples).

Evolutionary family studies assume that many of the emotions embedded in intergenerational family relations should be strongly connected to the existence of a common descendant (see also Fischer, 1983). It is therefore often suggested that the birth of a child brings parents closer to both their own parents and to their parents-in-law. However, to our surprise, we have not found any large-scale studies that have investigated this change. Our first hypothesis was as follows:

> *Hypothesis 1*: Respondents who have children report being closer to their parents and their parents-in-law compared to couples with no children.

Biased Grandparental Investment and Emotional Closeness

Our second focus in this study was on differential grandparenting, or biased grandparental investment. This is related to studies on intergenerational transfers (e.g., Albertini, Kohli, & Vogel, 2007; Attias-Donfut, Ogg, & Wolf, 2005), solidarity (Bengtson, 2001; Bengtson & Roberts, 1991; Szydlik, 2008), and conflicting or ambivalent relationships (e.g., Luescher & Pillemer, 1998). In contrast to most family scholars, evolutionary researchers also use the term *grandparental investment*. In a theoretical sense, the concept is an extension of a parental investment theory (Trivers, 1972) and includes all forms of resources that grandparents provide for their offspring (e.g., care, time, emotional support, and financial assistance). Grandparental investments can benefit the grandchild either directly or indirectly, via the child's parents. The concept of biased grandparental investment reflects the fact that grandparental investment often varies according to the gender and lineage of the investment provider. It is usually, but not always, the case that maternal grandmothers invest the most, followed by maternal grandfathers, paternal grandmothers, and paternal grandfathers, who invest the least (e.g., Danielsbacka & Tanskanen, 2012; Danielsbacka, Tanskanen, Jokela, & Rotkirch, 2011; Euler & Weitzel, 1996; Pollet, Nettle, & Nelissen, 2006, 2007; but see Kaptijn, Thomese, Liefbroer, & Silverstein, 2013, and Pashos, 2000).

The pattern of biased grandparental investment was outlined in the 1970s by family researchers (e.g., Hoffmann, 1979; Kahana & Kahana, 1970). Theoretically coherent explanations for this pattern were, however, not presented by evolutionary researchers until later. The first proposed evolutionary explanation for differential grandparenting focused on *paternity uncertainty*, or the fact that fathers can never be as sure as mothers that the child is genetically related to them (e.g., Euler & Weitzel,

1996; Smith, 1991). This creates a pattern of intergenerational relationship uncertainty: The maternal grandmother can be totally certain that the grandchild is genetically related to her, the maternal grandfather and paternal grandmother both have one potentially uncertain genetic link, and the paternal grandfather has two uncertain links.

Also, the evolutionary predictions of gendered reproductive strategies, whereby a daughter can be assumed to channel the investment in grandchildren more effectively than a son because of gender differences in reproductive behavior, provide predictions similar to that of paternity uncertainty (see Euler, 2011, for a full discussion). Both the paternity-uncertainty and the gender-differences arguments predict that the grandparent–parent relationship is closer between biological kin compared to in-laws. In addition, the amount of time individuals spend together tends to increase emotional closeness (e.g., Dunbar & Shultz, 2010), which should further strengthen ties between biological kin compared to affines. The comparatively closest relationship is predicted to emerge between a mother and her adult daughter and the weakest between mother-in-law and daughter-in-law (Euler, 2011).

However, although existing evolutionary studies have investigated associations between grandparental behavior and child or family outcomes, they tend to bypass the role of emotions in shaping these patterns. The few evolutionary studies that have examined the association between emotional closeness and kinship investment discovered a *kin premium*. This expression means that although kin are typically closer to each other than non-kin, kin also help each other more than non-kin, irrespective of relationship closeness (Curry, Roberts, & Dunbar, 2013; Hackman, Danvers, & Hruschka, 2015; Pollet, Roberts, & Dunbar, 2013).

Most evolutionary-oriented studies have so far explained the bias in grandparenting (or the grandparental investment pattern) from the grandparents' perspective, asking how much grandparents are "willing to invest" in particular grandchildren given the expected benefits to inclusive fitness (e.g., Michalski & Shackelford, 2005; Tanskanen, Rotkirch, & Danielsbacka, 2011). By doing so, they ignore the gatekeeping role of the middle generation, which has been studied in family sociology (Robertson, 1975; Thompson & Walker, 1987). Grandparents cannot take for granted that they can freely channel all desired investment in grandchildren. Unlike parental investment, which is seldom refused by the recipient (the child), grandparental investment may be partly or wholly rejected by the parents of the grandchildren or by the grandchild him- or herself (Barnett, Scaramella, Neppl, Ontai, & Conger, 2010; Michalski, 2010; Pashos & McBurney, 2008). When parents guard or monitor access to a grandchild, they act as gatekeepers. Gatekeeping can arise when either parent does not trust the grandparents to provide suitable care for or influences on his or her child, often as a consequence of parental divorce (e.g., Drew & Silverstein, 2007). The gatekeeping role of the middle generation highlights the importance of the quality of the dyadic parent–grandparent relationship: When that dyad deteriorates, obstacles to grandparental investment arise.

In the field of family sociology, one crucial explanation for the amount of grandparental investment, in addition to need and opportunity structures (Szydlik, 2008), has been relationship quality (e.g., Chan & Elder, 2000; Hagestad, 2006; Uhlenberg & Hammill, 1998). This is often measured by asking about the perceived quality of the relationship (ranging from *very poor* to *excellent*; Chan & Elder, 2000; Uhlenberg & Hammill, 1998). The question theoretically incorporates both positive and negative emotions and is thus a broader concept than emotional closeness. Emotional closeness, in turn, is generally known to be associated with more helping and fewer conflicts between family members (e.g., Korchmaros & Kenny, 2001). An emotionally close parent–grandparent relationship has been found to promote more frequent contacts and a closer relationship between the grandparent and the grandchild (e.g., Chan & Elder, 2000; King & Elder, 1995; Uhlenberg & Hammill, 1998). The quality of the relationship between in-laws may also have a greater effect on the grandparent–grandchild relationship quality than on that between parents and their adult children (Fingerman, 2004).

Family sociologists often explain differential grandparental investment through cultural and normative incentives for both generations and genders to act in a certain way. It is thus often assumed that social norms are the main reason women act as kin-keepers, or take care of both close and more distant family relations (Bracke, Christiaens, & Wauterickx, 2008; Dubas, 2001).

Kin-keeping is in turn assumed to make grandmothers emotionally closer than grandfathers to their children and grandchildren (Uhlenberg & Hammill, 1998). Female kin-keeping may also increase the importance of matrilineal relations over patrilineal ones (Chan & Elder, 2000; Fingerman, 2004). However, sociological studies do not usually take into account other reasons for the formation of social norms, gendered behavior, and family ties, such as genetic relatedness. Although there is currently a greater awareness of the possible impact of biological relatedness, very few intergenerational studies have taken into account lineage and genetic interest (Coall, Hilbrand, & Hertwig, 2014). Neither has research studied the degree to which emotional closeness actually explains the greater helping behavior of maternal grandmothers.

In sum, evolutionary researchers approach gender and lineage differences in intergenerational family relations mainly as products of evolved reproductive strategies, whereas family sociologists consider these differences mainly to be due to cultural norms and socialization. These two approaches are not necessarily contradictory but may operate on different levels. Genetic relatedness and reproductive strategies may serve as ultimate-level explanations, whereas socialization and cultural norms provide mechanisms and variation on the proximate level. The latter can also be seen as a test of whether and how an assumed evolutionarily adaptive behavior actually takes place in a specific society.

In the present study we used parental perceptions of their emotional closeness toward their own parents and their parents-in-law to measure the closeness of these dyadic relations. It is reasonable to assume that the emotional closeness perceived by the recipient (in this case, the parent) will affect gatekeeping and thus the amounts of received grandparental investment, because the recipient can decide whether to accept offered investment.

On the basis of these considerations we formulated our second and third research hypotheses about child care reception. First, from an evolutionary viewpoint, one's own parents should be perceived as emotionally closer than parents-in-law, and thus parents can be predicted to favor their own parents as childminders over their in-laws. Perceived emotional closeness to own parents should not alter the typical pattern of biased grandparental investment (the pattern in which most investment is received from the maternal grandmother, followed by the maternal grandfather, the paternal grandmother, and the paternal grandfather).

> *Hypothesis 2*: Controlling for the emotional closeness reported by parents to their own parents will not alter the overall grandparental investment pattern.

However, if one takes into account the emotional closeness toward both own parents and parents-in-law, the biased grandparental investment pattern can be expected to change, increasing the predicted investment from parents-in-law.

> *Hypothesis 3*: Controlling for emotional closeness reported by parents to their own parents and parents-in-law alters the grandparental investment pattern, increasing the investment from parents-in-law.

Child Care Policy and Intergenerational Support in Finland

The empirical data for this study come from Finland, which is a Nordic welfare state characterized by generous family benefits. Public spending on family benefits (i.e., cash transfers, publicly provided services, and tax spending toward families with children) as a percentage of gross domestic product is in Finland approximately 3.4% above the Organisation for Economic Co-operation and Development (2014) average (2.6%). Also, the coverage of formal child care for parents with small children is above the European average (Saraceno, 2011). Finnish parental leaves extend until the child is around 10 months old. After this, care leaves can then extend until the child turns 3 and are compensated for on a smaller, flat rate basis. As a result, around 30% of children under age 3 and around 75% of 3- to 5-year-old children are enrolled in municipal day care in Finland (Organisation for Economic Co-operation and Development, 2014). The need for more extensive grandchild care is greatest when the children are not enrolled in formal day care, although occasional help is also obviously needed after that. The Finnish state supports families with children in many ways, so there is less need for informal child care compared to countries where formal child care arrangements are scarcer. Thus Nordic grandparents less often provide intense

(e.g., daily) care of grandchildren compared to, for example, grandparents in southern Europe (Hank & Buber, 2009).

Finnish grandparents rarely live in the same household as their grandchildren, act as a guardian for their grandchildren, or possess any legal rights in regard to their grandchildren, but they are nevertheless often seen as part of the family (Paajanen, 2007). In addition to the considerable public support for families with children, the great majority of Finnish grandparents also provide informal child care assistance to their offspring. In the year 2012, approximately 80% of grandparents from the Finnish baby boomer generation (born between 1945 and 1950) reported that they had looked after their grandchildren during the last year (Danielsbacka et al., 2013). The result is in line with previous findings reporting extensive child care provision on the part of grandparents in Nordic welfare states (e.g., Hank & Buber, 2009; Igel & Szydlik, 2011).

Method

The data are from the Generational Transmissions in Finland (Gentrans) project (see http://blogs.helsinki.fi/gentrans). The aim of the Gentrans project is to gather information on two family generations: (a) the Finnish baby boomer generation, born in 1945–1950 ($M = 1947$, $SD = 1.7$ years; the older generation), and (b) their adult children, born in 1962–1993 ($M = 1976$, $SD = 5.6$ years; the younger generation), the older generation being the pivot generation of the study. Statistics Finland conducted two separate representative surveys in Finland (excluding Åland) in spring 2012 via postal mail. Respondents from the younger generation could also answer the questionnaire via the Internet. Only one person per household participated in the study. The younger generation's survey reached 1,753 respondents, and the response rate was 50% (Danielsbacka et al., 2013; see also Tanskanen, Danielsbacka, & Rotkirch, 2014, and Tanskanen & Danielsbacka, 2014, who have used the same data). In this study we used only data from the younger generation because we were interested in their emotions and because of the different structure of the two surveys. The questionnaire for the older generation included only one question concerning a daughter-in-law or a son-in-law, whereas the questionnaire for the younger generation included several questions concerning parents-in-law. Hence, we were able to measure both grandparental investment and perceived emotional closeness between a parent and a grandparent, including in-laws, only in the younger generation data.

According to a nonresponse analysis based on the whole sample ($N = 3{,}495$), the younger generation data were fairly representative, although some groups answered more actively than others. Women had a higher response rate (59%) than did men (40%). The age distribution of respondents corresponded well to that of the whole sample, with the exception of the youngest age group (under age 25), who had a very low response rate (36%). Response rates among respondents with children and childless respondents were fairly similar. Response rates among divorced respondents were lower (43%) compared to those of married respondents (54%). The difference between respondents and nonrespondents was sharpest with respect to educational background: Those with the highest educational level responded more actively (74%) than did those with only a basic level of education (30%), with a linear effect. Also, socioeconomic background mattered, such that students (55%) and those with a higher socioeconomic position (upper clerical worker: 63%, lower clerical worker: 54%) were more active respondents than were entrepreneurs (39%), manual workers (39%), or the unemployed (37%).

To study Hypothesis 1, that parenthood is associated with closer relationship with parents and/or in-laws, we selected only those cases in which the respondent had a partner and had either no child or at least one child with that partner. This left us with 1,216 observations in the sample born in 1962–1990 ($M = 1975$, $SD = 5.1$ years).

The dependent variable in the first analysis was the reported emotional closeness between parent and grandparent (or potential grandparent) reported by the parent. Respondents were asked to report how (emotionally) close they consider their parents and in-laws using a 5-point scale (1 = "very close," 2 = "close," 3 = "not close or distant," 4 = "distant," 5 = "very distant"). The question was asked separately by sex and lineage. Responses were classified into two groups (1 = close and very close, 0 = other) for the analysis because we were interested in the respondents who considered their parents and/or in-laws close. Eighty-four percent of

Table 1. *Descriptive Statistics. Dependent Variable (Child Care), Parent–Grandparent, and Grandparent Variables*

	Women				Men			
Variable	Mother (% or *M*)	Father (% or *M*)	Mother-in-law (% or *M*)	Father-in-law (% or *M*)	Mother (% or *M*)	Father (% or *M*)	Mother-in-law (% or *M*)	Father-in-law (% or *M*)
Received child care (%)								
Never	10.2	28.1	21.8	41.0	14.2	31.3	16.9	29.3
1–6 times	33.2	33.0	39.2	33.8	39.9	38.1	38.4	39.3
7–12 times	16.9	12.3	16.1	11.6	22.6	15.5	19.2	16.1
13–25 times	14.3	12.7	10.2	6.7	9.3	7.7	14.2	9.6
26–50 times	11.8	6.5	7.5	4.9	7.7	5.4	7.3	3.2
More than 50 times	13.6	7.3	5.3	2.0	6.2	2.0	4.0	2.5
Emotional closeness (*M*)[a]	4.3	3.8	3.4	3.0	4.0	3.9	3.4	3.3
Geographical distance (km, mean)	126.8	150.9	260.7	303	117.1	121.9	189.1	198.2
Grandparent's year of birth (mean)	1949	1947	1947	1945	1948	1947	1949	1947
Grandparent's health (%)								
Very good	7.1	5.2	6.9	5.2	3.7	7.2	5.8	7.9
Good	50.0	41.4	43.2	38.1	46.8	36.8	44.3	39.3
Reasonable	32.4	40.5	37.3	41.7	42.7	43.3	37.5	44.1
Poor	8.7	11.1	10.6	12.6	6.5	11.3	11.7	7.1
Very poor	2.2	1.9	2.0	2.4	0.3	1.4	0.7	1.6

Note: Observations in long format data: women $n = 2{,}034$–$2{,}095$; men $n = 1{,}157$–$1{,}202$.

[a]Scale: 1–5.

respondents perceived their mother as close or very close, 72% perceived their father as close or very close, 47% perceived their mother-in-law as close or very close, and 34% perceived their father-in-law as close or very close. The dependent variable was not normally distributed across all parents and in-laws, so analyses with a continuous variable could not have been performed properly, and therefore we used a dichotomized variable. Because sensitivity analyses with a continuous variable produced results similar to those of the analyses with the dichotomized variable, the loss of information may be considered minor.

We used logistic regression to predict whether respondents with a child or children were more likely to report emotional closeness to a particular parent or parent-in-law compared to childless respondents. We visualized the results by calculating the predicted probabilities of emotional closeness by having or not having children based on the logistic regression models.

To study Hypotheses 2 and 3, we selected only respondents whose youngest child was 12 years old or younger at the time of the survey, because child care is rarely provided for older children. This selection left us with 938 parent observations in the sample (of which 65% were mothers, year of birth $M = 1975$, $SD = 4.4$ years, and 35% fathers, year of birth $M = 1974$, $SD = 4.5$ years).

The dependent variable measured the child care received from respondents' parents and in-laws (i.e., grandparents). In the Gentrans survey, respondents reported whether they had received child care help from their parents or in-laws during the past 12 months. The question was asked separately by gender and lineage (i.e., for the mother, father, mother-in-law, and father-in-law). The original 6-point scale (0 = *never* to 5 = *over 50 times*) was classified into two groups (0 = less than 13 times during the last 12 months, 1 = 13 times or more during the last 12 months). The classification was done for two reasons. First, the dependent variable was not normally distributed across all grandparents, so analyses with continuous variable could not be properly conducted; second, the cut-point was selected in order to estimate the prevalence of at least somewhat regular child care provision (at least once a month; see descriptive statistics in Table 1). Almost 40% (39.7%) of women received child care help 13 times or more from their mothers, 26.5% had received it from their fathers, 22.9% had received it from their mothers-in-law, and 13.6% had received it from their fathers-in-law,

whereas 23.2% of men had received child care help 13 times or more from their mothers, 15.2% had received it from their fathers, 25.5% had received it from their mothers-in-law, and 15.4% had received it from their fathers-in-law. In the Nordic countries very intense grandparental child care is rare (Hank & Buber, 2009), and for that reason we could not assess the differences between more intense child minders, especially because we were interested in all grandparental types. Looking after grandchildren at least once a month can be considered moderate help for parents and an indicator of fairly strong investment in a grandchild in Finland. We also conducted sensitivity analyses with a continuous variable and with different cutpoints, which all produced results similar to those of the current analyses. Thus, the results can be considered robust.

The main independent variable was the parent's relation to the grandparent (i.e., parent or in-law). The main control variable measures the closeness of the relationship between parent and grandparent through perceived emotional closeness reported by the parent. The original 5-point scale (1 = *very close* to 5 = *very distant*) was reversed in ascending order for the analysis. Again, the question was asked separately by gender and lineage (i.e., for the mother [$M = 4.2$, $SD = 0.9$], father [$M = 3.8$, $SD = 1.0$], mother-in-law [$M = 3.4$, $SD = 0.9$], and father-in-law [$M = 3.1$, $SD = 0.9$]).

For the analyses concerning Hypotheses 2 and 3, the data were reshaped to a long format, so that the observations are the original respondent's parents and in-laws (i.e., the grandparents), resulting in a total of 3,241 observations (on average, 3.5 parents or in-laws per respondent). Because it is important to examine gender and lineage differences, we conducted separate analyses for women and men (i.e., mothers and fathers) for Hypothesis 3. We used logistic regression to predict child care provision by grandparents, and the results were visualized by calculating the predicted probabilities of child care by kin lineage from the logistic regression models. Because the data are clustered within kin lineages (i.e., data include more than one observation from the same respondent), we used Stata's statistical software cluster option to compute the standard errors.

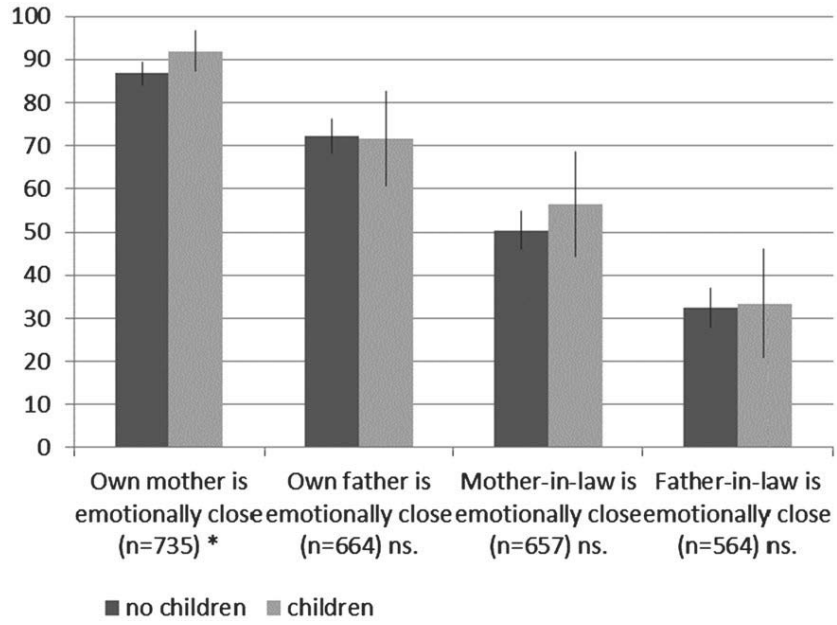
In the adjusted regression models we controlled for several potential confounding variables known to influence grandparental provision of child care (e.g., Uhlenberg & Hammill, 1998; see Tables 1 and 2). These include the geographical distance between parent and grandparent, grandparent's year of birth, grandparent's health (here as observed by the respondent), respondent's marital

Table 2. *Descriptive Statistics: Parent Variables*

Variable	Women (% or *M*)	Men (% or *M*)
Marital status (%)		
Unmarried or divorced	9.1	4.2
Cohabiting or married	90.9	95.8
Year of birth (*M*)	1975	1974
Number of children (*M*)	2.2	2.2
Year of birth of youngest child (*M*)	2007	2007
Work status (%)		
Working	70.2	91.7
Not working	29.8	8.3
Education (%)		
Part of elementary school or less	0	0.3
Elementary school	1.8	3.9
Baccalaureate	4.0	8.2
Vocational school or other vocational degree	17.2	27.9
Vocational college-level training	16.8	13.0
University of applied science or other lower university degree	30.0	21.5
Master's degree	26.7	22.1
Licentiate's or doctoral degree	3.5	3.0

Note: Observations in basic data: $n = 909–938$.

Figure 1. Predictions of Women's Reported Emotional Closeness Toward Their Mother, Father, Mother-In-Law, and Father-In-Law by Having or Not Having a Child/Children (Regression-Based Predicted Probabilities and 95% Confidence Intervals).



Note: Analyses controlled for respondent's year of birth, parents'/in-law's year of birth, and geographical distance. *$p < .05$.

status (unmarried or divorced vs. cohabiting or married), respondent's year of birth, respondent's number of children, year of birth of the respondent's youngest child, respondent's working status (working vs. not working), and respondent's education. Because grandparental socioeconomic status (here as observed by the respondent) did not significantly correlate with the dependent variable (received child care), it was not included in the final models.

Results

Hypothesis 1

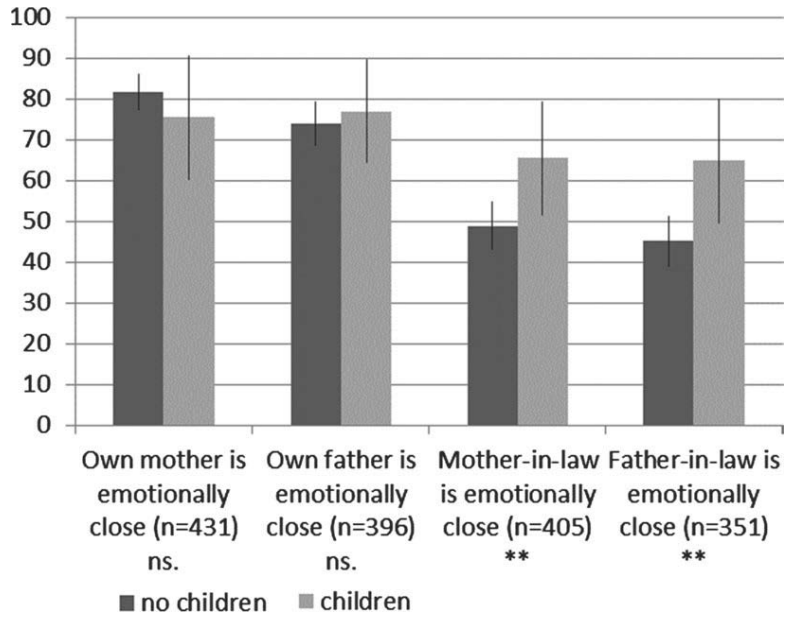
First, we investigated how emotional closeness to one's own parents and parents-in-law differed according to whether a woman or a man was a parent. Women who were mothers were more likely to perceive their own mother as emotionally close compared to childless women (see Figure 1; odds ratio [OR] = 1.76, $p = .022$). No statistically significant difference in emotional closeness was found in the case of the women's own father, mother-in-law, or father-in-law (see Figure 1).

Fathers were significantly more likely to perceive their mother-in-law and father-in-law as emotionally close compared to men with no children (mother-in-law OR = 2.06, $p = .004$; father-in-law OR = 2.40, $p = .002$; see Figure 2). However, there was no statistically significant difference between the emotional closeness toward own parents as reported by childless men and fathers.

Hypothesis 2

Next, we studied whether controlling for the emotional closeness between the respondent and his or her own parents would change the frequency of received child care help, and thus how emotional closeness is associated with the grandparental investment pattern. Three regression models presented in Figure 3 (and Table 3) show mothers' and fathers' predicted probabilities of receiving child care help from their own parents (but not their in-laws). The first model in Figure 3 (and Table 3) shows the unadjusted results, the second model adjusts for all control variables except for emotional closeness, and

Figure 2. Predictions of Men's Reported Emotional Closeness Toward Their Mother, Father, Mother-In-Law, and Father-In-Law by Having or Not Having a Child/Children (Regression-Based Predicted Probabilities and 95% Confidence Intervals).



Note: Analyses controlled for respondent's year of birth, parents'/in-law's year of birth, and geographical distance. $^{**}p < .01$.

the third model adjusts for all control variables, including emotional closeness.

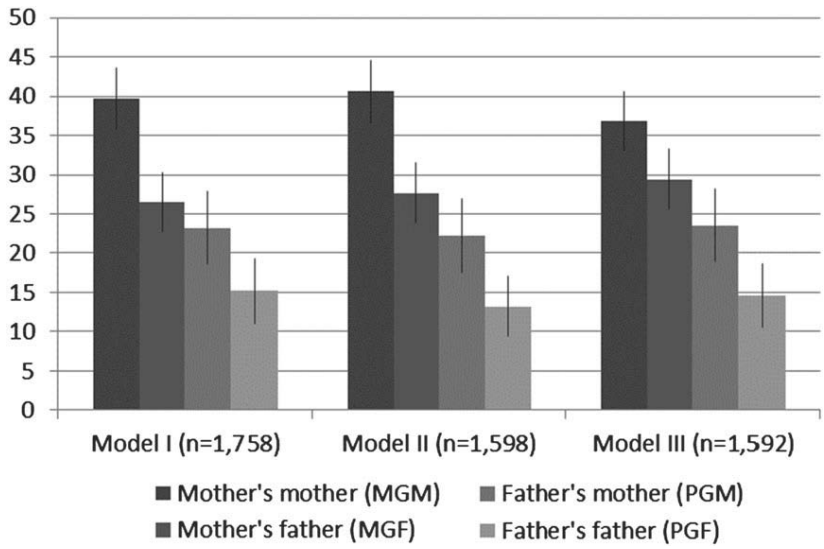
The main results were in line with the typical biased grandparental investment pattern (maternal grandmothers provided the most child care and paternal grandfathers provided the least). Adding the socioeconomic variables to the regression (see Figure 3, Model II, and Table 3, Model 2) did not alter the biased grandparental investment pattern, although the variance explained by the model increased. Controlling for emotional closeness (see Figure 3, Model III, and Table 3, Model 3) slightly reduced the differences between the maternal grandmother and other grandparental types observed in Models I and II but did not alter the main investment pattern. In all three models child care help was most likely to be received from the mother's mother (Models I/II/III: 39%/40%/36%), followed by the mother's father (26%/27%/29%), father's mother (23%/22%/23%), and the father's father (15%/13%/14%). The difference between maternal grandmothers and other grandparents was statistically significant in all models.

Although reported emotional closeness to own parents did not alter the investment patterns, it was positively associated with the probability of receiving child care. The closer the respondent perceived his or her parent the more likely he or she was to receive child care help from that parent (OR = 2.45, $p < .001$; see Table 3, Model 3). In addition to emotional closeness, other variables associated with the probability of receiving grandparental child care were respondent's employment status, grandparent's age, age of the youngest grandchild, and distance between a parent and a grandparent. Respondents were more likely to receive child care help frequently if they were employed, the grandparent was younger, the younger the youngest of their child was, and the closer the grandparent lived from the respondent (see Table 3, Model 3).

Hypothesis 3

Above, we described how we found that the emotional closeness to a parent did not alter the overall bias in grandparental investment in the case of the respondent's own parents.

Figure 3. Predicted Share of Received Child Care Help From One's Own Parents Only for at Least 13 Times During the Past 12 Months (Predicted Probabilities and 95% Confidence Intervals).



Note: Data are from male and female respondents with children age 12 years or younger. Model I shows unadjusted results; Model II adjusts for geographical distance between parent and grandparent, grandparent's year of birth, grandparent's health, respondent's marital status, respondent's year of birth, respondent's number of children, year of birth of the respondent's youngest child, respondent's working status, and education; and Model III adjusts the same variables as in Model II and emotional closeness toward a particular grandparent. ***$p < .001$.

Hypothesis 3 investigated how controlling for emotional closeness affects the investment pattern with respect to both the parents' own parents and parents-in-law (see Figures 4 and 5 and Table 4).

The mother's probability of receiving child care help from each grandparent did not notably change when socioeconomic status and age variables were added to the regression models, although the variance explained by the model increased (see Figure 4, Models I and II, and Table 4, Models 1A and 2A). The maternal grandmother was, as expected, the most frequent child minder (Models I/II: 39%/38%) followed by the maternal grandfather (26%/27%), the paternal grandmother (22%/23%), and the paternal grandfather (13%/14%). However, when the emotional closeness between mother and a particular grandparent was controlled for, the pattern altered (see Figure 4, Model III, and Table 4, Model 3A) so that the predicted probability of receiving grandparental child care no longer differed between maternal grandmothers and paternal grandmothers (OR = 0.96, $p = .815$; maternal grandmother = 29.9% vs. paternal grandmother = 29.2%; see Table 4, Model 3A). This result suggests that one reason for the matrilineal advantage in grandparenting is the mother's closer relationship with her own mother compared to that with her mother-in-law.

Next, we investigated whether the fathers' perceived emotional closeness to their own parents and parents-in-law alters the biased grandparental investment pattern. Contrary to the mothers, there was no significant difference between the likelihood of receiving child care help from a father's own mother and his mother-in-law (ref. category was paternal grandmother: maternal grandmother OR = 1.32, $p = .104$) when adjusting for various socioeconomic and age variables (see Figure 5, Models I and II, and Table 4, Models 1B and 2B). After controlling also for emotional closeness, the role of the mother-in-law was accentuated and that of the father's own mother diminished (see Figure 5, Model III, and Table 4, Model 3B). Now the overall pattern for fathers resembled the typical grandparental investment pattern, so that the maternal grandmother was most likely to provide child care help (31.4%), followed

Table 3. *Odds Ratios for Both Sexes From Three Logistic Regression Models (Received Child Care Help More Than 13 Times in the Past 12 Months and Emotional Closeness to One's Own Parents Only)*

Predictor	Model 1 ($n = 1{,}758$)	Model 2 ($n = 1{,}598$)	Model 3 ($n = 1{,}592$)
Maternal grandmother (ref.)	1	1	1
Maternal grandfather	0.55***	0.51***	0.65***
Paternal grandmother	0.46***	0.36***	0.45***
Paternal grandfather	0.27***	0.18***	0.22***
Respondent's year of birth		1	0.99
Respondent's work status			
Working (ref.)		1	1
Not working		0.53**	0.57*
Respondent's marital status			
Unmarried (ref.)		1	1
Cohabitation or married		0.92	0.79
Respondent's education		1.05	1.06
Year of birth of respondent's youngest child		1.15***	1.14***
Number of children		1.11	1.15
Respondent's distance to a parent		0.99***	0.99***
Parent's year of birth		0.93**	0.93**
Parent's health		0.85	0.94
Reported emotional closeness toward a parent			2.45***
Goodness of fit			
−2 log likelihood	2,028.528	1,615.127	1,505.282
Nagelkerke R^2	.055	.239	.315

Note: Data include respondents with children age 12 years or younger. ref. = reference category.
*$p < .05$. **$p < .01$. ***$p < .001$.

by the maternal grandfather (21.6%), paternal grandmother (20.1%), and paternal grandfather (13.3%). The difference between grandmothers was statistically significant (ref. category was paternal grandmother: maternal grandmother OR = 2.03, $p < .001$, see Table 4, Model 3B).

Discussion

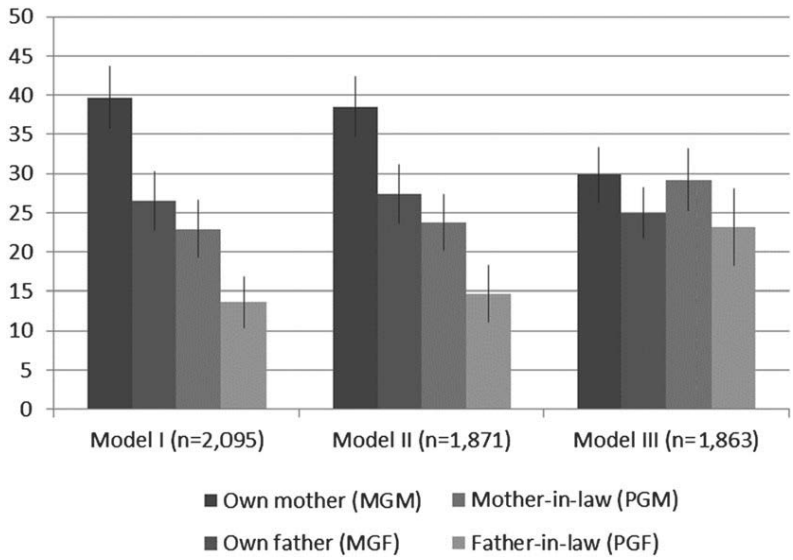
Combining and testing proximate and ultimate explanations from family and evolutionary sociology can strengthen our understanding of intergenerational relations. This study has shown one way of integrating evolutionary (or ultimate) assumptions of genetic relatedness and reproductive interests with sociological (proximate) explanations of emotional closeness and helping behavior. We wanted to combine and test assumptions from evolutionary research and family sociology in relation to grandparental involvement and intergenerational relations, and especially the role of parents as gatekeepers in grandparenting, using data from the Finnish Gentrans survey.

Our first prediction was that, compared to childless individuals, parents would report a closer relationship to their own parents and parents-in-law because of the shared reproductive interest that the small child represents (Hughes, 1988). This hypothesis was supported only partially.

Having children in contemporary Finland appears to bring both spouses closer to the woman's parents, especially her mother. This result is in line with previous studies of how the maternal grandmother is usually the most involved grandparent of all four grandparental types (e.g., Danielsbacka et al., 2011; Pollet et al., 2006, 2007). It also corresponds to Fischer's (1983) finding that the relationship quality between the daughter and the mother improves when the grandchild arrives.

From the evolutionary standpoint, however, this result suggests a modification of the general hypothesis. Parental emotions do not straightforwardly follow Hughes's (1988) predictions of shared reproductive interests

Figure 4. Mothers' Predicted Share of Received Child Care Help for at Least 13 Times During the Past 12 Months (Predicted Probabilities and 95% Confidence Intervals).



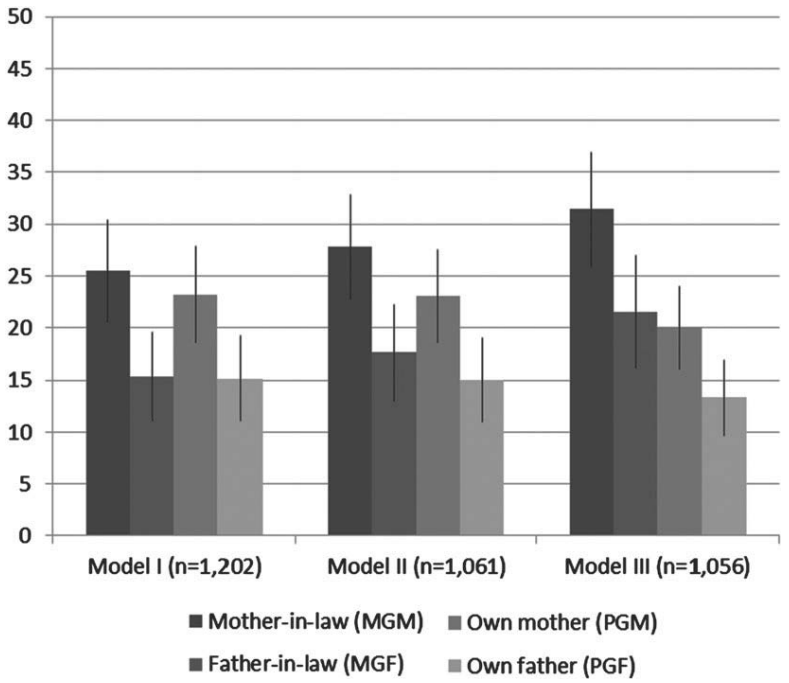
Note: Data are from women with children age 12 years or younger. Model I shows unadjusted results; Model II adjusts geographical distance between parent and grandparent, grandparent's year of birth, grandparent's health, respondent's marital status, respondent's year of birth, number of children, year of birth of the respondent's youngest child, and respondent's working status and education; and Model III adjusts the same variables as in Model II and emotional closeness toward a particular grandparent (both one's own parents and in-laws). ref. = reference category. $*p < .05$. $**p < .01$. $***p < .001$.

based on genetic relatedness, whether direct (biological) or inverse (through children). Instead, shared reproductive interests between biological kin and affines may increase emotional bonding with those kin whom parents perceive to be most beneficial for the well-being of their children. If the maternal grandmother is highly important for the child, it follows that the father should grow close to her. At the same time, it is true that if maternal grandmothers are most involved in grandchild care, both the mother and the father see more of her and grow to like her more irrespective of genetic relatedness or reproductive interest. To discern between these two explanations, one ultimate (closeness to those of highest benefit to the child) and one proximate (closeness due to time spent together), one would need more detailed data about contacts between relatives before and after having a child than was available in this survey.

Given the cross-sectional nature of our data, we cannot claim causality. It is possible, for instance, that young adults who perceive the relationship to their own parents as closer become more likely to have a first child (cf. Waynforth, 2012), although this would not explain why men who have children reported being closer to their parents-in-law but not to their own parents. The topic could be investigated using longitudinal data to see whether emotional closeness to one's own parents and in-laws differs within the same person before and after the transition to parenthood.

Our second focus was on the associations between grandparental investment, genetic relatedness, and the emotional closeness of the parent–grandparent relationship. First, we predicted and found that controlling for the emotional closeness reported by parents to their own parents would not change the general grandparental investment pattern as measured by child care (Hypothesis 2). This indicates that biased grandparenting is not fully explained by emotional closeness: The maternal grandmother helped most irrespective of her closeness to her adult daughter. The "kinship premium" detected for the willingness to be altruistic (Curry et al., 2013) appears to hold for grandparental child care from own parents as well.

Figure 5. Fathers' Predicted Share of Received Child Care Help for at Least 13 Times During Last 12 Months (Predicted Probabilities and 95% Confidence Intervals).



Note: Data are from men with children age 12 years or younger. Model I shows unadjusted results; Model II adjusts for geographical distance between parent and grandparent, grandparent's year of birth, grandparent's health, respondent's marital status, respondent's year of birth, number of children, year of birth of the respondent's youngest child, and respondent's working status and education; and Model III adjusts the same variables as in Model II and emotional closeness toward a particular grandparent (both one's own parents and in-laws). ref. = reference category. $^{**}p < .01$. $^{***}p < .001$.

However, the intergenerational dynamics became more complicated once we include in-laws. We expected and found that the parent's perceived emotional closeness to his or her own parents and parents-in-law would change the grandparental investment pattern (Hypothesis 3). These results are in line with a previous study by Chan and Elder (2000), whose data from grandchildren in rural Iowa showed that the matrilineal advantage in grandchild–grandparent relations reflects lineage, not kin, differentials in intergenerational relations. Mothers and fathers were both closer to their own parents than to their parents-in-law. Despite this, matrilineal biases in parent–grandparent relations were stronger than patrilineal biases, which resulted in an overall matrilineal bias. Chan and Elder (2000) concluded that "matrilineal bias in parent–grandparent ties explains a large portion of matrilineal advantage in grandchild–grandparent relations" (p. 187), which also seems to hold for our data of contemporary Finns. The authors explained their result through the kin-keeping role of mothers in the middle generation. According to them, the matrilineal advantage in grandparent–grandchild relationship is mainly due to the quality of the relationship between mothers and their parents and parents-in-law. However, as we have shown here, matrilineal bias is due not only to perceived emotional closeness. If kin-keeping can be assumed to enhance emotional closeness and that would be the main reason for matrilineal bias in intergenerational relations, then controlling for emotional closeness should remove differences between grandparents altogether, which was not the case in our study.

Our study contributes to the intriguing question of how much grandparenting is shaped by

Table 4. *Odds Ratios for Fathers and Mothers From Six Logistic Regression Models (Received Child Care Help More Than 13 Times in the Past 12 Months and Emotional Closeness to Both One's Own Parents and In-Laws)*

	Women			Men		
Predictor	Model 1A ($n = 2,095$)	Model 2B ($n = 1,871$)	Model 3A ($n = 1,863$)	Model 1B ($n = 1,202$)	Model 2B ($n = 1,061$)	Model 3B ($n = 1,056$)
Own mother (ref.)	1	1	1	1	1	1
Own father	0.55***	0.56***	0.73**	0.59***	0.56***	0.58***
Mother-in-law	0.45***	0.45***	0.96	1.13	1.32	2.03***
Father-in-law	0.24***	0.23***	0.65*	0.60**	0.69	1.11
Respondent's year of birth		1.04	1.03		0.99	0.98
Respondent's work status						
Working (ref.)		1	1		1	1
Not working		0.52***	0.58**		1.1	1.2
Respondent's marital status						
Unmarried (ref.)		1	1		1	1
Cohabitation or married		0.99	0.8		2.12	1.91
Respondent's education		1.08	1.12		0.93	0.94
Year of birth of respondent's youngest child		1.10**	1.09**		1.15***	1.14***
Number of children		1.07	1.08		1.08	1.14
Respondent's distance to a parent/parent-in-law		0.99***	0.99***		0.995*	0.995*
Parent's/parent's-in-law year of birth		0.98	0.98		0.98	0.98
Parent's/parent's-in-law health		0.77**	0.84*		0.71**	0.79
Reported emotional closeness toward a parent/parent-in-law			2.52***			1.98***
Goodness of fit						
−2 log likelihood	2,331.393	1,881.164	1,738.701	1,185.79	974.446	936.334
Nagelkerke R^2	.065	.221	.307	.021	.162	.209

Note: Data include respondents with children age 12 years or younger. ref. = reference category.
*$p < .05$. **$p < .01$. ***$p < .001$.

the gatekeeping role of the middle generation. Emotions shape helping behavior, probably both among care providers (grandparents) and the recipients and gatekeepers (parents). The evolutionary reason for preferring one grandparent over others may be that parents assess the trustworthiness and motivation of a child minder. One cue for the reliability of a child minder is the shared reproductive interest between a parent and a grandparent, a cue that would favor maternal grandparents because of both reasons, genetic relatedness and species-typical child care, as discussed at the outset of this article. Social and cultural expectations also shape expectations of care provision and quality. For instance, parents can expect to encounter fewer conflicts over childrearing practices with their own biological kin, because ways of disciplining children transmit across family generations (Covell, Grusec, & King, 1995). Because of the prominent cultural role of the maternal grandmother, social expectations may work against paternal grandparents, who, according to one study, expect to be less involved as grandparents than maternal grandparents do already prior to the birth of the grandchild (e.g., Somary & Stricker, 1998).

The emotional closeness toward an in-law was strongly associated with the likelihood of him or her looking after a grandchild. This result has practical implications, especially in situations of parental divorce. During and after parental separation, grandparents are especially important for the well-being of grandchildren (e.g., Attar-Schwartz et al., 2009), and maintaining friendly relations with the custodial parent, who is usually the mother, increases the grandparents' likelihood of maintaining contact with their grandchildren (Doyle, O'Dywer, & Timonen, 2010). This suggests that efforts within, for instance, social work could pay more attention to supporting the bonds between in-laws.

Our study described intergenerational relations in contemporary Finland, a Nordic

welfare state where parents can use long parental leaves and municipal child care, so that grandparents typically help with child care on a nonregular basis (Danielsbacka et al., 2013). In this society, grandparental care is perceived not as an obligation but a free choice, and most children have several grandparents investing some amount in them. Parents are thus quite free to choose which kin and grandparents with whom to interact, because intergenerational relations are not guided by legal or strong social norms or harsh logistic requirements. This results in the familiar pattern, dominant throughout contemporary Europe, in which the maternal grandmother is the most involved grandparent (Danielsbacka et al., 2011).

Among the limitations of our study is the narrowness of the main measurement, emotional closeness, which does not fully reflect the conflicts that may also occur in family relations as a consequence of having a child. Future studies should investigate conflicts in parent–grandparent relations and how these are affected by having a (grand)child. It would be also interesting to know how conflicting relations affect both parental gatekeeping and grandparental investment behavior. Another limitation concerns the survey data, from which some grandparent characteristics (e.g., employment status or marital status) were unavailable, although they can be assumed to affect grandparental helping.

Genetic relatedness and reproductive interests provide a general frame for predicting intergenerational relations; however, evolutionary theory alone cannot predict more specifically how family relations will materialize in a given social and cultural context. Studying actual patterns of emotional closeness between family members is thus crucial in order to test and refine the building of hypotheses on both the macro and meso theoretical levels. Future studies are also needed to investigate kin investment both from the providers' and from the recipients' viewpoint. By acknowledging both ultimate and proximate explanations and the fact that investments have to be both offered and accepted, we gain a fuller picture of the complexity and dynamics of extended family relations.

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III

Parenthood and in-law conflict in contemporary Finland

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Abstract

Conflicts with in-laws are a common feature of human family life, yet this phenomenon has been little studied in industrialised societies. Here we use survey data of contemporary Finns (*n*=1,202) to investigate how parenthood is associated with the likelihood of conflicts with parents and parents-in-law. Based on inclusive fitness and inverse relatedness theory, we hypothesized that (i) spouses would be less likely to report conflicts with their own parents than with their parents-in-law and (ii) conflict-proneness with own and affinal parents would be more similar among couples who had children compared to childless couples. Support was found for the second but not the first hypothesis. Overall, spouses reported more conflicts with their own parents than with their in-laws. Compared to childless spouses, spouses with children had a higher likelihood of conflicts with their parents-in-law, but a similar likelihood of conflicts with their own parents. Having more frequent contact increased the likelihood of conflicts, but our main results remained also after taking contact frequencies into account. Paternal grandmothers who provided more grandchild care had more conflicts with their daughters-in-law. We conclude that the inverse relatedness created through a grandchild appears to render affinal relations more akin to consanguineal relations in contemporary Finland.

Key words: Affinal kin, conflicts, cross-generational relations, grandchild care, grandparents, inclusive fitness, in-laws, inverse relatedness, mother-in-law, parents

Introduction

Across societies, grandparents are involved in the lives of their adult children and grandchildren (Sear and Coall, 2011; Sear and Mace, 2008). These cross-generational contacts include extensive and various forms of help and support as well as tensions and conflicts (Lüscher, 2002; Lüscher and Pillemer, 1998; Pillemer et al., 2007; Strassmann and Garrard, 2011). The care provided by grandparents often constitutes significant help to parents of young children, but may also be a source of conflicts when grandparents are perceived as intruding too much in the life of the young family, or on the contrary as not providing enough help. Conflicts with mothers-in-law are the subject of many anecdotes and proverbs across cultures, yet to date only a few studies have investigated how parenthood affects relationships with in-laws in contemporary societies (Danielsbacka et al., 2015; Rossi and Rossi, 1990) and conflicts between these two generations have been even less explored (but see Fischer, 1983). Here, we are interested in how parenthood is associated with the occurrence of cross-generational conflicts between affinal and consanguineal kin.

Humans are cooperative breeders, so that both mother and father and their respective kin may bond with a child and invest in rearing it (Hrdy, 1999; 2009). Evolutionary theory makes several predictions about the forms of kin altruism and conflict arising from this complex constellation of two sexes, two lineages and three generations. Below, we outline the two main theories on how conflict proneness with different kin is expected to differ and how this may be associated with parenthood.

Typically, cross-generational relationships are accounted for by two reproductively relevant variables: sex-specific reproductive strategy and genetic relatedness (Euler, 2011; Euler, Hoier, and Rohde, 2009; Euler and Michalski, 2007). Sex-specific reproductive strategy relates to sex differences in parental and, by extension, grandparental investment. In humans, the child's mother typically invests most in reproduction, so that the mother and her kin become especially important for child survival and well-being (Leonetti et al., 2007). Genetic relatedness constitutes the core of Hamilton's (1964) inclusive fitness theory, which predicts that natural selection should favour investment in close kin. Other factors being equal, individuals will invest more in their close relatives than in less closely related or unrelated individuals.

In the case of humans, inclusive fitness theory implies a closer relationship (e.g., more emotional closeness and altruistic helping) towards an individual's genetic kin, compared to affinal kin or non-kin. Previous studies of extended families in contemporary developed societies have found support for the assumption, showing that individuals often feel emotionally closer (e.g., Danielsbacka et al., 2015; Euler et al., 2001; Waynforth, 2011; Willson et al., 2003) and have more feelings of obligation (Rossi and Rossi, 1990) to their own parents compared to their in-laws. People also provide more assistance to their close kin compared with distant kin or non-kin (Salmon and Shackelford, 2011) and expect fewer expressions of gratitude in return (Rotkirch et al., 2014). The propensity to greater altruism towards kin remains after taking into account the higher emotional closeness usually felt towards closer kin (Korchmaros and Kenny, 2001), creating the so-called "kin bonus" in helping behaviour (Burton-Chellew and Dunbar, 2011; Danielsbacka et al., 2015).

Kin altruism as predicted by inclusive fitness theory is also often combined with kin competition, the severity of which may reduce or overrun the tendencies to altruistic helping among kin (Griffin and West 2002; Mace, 2013; Tanskanen et al., 2016). Inclusive fitness theory has been interpreted as predicting less competition and fewer conflicts with close genetic kin compared to more distant kin or non-kin (Salmon and Hehman, 2014). Confirming this prediction, Euler and colleagues (2001) found that the overall relationship quality between parent and grandparent observed and reported by the youngest generation (the grandchild generation) was better among biological kin than among in-laws. For the topic investigated here, the hypothesis derived from inclusive fitness theory predicts more conflicts with parents-in-law than with consanguineal parents. To our knowledge, no studies have yet compared the conflict proneness of spouses towards their own parents and their parents-in-law.

Inclusive fitness theory has been expanded and modified in several ways. Among them, the concept of inverse relatedness as formulated by Hughes (1988) is crucial for investigating in-law relations. Hughes (1988) theory of affinal kin argued that in-laws, who are usually not closely genetically related, become "inversely" genetically related to each other through common descendants. Affinal kin are related through their common offspring, not common ancestors. This should render the relationship an adult child has with his or her parents-in-law more akin to the relationship with his or her own parents, especially if the third generation that creates the inverse genetic

relatedness with in-laws already exists. Burton-Chellew and Dunbar (2011) found empirical support for Hughes' hypothesis in a contemporary Belgian population, in which the relationship between contact frequencies and emotional closeness was similar for in-laws and biological kin, but differed with regards to non-kin friends. Moreover, Danielsbacka et al. (2015) showed that Finnish fathers were emotionally closer to their parents-in-law compared to childless men in couples. However, the hypothesis of inverse relatedness has not been investigated with regards to conflicts among adult family generations and comparing couples with and without children. Based on Hughes' hypothesis of the similarity of genetic and affinal relationships and its dependence on common descendants, the relationship towards one's own parents and parents-in-law is predicted to be more similar among couples who have children compared to those who do not.

This study investigates how parenthood is associated with cross-generational conflict proneness between affinal and consanguineal or genetic kin. Previously, in-law conflicts have been mainly studied in historical and traditional societies. These studies have often investigated the association between the presence of mothers-in-law and child survival or well-being (e.g., Chan et al., 2008; Lahdenperä et al., 2012; Leonetti et al., 2007; Mace 2013; Voland and Beise, 2005). We expand the field by studying conflicts in a contemporary society and by including fathers-in-law. Taking into account gender, there are eight possible relationship dyads among child/parent and child/parent-in-law (Euler, 2011). Using survey data of younger adults from contemporary Finland, we compare couples with and without children and ask how parenthood is associated with the likelihood of reported conflicts in each of the eight dyads. Based on the theoretical framework outlined above, we have two research hypotheses. First, inclusive fitness theory (Hamilton, 1964) indicates that, while genetically closer kin are expected to be emotionally closer, more severe conflicts will occur with genetically more distant individuals. Thus our first hypothesis predicts that:

Hypothesis 1 (H1): Adult children are more likely to have conflicts with their parents-in-law than with their own parents.

Second, because affinal kin become "inversely" genetically related only after the advent of a third generation (Hughes, 1988), we expect that having (grand)children should be associated with in-law relations, so that they would be more like the relations between

genetic kin. The expected direction of the association is dependent on whether adult children have more or fewer conflicts with their own parents than with parents-in-law in the first place. Thus, if H1 holds we assume that:

Hypothesis 2a (H2a): Parents are less likely to have conflicts with their parents-in-law compared to childless couples and the difference between conflict proneness by kin type is reduced.

If H1 does not hold we assume the contrary:

Hypothesis 2b (H2b): Parents have more conflicts with their parents-in-law compared to childless couples and the difference between conflict proneness by kin type is reduced.

Data and methods

This study uses survey data from the Generational Transmissions project in Finland (Gentrans). The aim of Gentrans is to gather information on two family generations: the Finnish baby boomer generation born between 1945–1950 (M=1947, SD=1.67) (referred to as the older generation) and their adult children born between 1962–1993 (M=1976, SD=5.6) (the younger generation); the older generation is the pivot generation of the study. Statistics Finland collected two separate representative surveys in Finland (excluding the Åland islands) for the Gentrans project in spring 2012 via postal mail. Respondents from the younger generation could also respond to the questionnaire via the Internet. Only one person per household participated in the survey. This study uses only data from the younger generation, because the older generation data does not include information concerning in-law relations. The younger generation's survey reached 1,753 respondents and the response rate was 50% (see also Tanskanen et al., 2014; Tanskanen and Danielsbacka, 2014, and Danielsbacka et al., 2015 who used the same data).

Contemporary Finland is a wealthy country characterised by high gender equity, dual breadwinner families and extensive welfare state support to families (Kangas and Kvist, 2013). The median age at first birth is 28.5 for women and individuals who become parents typically have two or three children (Official Statistics of Finland, 2015).

Subsidized parental and care leaves are available until the child is 1–3 years old, after which children usually enter municipal day care. A Finnish child born today has on average three grandparents alive (Official Statistics of Finland, 2012). Grandparental support can be described as extensive, so that several grandparents are present in the grandchild's life, but none of them to a very high degree, due to the availability of institutionalised day care (Danielsbacka et al., 2013); such extensive but "light" grandparenting is common for families in the Nordic welfare states (Hank and Buber, 2009; Igel and Szydlik, 2011).

To study conflicts with own parents and in-laws, we selected only those respondents who had a partner. This left us with 1,202 observations (women=62.6%, men=37.4%) in the sample born between 1962–1990 (M=1975, SD=5.1). Respondents had on average 3.6 parents or parents-in-law alive. For every analysis (within every dyad) we have selected only those respondents who had the concerned relative alive. For the analysis concerning Hypothesis 1, the data was reshaped to a long format, so that the observations were the original respondent's parents and parents-in-law.

The dependent variable measures the frequencies of reported conflict between a respondent and his/her parent or in-law. The question was asked as follows: "Disagreements between close people can lead to conflicts. Have you had conflicts with him/her? How often?" and the response alternatives were: 1=Never, 2=Rarely, 3=Occasionally and 4=Often. The question was asked separately by kin sex and lineage. We coded the variable into two categories 0=No conflicts, 1=Conflicts. Sensitivity analyses with different cut points and a continuous variable produced results similar to the analyses using the binary variable, so that the results presented here may be considered robust. We also tested the results by fitting the regression models with ordered logistic regression that takes into account ordered categories (0=No conflicts, 1=Rarely, 2=Occasionally or often) without equal spacing between the categories ('ologit' command in Stata 13.1; see Liu, 2009). This modelling did not considerably alter the results compared to the binary analysis (results based on ordered logistic regression models are presented in the appendices Table A.1, Table A.2 and Table A.3).

The main independent variable in the second stage of the analysis (Hypotheses 2a and 2b) measures whether or not the respondent had children. For the analyses, the data was split according to the eight adult child/parent and adult child/parent-in-law dyads.

Logistic regression was used to predict the likelihood of conflicts. The results are illustrated by calculating the predicted probabilities of conflicts by kin lineage from the logistic regression models of conflicts by parenthood status. Because in the first analysis (Hypothesis 1) the data are clustered within kin lineages (i.e., the data may include more than one observation from the same respondent), we used Stata's statistical software cluster option to compute the standard errors. This method takes into account the non-independence of answers reported by the same respondent.

In the analyses we have controlled for several potentially confounding variables known to affect the relations between parents of young children and their in-laws (Danielsbacka et al., 2015; Willson et al., 2003). These variables include respondents' age, education and health, geographical distance between respondent and parent/in-law, contact frequency with parent/in-law (0="never", 1="less than once a month", 2="about 1–3 times a month", 3="once a week", 4="several times a week"), age of the parent/in-law, and parent's/in-law's health as reported by the respondent (see Table 1 and 2 for descriptive statistics).

Table 1. Descriptive statistics: Respondent characteristics (%/mean)

	Women %/mean n=752	Men %/mean n=450
Has children		
No (%)	23.5	31.0
Yes (%)	76.5	69.0
Year of birth, mean	1975.3	1975.1
Education		
Elementary school or less (%)	1.9	4.0
Baccalaureate (%)	4.8	9.6
Vocational school or other vocational degree (%)	15.2	25.3
Vocational college-level training (%)	16.1	12.2
University of applied science or other lower university degree (%)	31.7	23.8
Master's degree (%)	27.0	22.0
Licentiate or doctoral degree (%)	3.5	3.1
Respondent's health		
Very good (%)	28.6	28.7
Good (%)	61.0	55.1
Reasonable (%)	10.0	14.9
Poor (%)	0.4	1.3

Table 2. Descriptive statistics: Reported conflicts between own parents and parents-in-law and other parent and parent-in-law variables (%/mean): Dyadic analyses include only respondents with the relative in question alive

	Women				Men			
	Mother %/mean n=716	Father %/mean n=639	Mother-in-law %/mean n=632	Father-in-law %/mean n=540	Mother %/mean n=421	Father %/mean n=386	Mother-in-law %/mean n=385	Father-in-law %/mean n=330
Have had conflicts								
Never (%)	15.5	24.6	47.8	59.6	19.2	17.1	56.6	66.1
Rarely (%)	55.0	53.1	37.7	30.4	62.2	62.2	33.0	28.2
Occasionally (%)	23.7	19.1	11.7	7.8	15.9	17.4	8.8	4.9
Often (%)	5.7	3.3	2.9	2.4	2.6	3.4	1.6	0.9
Parent's/in-law's year of birth, mean	1948.5	1946.9	1947.1	1945.3	1948.4	1946.5	1949.5	1948.2
Geographical distance (km), mean	133.1	154.1	215	239.8	145.8	153.3	229.2	225.7
Contact frequency, mean	3.3	2.6	2.3	2	2.8	2.7	2.2	2
Parent's/in-law's health (%)								
Very good	7.2	4.7	7.2	4.1	4.3	6.2	6.2	7.6
Good	48.5	43.8	45.5	39.0	47.9	37.0	47.3	40.5
Reasonable	35.1	39.8	33.5	40.1	40.3	44.7	34.6	41.1
Poor	7.4	10.3	11.0	13.3	6.4	10.3	10.3	8.8
Very poor	1.8	1.6	2.7	3.5	1.2	1.8	1.6	2.1

Results

First, we studied with which kin respondents were most likely to report conflicts (Hypothesis 1). We assumed that conflict-proneness would be higher with in-laws than with consanguineal parents. The hypothesis was not supported. Figure 1 illustrates the predicted probabilities to report conflicts with parents or parents-in-law separately for women and men. Both women and men were more likely to report having had any conflicts with their own parents than with their in-laws. Predicted probabilities for conflicts were, for women: own mother=84% (ref.), own father=76%; OR=0.57; p < .001; 95% confidence intervals (CIs) lower-upper 0.45–0.72; mother-in-law=52%; OR=0.20; p < .001; CIs 0.15-0.26 and father-in-law=40%; OR=0.12; p < .001; CIs 0.09–0.16. For men the results were as follows: own mother=79% (ref.); own father=82%; OR=1.20; p=.226; CIs 0.90–1.62; mother-in-law=45%; OR=0.20; p < .001; CIs 0.15–0.28 and father-in-law=36%; OR=0.14; p < .001; CIs o.10–0.19.

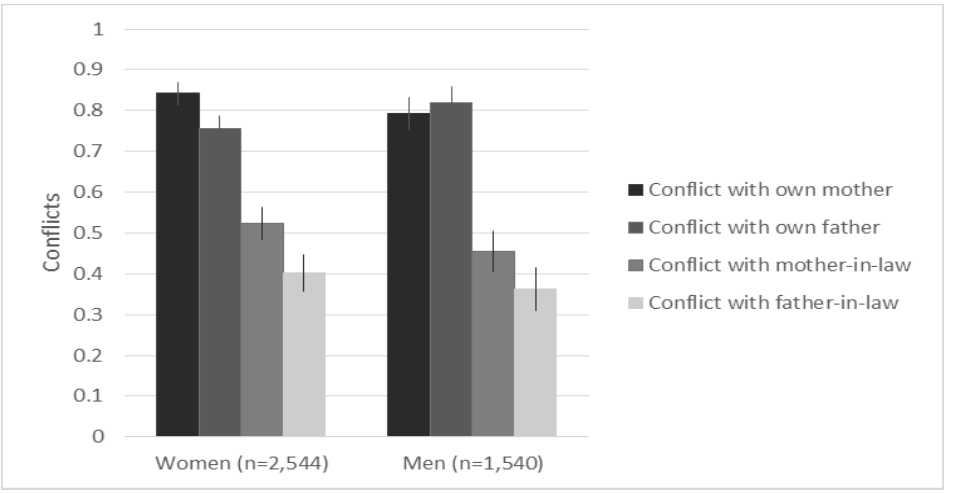

Figure 1. Women's and men's reported conflicts between self and mother, father, mother-in-law and father-in-law (regression-based predicted probabilities and 95% confidence intervals): Adjusted variables: age, education, and health of the respondent, whether or not the respondent has children, age of the parent/in-law, geographical distance, contacts with parent/in-law, and health of parent/in-law.

Next, we investigated the association between parenthood and the likelihood of reporting any conflicts with multivariate regressions, controlling for other factors and separately for women and men. We assumed that having a child would be associated with similar levels of conflicts reported with a person's own parents and with parents-in-law. Because Hypothesis 1 was not supported and people reported more conflicts with consanguineal than with affinal parents, we investigated Hypothesis 2b, that parents would report more conflicts with in-laws. Figure 2 illustrates women's predicted probability to report conflicts in their relations with their parents or in-laws depending on parenthood status. Parenthood was not associated with women's probability to report conflicts with their own parents, but was significantly associated with the likelihood for conflicts with their mothers-in-law and fathers-in-law. The predicted probability for conflicts was in the case of mother-in-law: no children=32% vs. children=59%, OR=3.04; $p < .001$; 95% CIs 1.99–4.65 and in the case of father-in-law: no children=31% vs. children=43%, OR=1.75; $p=.017$; 95% CIs 1.10–2.78. Among mothers, more conflicts were reported with the mother-in-law than with the father-in-law, but among childless women there was no difference in conflict proneness between mother- and father-in-law. Thus, hypothesis 2b was supported among women, so that parenthood

was associated with more conflicts with in-laws, resulting in a smaller difference between conflict proneness by kin type.

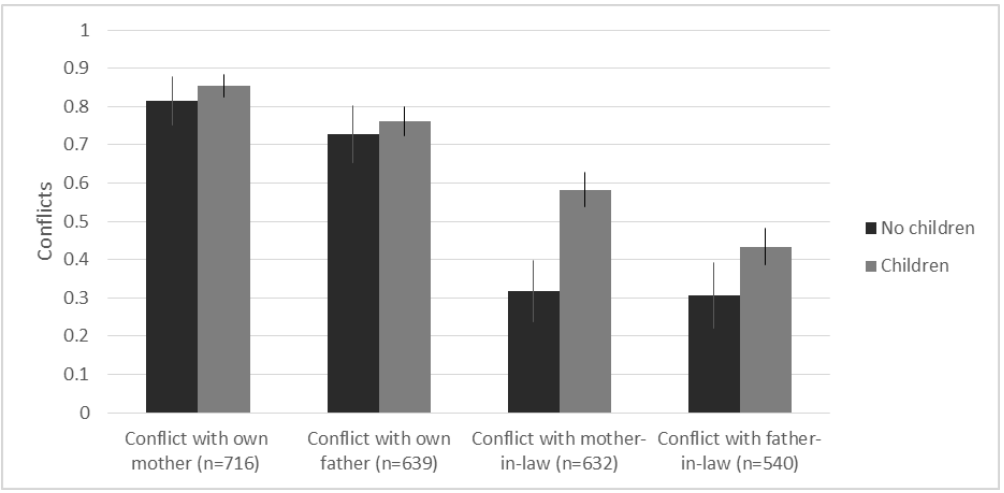

Figure 2: Women's reported conflicts between self and mother, father, mother-in-law and father-in-law by having or not having a child/children (regression-based predicted probabilities and 95% confidence intervals): Adjusted variables: age, education, and health of the respondent, age of the parent/in-law, geographical distance, contacts with parent/in-law, and health of parent/in-law.

Figure 3 shows men's predicted probability to report conflicts in the relationship with their parents or in-laws, depending on whether or not they had children. Parenthood was not associated with men's probability for conflicts with their own parents, but was significantly associated with the likelihood for conflicts with their mothers-in-law (no children=30% vs. children=49%, OR=2.29; *p*=.002; 95% CIs 1.37–3.82) and with fathers-in-law, although the latter difference was only marginally significant (no children=26% vs. children=37%, OR=1.77; *p*=.058; 95% CIs 0.98–3.20). As among women, fathers reported more conflicts with their mother-in-law compared to their father-in-law, while among childless men there was no difference in conflict proneness with mother-in-law and father-in-law. Thus hypothesis 2b was supported also among men.

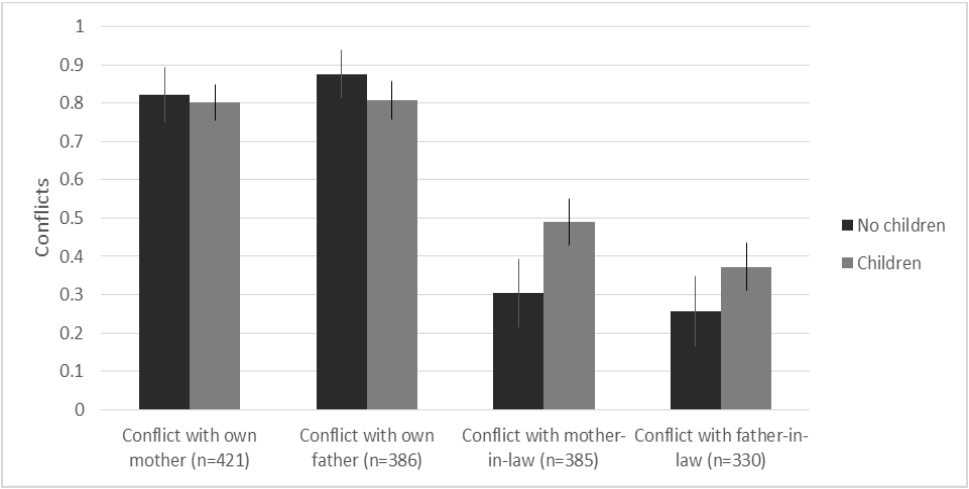

Figure 3: Men's reported conflicts between self and mother, father, mother-in-law and father-in-law by having or not having a child/children (regression-based predicted probabilities and 95% confidence intervals): Adjusted: age of the respondent, education, health, age of the parent/in-law, geographical distance, contacts with parent/in-law, and parent's/in-law's health

To see whether our results depended on how often the parties met each other, we have controlled for contact frequency in the respective dyad in the models presented in Figures 1–3. After controlling for other factors, contact frequencies were in some cases significantly associated with the likelihood for reporting conflicts with parents and parents-in-law. The associations were statistically significant for men (Figure 1: OR=1.24; $p < .003$; 95% CIs 1.08–1.43), although this association disappeared in ordered logistic regression models meaning it concerned only having any conflicts at all and it did not concern the association between having more conflicts and more contacts (see Appendix, Table 1), in all dyadic models involving fathers-in-law (Figure 2: women: OR=1.31; p=.002; 95% CIs 1.10–1.56, Figure 3: men: OR=1.40; p=.007; 95% CIs 1.10–1.77) and for the daughter-mother dyad in the ordered logistic models (in which case the association was negative, so that higher contacts indicated lower conflict proneness see Appendix, Table 2). However, taking into account contact frequencies did not alter the main associations between parenthood and reported conflicts in any regression models.

We also investigated one possible reason for the higher number of conflicts between couples with children and the grandparental generation: the provision of child care. If grandparents participated in child care, interactions with the child's family increased, potentially also increasing sources of tensions and conflict. We analysed whether the amount of reported received child care from grandparents was related to the likelihood of conflicts. These analyses employed the same variables as in the previous analyses, with the addition of the age of the youngest child of the respondent and the number of grandparents of the child. Grandchild age and the number of other potential providers of grandparental care may both be associated with the amount of child care provided by a particular grandparent. Ordered logistic regression analyses which included only parent respondents (n=886) showed a significant association between reported conflicts and child care for the daughter-in-law/mother-in-law dyad. The more a daughter-in-law received child care help from her mother-in-law, the more likely she was to report frequent conflicts with her (see Tables 3 and 4). As we did the analyses with binary logistic models, the same association was marginally significant (OR=1.18; *p*=.059; 95% CIs 0.99–1.40) (result not shown in the Tables) indicating that for women receiving child care from mothers-in-law may not only add the number of conflicts, but also their occurrence at all.

Table 3. Women's conflicts with parent/parent-in-law by child care received and control variables: ordered logistic regression analyses (Coeff. and 95%CIs): Only those respondents who have children.

	Mother n=521	95%CIs		Father n=454	95%CIs		Mother-in-law n=457	95%CIs		Father-in-law n=386	95%CIs	
	Coeff.	lower	upper	Coeff.	lower	upper	Coeff.	lower	upper	Coeff.	lower	upper
Child care received	-0.08	-0.21	0.05	-0.02	-0.16	0.13	0.19*	0.03	0.34	-0.06	-0.24	0.13
Year of birth of the youngest child of the respondent	0.04	-0.01	0.09	0.05	0.00	0.11	-0.06*	-0.12	-0.005	-0.04	-0.10	0.03
Number of grandparents	-0.13	-0.39	0.13	-0.04	-0.36	0.28	-0.02	-0.35	0.32	0.35	-0.15	0.85
Year of birth of the respondent	0.02	-0.03	0.08	0.01	-0.05	0.06	0.04	-0.02	0.10	-0.04	-0.11	0.02
Respondent education	-0.04	-0.18	0.10	-0.01	-0.16	0.13	0.14	0.00	0.29	-0.05	-0.21	0.11
Respondent reported health	0.23	-0.06	0.52	0.26	-0.06	0.58	0.43**	0.12	0.73	0.06	-0.29	0.41
Parent's/in-law's year of birth	-0.03	-0.10	0.03	0.01	-0.06	0.08	0.00	-0.03	0.03	0.05*	0.01	0.08
Parent's/in-law's health (reported by the respondent)	0.22*	0.003	0.43	0.22*	0.00	0.45	0.14	-0.07	0.36	0.11	-0.13	0.35
Geographical distance (km)	0.0003	-0.0005	0.001	0.0002	-0.0003	0.0007	0.0002	-0.0001	0.0005	0.0002	-0.0001	0.0004
Contacts	-0.11	-0.34	0.12	-0.13	-0.35	0.09	-0.21*	-0.42	-0.01	0.30**	0.08	0.51

* p < .05, ** p < .01, *** p < .001

Table 4. Men's conflicts with parent/parent-in-law by child care received and control variables: ordered logistic regression analyses (Coeff. and 95%CIs): Only those respondents who have children.

	Mother n=278	95%CIs		Father n=241	95%CIs		Mother-in-law n=248	95%CIs		Father-in-law n=211	95%CIs	
	Coeff.	lower	upper	Coeff.	lower	upper	Coeff.	lower	upper	Coeff.	lower	upper
Child care received	0.13	-0.09	0.34	0.002	-0.25	0.25	0.07	-0.14	0.27	0.08	-0.18	0.33
Year of birth of the youngest child of the respondent	-0.03	-0.11	0.04	0.07	-0.06	0.10	-0.01	-0.09	0.06	-0.11*	-0.20	-0.01
Number of grandparents	-0.39	-0.84	0.05	-0.11	-0.66	0.44	-0.27	-0.81	0.28	0.60	-0.20	1.40
Year of birth of the respondent	0.07*	0.004	0.14	-0.03	-0.11	0.05	-0.02	-0.09	0.05	-0.04	-0.12	0.05
Respondent education	-0.09	-0.26	0.07	-0.10	-0.28	0.07	-0.10	-0.26	0.07	0.12	-0.07	0.31
Respondent reported health	0.06	-0.30	0.42	0.07	-0.34	0.48	0.19	-0.19	0.56	0.34	-0.10	0.77
Parent's/in-law's year of birth	-0.006	-0.11	0.10	0.05	-0.03	0.13	0.03	-0.01	0.07	0.03	-0.01	0.08
Parent's/in-law's health (reported by the respondent)	0.24	-0.12	0.60	0.49**	0.18	0.81	0.15	-0.17	0.46	0.18	-0.18	0.54
Geographical distance (km)	-0.0007	-0.002	0.0008	-0.0007	-0.002	0.0009	-0.0003	-0.0009	0.0004	-0.0004	-0.001	0.0005
Contacts	-0.38*	-0.69	-0.07	-0.09	-0.39	0.20	-0.05	-0.31	0.21	0.21	-0.09	0.51

* p < .05, ** p < .01, *** p < .001

Discussion

We tested evolutionary predictions regarding affinal kin by investigating reported conflicts towards parents and parents-in-law in contemporary Finland, studying all the eight dyadic relations between younger adults and their parents/in-laws by sex and lineage. Our first hypothesis predicted based on inclusive fitness theory (Hamilton, 1964) that younger adults should be more likely to report conflicts with their parents-in-law compared to their own parents. This hypothesis did not gain support, because both men and women were more likely to report conflicts with their own parents than with their parents-in-law. This finding is similar to recent studies of the effect of genetic relatedness on conflict proneness between siblings (Salmon and Hehman, 2015; Tanskanen et al., 2016), showing more conflicts among full than half siblings. Thus, accumulating evidence now indicates that genetically close relations are not less conflict-prone than others, although they are typically emotionally close and quite altruistic.

Our second hypothesis was based on inclusive fitness theory as extended to in-laws (Hughes, 1988) and predicted conflict proneness between in-laws to be more similar to the child-parent relation if the respondent has children. This hypothesis was confirmed: while being a parent was not associated with the likelihood for conflicts with an

individual's own parents compared to childless couples, the likelihood for conflicts with parents-in-law was substantially higher among parents. These results were similar for women and men and both reported more conflicts with their mother-in-law than their father-in-law.

Why would couples with children have more conflicts with their parents-in-law, compared to childless couples? We predicted our results from the theory of inverse relatedness (Hughes, 1988). The shared reproductive interest that is created through a grandchild brings with it new reasons for grandparents to influence and interfere in the lives of other family members, which in turn may be reflected in conflict-proneness. Our findings were related to higher contact frequencies, suggesting that the existence of a grandchild makes the parents interact more with their in-laws. However, parenthood was also associated with more conflicts after taking contact frequency into account; thus, contacts could not fully explain the increase in the likelihood for conflicts.

Women's higher parental investment and the female dominance in monitoring and investing in cross-generational family relations (Coall and Hertwig, 2010) can, in turn, explain why more conflicts appear to emerge vis-à-vis the mother-in-law than the father-in-law. A higher amount of child care provision was related to having frequent conflicts between daughter-in-law and mother-in-law. Fischer's (1983) classic study that reported that the most frequent source of irritation between daughters-in-law and mothers-in-law was focused on issues around the young children is apparently in line with our results.

Another explanation for our results could be the different function the older generation has dependent on whether or not there is a grandchild. The existence of a child makes the elderly potential providers of care to the grandchild and support to parents, creating new demands and expectations from both sides. However, this difference in relationship dynamics associated with the parenthood and grandparenthood concerns both genetic kin and in-laws. Because conflict proneness with consanguineal parents did not differ by parental status, it cannot solely account for our results.

Parenthood can cause stress and conflicts between spouses, which would in turn affect relations with the spouse's parents. Conflicting interests between two heterosexual spouses are ultimately based on male and female sex-specific reproductive strategies

(e.g., Leonetti et al., 2007) and conflicts between spouses can thus extend to include the maternal and paternal lineages (Euler, 2011). Although parents of small children, in general, have a lower probability to divorce than childless couples (Kulu, 2014; Lyngstad and Jalovaara, 2010), relationship dynamics between spouses do change with the transition to parenthood. A recent study found that in contemporary Western countries, parents of small children had lower relationship satisfaction than couples without children, although this effect can partly be due to the length of the relationship rather than the transition to parenthood per se (Mitnick, Heyman, and Smith Slep, 2009). Of course, adults may also have relationship conflicts with their own parents or parents-in-law regardless of marital relationship quality. Neither does this reasoning explain why more conflicts were reported with a person's own parents than with parents-in-law. Due to lack of data in the survey used, we could not here explore the association between spousal and in-law relations, which remains an interesting topic for future research.

Among the limitations of our study is its cross-sectional nature and focus on the perceptions of only one family generation. The relationship between children-in-law and parents-in-law may vary with both time and the source of the reports. For example, in a study of Israeli daughters-in-law and mothers-in-law (Linn and Breslerman, 1996), the younger women estimated that the relationship toward mother-in-law either improved or was stable over time, whereas their mothers-in-law estimated that the relationship improved or deteriorated over time. Moreover, the daughters-in-law thought the improvement occurred as a function of detachment (they did not see each other as much as in the beginning of the relationship), whereas the mothers-in-law viewed the improvement as a function of attachment (the daughters-in-law had grown to like them more). There is a need for longitudinal studies that analyse how in-law relations vary over the life course and for studies that investigate in-law conflicts from the perspectives of both parties involved. It would also be useful to have data on the couple's relationship quality and history. The longer a couple has been together, the more likely they are to have children and the longer history they are likely to share with their parents-in-law, which can affect conflict occurrence through the habituation effect (Voland and Beise, 2005).

Another limitation of the current study is that we do not know what kind of conflicts the respondent had in mind, or whether the nature of these conflicts differed between

different dyads, or between spouses with children and childless couples. Conflicts may be more severe between in-laws than between biological kin or vice versa and their sources may differ. While we did investigate contact frequency, we could not take into account length of contacts: it is likely the length of the contact with parents and/or in-laws differs depending on parenthood status. Couples with children may spend longer periods of time together when they meet their in-laws, creating more opportunities for conflicts to occur. According to a previous American study, conflicts between older parents and adult children consist of six conflict themes: communication and interaction style; habits and lifestyle choices; child-rearing practices and values; politics, religion and ideology; work habits and orientations, and household standards or maintenance (Clarke et al., 1999). Future studies need to investigate the proximate reasons for conflicts within cross-generational relationships.

A previous study using the same data showed that emotional closeness of parents to their parents-in-law was similar (for mothers) or higher (for fathers) compared to childless women and men (Danielsbacka et al., 2015). Combined with the results presented here, we have demonstrated with large and reliable data that parenthood appears to increase conflicts within the extended family, without lessening emotional closeness. Relational dynamics between in-laws become more "kin-like" with the arrival of a new young family generation. Inverse relatedness (Hughes, 1988) and intra-group relatedness theory (Savage et al., 2013) are likely to yield many other insights into kin and spousal dynamics in relation to fertility, provided access to appropriately detailed human family data.

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Appendix Table 1. Women's and men's reported conflicts between self and mother, father, mother-in-law and father-in-law: Ordered regression analyses and 95%Cis

	Women	95%CIs		Men	95%CIs	
	n=2,544	lower	upper	n=1,540	lower	upper
Conflict with						
Mother (ref.)						
Father	-0.46***	-0.63	-0.29	0.13	-0.07	0.34
Mother-in-law	-1.39***	-1.60	-1.18	-1.42***	-1.70	-1.14
Father-in-law	-1.94***	-2.21	-1.68	-1.87***	-2.18	-1.57
Respondent is a parent						
No (ref.)						
Yes	0.42**	0.18	0.66	0.23	-0.04	0.51
Respondent's year of birth	0.0001	-0.02	0.02	-0.01	-0.04	0.02
Respondent's health	0.19*	0.03	0.35	0.19	-0.02	0.40
Respondent's education	0.02	-0.05	0.10	-0.04	-0.13	0.04
Parent's/in-laws' year of birth	-0.004	-0.02	0.02	0.01	-0.01	0.04
Parent's/in-laws' health	0.14**	0.04	0.24	0.25***	0.12	0.39
Geographical distance	0.0002	-0.00002	0.00037	-0.0003*	-0.00067	-0.00003
Contact frequency	-0.03	-0.13	0.07	0.07	-0.06	0.21

* p < .05, ** p < .01, *** p < .001

Appendix Table 2. Women's conflicts with parent/parent-in-law by having or not having a child/children and control variables: Ordered regression analyses and 95%CIs

	Mother	95%CIs		Father	95%CIs		Mother-in-law	95%CIs		Father-in-law	95%CIs	
	n=716	lower	upper	n=639	lower	upper	n=632	lower	upper	n=540	lower	upper
Respondent is a parent												
No (ref.)												
Yes	0.27	-0.09	0.62	-0.06	-0.44	0.32	1.14***	0.73	1.56	0.57*	0.12	1.03
Respondent's year of birth	0.004	-0.03	0.04	0.01	-0.02	0.05	0.01	-0.03	0.05	-0.04*	-0.09	0.00
Respondent's health	0.25*	0.01	0.50	0.21	-0.05	0.47	0.28*	0.02	0.54	-0.07	-0.36	0.23
Respondent's education	0.01	-0.10	0.12	0.05	-0.06	0.17	0.06	-0.06	0.18	-0.02	-0.15	0.12
Parent's/in-laws' year of birth	0.002	-0.05	0.05	0.02	-0.03	0.07	-0.01	-0.04	0.01	0.02	-0.01	0.05
Parent's/in-laws' health	0.22*	0.03	0.40	0.19	-0.002	0.38	0.08	-0.10	0.26	0.06	-0.14	0.27
Geographical distance	0.00004	-0.00038	0.00046	0.0002	-0.00014	0.001	0.0003*	0.00003	0.0005	0.0001	-0.0002	0.0003
Contact frequency	-0.25**	-0.43	-0.08	-0.07	-0.22	0.08	-0.06	-0.22	0.09	0.26**	0.09	0.43

* p < .05, ** p < .01, *** p < .001

Appendix Table 3. Men's conflicts with parent/parent-in-law by having or not having a child/children and control variables: Ordered regression analyses 95%CIs

	Mother	95%CIs		Father	95%CIs		Mother-in-law	95%CIs		Father-in-law	95%CIs	
	n=421	lower	upper	n=386	lower	upper	n=385	lower	upper	n=330	lower	upper
Respondent is a parent												
No (ref.)												
Yes	0.15	-0.31	0.60	-0.40	-0.88	0.08	0.84**	0.33	1.34	0.55	-0.04	1.14
Respondent's year of birth	0.02	-0.02	0.06	-0.03	-0.07	0.02	-0.03	-0.08	0.02	-0.02	-0.07	0.03
Respondent's health	0.13	-0.17	0.43	0.08	-0.24	0.39	0.27	-0.04	0.58	0.34	-0.02	0.69
Respondent's education	-0.07	-0.20	0.07	-0.06	-0.20	0.07	-0.03	-0.17	0.11	0.01	-0.15	0.17
Parent's/in-laws' year of birth	-0.02	-0.09	0.06	0.04	-0.03	0.10	0.04*	0.002	0.07	0.01	-0.03	0.05
Parent's/in-laws' health	0.19	-0.09	0.47	0.42**	0.17	0.68	0.24	-0.01	0.49	0.19	-0.10	0.48
Geographical distance	-0.0002	-0.0007	0.0004	-0.0003	-0.0008	0.0003	-0.001	-0.0012	0.0002	-0.001	-0.0021	0.0004
Contact frequency	-0.22	-0.44	0.00	-0.02	-0.23	0.18	0.12	-0.08	0.32	0.32**	0.08	0.56

* p < .05, ** p < .01, *** p < .001

IV

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ORIGINAL INVESTIGATION

Adolescent grandchildren's perceptions of grandparents' involvement in UK: an interpretation from life course and evolutionary theory perspective

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Abstract In this article, we study grandparental involvement from the viewpoint of evolutionary theory and sociological life course perception. We have used 'the Involved Grandparenting and Child Well-Being 2007' survey, which is the first nationally representative sample of British and Welsh adolescents aged 11–16 ($n = 1{,}488$). First, we explore with the descriptive statistics the amount of grandparental involvement reported by adolescents. The result follows the predicted pattern: maternal grandparent is reported to involve in a grandchild's life the most, second maternal grandfather, third paternal grandmother and the last paternal grandfather. Second, we focus more closely on separate grandparents and show with four linear regression models which factors are connected to each grandparent's involvement. Grandchild's age, grandparent's health, grandparent's labour force participation and distance between a grandparent and a grandchild were factors that have similar effects in relation to all grandparents. Marital status mattered only for grandfathers, whereas family structure of a grandchild has opposite effects in relation to maternal and paternal grandparents. Grandchild's sex, grandparent's age, the number of grandchildren and the number of living grandparents all mattered, but only with respect to some grandparents. The study shows that it is advantageous to merge sociological and evolutionary viewpoints when studying a grandparental involvement in a modern society.

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Introduction

Owing to the demographic changes, especially the extended life expectancies, a grandparent–grandchild relationship has become an important issue in modern societies. Grandparental involvement has gained interest foremost from sociological and evolutionary researchers. There is now a growing body of studies about grandparenting from these disciplines. However, a salient division prevails between sociological and evolutionary studies about grandparenting. The division is most visible in the minor amount of references these two disciplines make to each other (Coall and Hertwig 2010, 2011).

To fully understand different aspects of grandparenting we need to combine these approaches and start studying grandparental involvement on multiple levels. Therefore, we suggest in this article one potential way of merging evolutionary theory and sociological life course theory.

In general evolutionary theory seeks the fundamental reasons for caring grandparenting. The idea that there is some basic core in grandparenting gains strong support from the analyses and reviews concerning pre-modern, traditional and contemporary human societies (Sear and Mace 2008; Coall and Hertwig 2010; Sear and Coall 2011) and the fact that the researchers have found occurrence of caring grandmothering for example in many primates furthermore highlights the possibility of the evolutionary value of caring grandparenting (Euler 2011).

The main explanatory power of evolutionary approach is that it seeks to explain coherently what motivates

grandparents to lend a hand and for what reasons the positive emotions towards close kin develop. The main theoretical premises are Hamilton's (1964) kin selection theory and Trivers' (1972) parental investment theory. Kin selection theory predicts that the closer the actual kin relationship is (i.e., the closer people have reason to believe they are genetically related) the more people will provide altruistic help. By helping genetically related kin, especially in descending line, it is possible to enhance one's inclusive fitness. Parental investment theory takes into account all investments parents make in their offspring and it also acknowledges the difference between sexes in the amount of the investment (i.e. female have higher obligatory investment into each single reproduction). Parental investment can be easily extended to grandparental investment. Hence, grandparental attachment as well as parental attachment has clear biological roots.

In spite of the emotional continuities, grandparenting has changed over the years. One evident change is the shift from high-fertility and -mortality societies to low-fertility and -mortality societies which has created a new setting for caring grandparenting (Coall and Hertwig 2011). Nowadays in industrialized societies grandparents are not needed to contribute on a child survival as before (see, e.g. Lahdenperä et al. 2004) but at the same time the grandparents themselves are in better health and in better economical situation than never before. In addition, the geographical mobility of people and the growing number of divorces separates grandparents and grandchildren both physically and mentally. Women's labour market participation and the public day care system, which was partly created to enable working mothers, on the one hand decrease and on the other hand increase the need for the help from grandparents (see Hank and Buber 2009). In human's grandparental attachment and caring grandparenting is thus a universally found psychological disposition (Hrdy 2009) but it does not take place in a vacuum.

Therefore, we need to take into account the proximate causes that might promote or lessen grandparental involvement in modern societies (Euler 2011). The sociological life course perspective is useful from this point of view and especially when examining intergenerational family relations. It takes into account the changes that have happened in society and changes that happen during the individual life course (see, e.g. Settersten 2003; Mayer 2009; see also biological counterpart: life-history theory of evolution, e.g. Stearns 1992).

Yet, there is one obvious flaw in many sociological studies about grandparenting. Grandparents are often handled with one equal group, only grandmothers and grandfathers are separated or only one grandparent is lifted up as an example (see, e.g. Attar-Schwartz et al. 2009a; Euler and Michalski 2007 for discussion). This is an interesting point because one of the most robust findings in grandparental studies is that grandparents are not in an equal position in relation to a grandchild. Maternal grandmothers tend to be involved in their grandchild's life the most, following maternal grandfathers and paternal grandmothers and finally paternal grandfathers who are the least involved (e.g. Kahana and Kahana 1970; Eisenberg 1988; Euler and Weitzel 1996; Euler et al. 2001; Mills et al. 2001; Sear and Mace 2008; Griggs et al. 2010; Danielsbacka et al. 2011; Coall and Hertwig 2010; Euler 2011 for review).

As the fundamental reason for grandparental attachment, evolutionary perspective explicates coherently why grandparents are not equal (e.g. Euler and Weitzel 1996). It is biologically much more costly to women than to men to reproduce and in addition women are physiologically obligated to provide more parental investment than men. This has led to the different sex-specific reproductive strategies which also explain many (maybe even most) other behavioural differences between the two sexes. Hence, for women it is much more important from a viewpoint of reproductive success to keep children alive whereas for men it may not have been that profitable as what it comes to maximizing their genes in future generations (Trivers 1972; Coall and Hertwig 2010). This is one reason for the common result of matrilineality in family relationships: women are more supported by their own kin because usually the support directed towards own female kin focus more likely also on the offspring.

In addition, it is a fact that a woman can be sure that the child she gives birth is her own but a man can never be as sure that the child really is his. The studies show that this paternity uncertainty has continuing effects on modern societies (see, e.g. Daly and Wilson 1982; Danielsbacka et al. 2011). It should be pointed out that the effects of paternity uncertainty are not necessarily in contact with actual non paternity rates (cf. Gilding 2009) which have been estimated to between two and three percent in contemporary industrialized societies (Anderson 2006; Bellis et al. 2005; Voracek et al. 2008) but the important point is the potentiality of non paternity. It should also be pointed out that in general the evolutionary predispositions which might shape human's behaviour are not consciously intended motives for action but rather unconscious potentials which can be easily triggered out by the support of surrounding environment.

In this study, we take as a starting point the idea that grandparents do differ from each other and that it is important to study grandparental involvement in grandchildren's life and the factors that are connected to the involvement for each grandparent separately (see Euler 2011). Our theoretical perspective is twofold: we see the formation of a grandparent–grandchild relationship as a

product of deep evolutionary shaped behavioural predispositions and sociological proximate causes.

To study grandparental involvement and factors that are connected to it we have searched from previous studies several factors which are related to grandparent's willingness or possibilities to involve in his or her grandchild's life. We have grouped these factors and the prediction they make on grandparental involvement in the light of evolutionary theory and sociological life course perspective.

Evolutionary theory perspective

The main prediction that evolutionary theory makes is that the sex and the lineage matters. One of the strongest predictions is the order of grandparents (1) maternal grandmother, (2) maternal grandfather, (3) paternal grandmother, (4) paternal grandfather which is due to the paternity uncertainty and preferential investment in more certain kin (see, e.g. Laham et al. 2005; Danielsbacka et al. 2011). According to evolutionary theory and its emphasis on the sex and the lineage we may form following predictions about the relevant connections between different variables and grandparental involvement.

Sex of grandparent and grandchild

From evolutionary viewpoint the sex and the lineage of a grandparent obviously has an effect on grandparental involvement (see above) but the effect of a sex of a grandchild is not so explicit. For instance paternity uncertainty makes no difference between granddaughters and grandsons. However, according to the asymmetric inheritance of the sex chromosomes, especially of the X chromosomes, grandparents may favour grandchildren based on their sex. In respect with autosomes grandparents are equally related to grandchildren but not with sex chromosomes. Males are heterozygous for the sex chromosomes and therefore paternal grandparents are asymmetrically related to granddaughters and grandsons. Grandfathers are more related to grandsons than granddaughters. Due to sex chromosomes, grandmothers are genetically more related to female than to male grandchildren (see Chrastil et al. 2006; Fox et al. 2010; Tanskanen et al. 2011). According to the variation in genetic relatedness between grandparents and grandchildren, we may predict that paternal grandmothers are more involved in their granddaughters' than in their grandsons' life and that paternal grandfathers are more involved in their grandsons' than in their granddaughters' life. Former studies have not found convincing evidence of sex discrimination by grandparents (e.g., Chrastil et al. 2006; Tanskanen et al. 2011).

Marital status of grandparent and parent

From evolutionary theory perspective the interaction of a marital status of a grandparent with the sex and lineage of a grandparent is of interest. Due to the matrilateral effect (i.e. matrilinear kin ties are usually stronger due to the sex-specific reproduction strategies) living without a spouse should matter more for grandfathers than for grandmothers. We may also form *an incidental exposure hypothesis* (see Euler and Michalski 2007) which may explain why maternal grandfathers usually get more involved in grandchildren's life than paternal grandmothers do even though they have the same genetic certainty to be related to a grandchild. Maternal grandmother is most of all involved in her grandchildren's life and her spouse that is to say maternal grandfather is also often present. Hence he becomes incidentally exposed to the grandchildren too. According to the incidental exposure hypothesis the presence or the absence of spouse do not have an effect on the involvement made by the maternal grandmother. The absence of spouse, however, matters little for the paternal grandmother, more for the maternal grandfather and the most for the paternal grandfather (Euler and Michalski 2007).

The marital status of a parent also matters. From evolutionary viewpoint the attachment to (alleged) biological relative should be stronger than to in-law (of the importance of biological kinship see, e.g. Schnettler and Steinbach 2011). Hence, it may be predicted that grandparental involvement depends partly on with whom the child end up living with in case of divorce because parents may act as gatekeepers (see Robertson 1975) between the grandparent and the grandchild. The children living only with their mother should receive more involvement from maternal grandparents and the children living with their father should receive more involvement from paternal grandparents.

The age of grandparent and grandchild

Evolutionary theory predicts grandparental involvement to depend partly on its age-dependent fitness effect (Euler 2011). This means that the infant grandchildren, who are the most vulnerable, get the most grandparental involvement but it also suggests that those grandchildren, who are biologically at the beginning of their reproductive career, get more grandparental involvement. The effect of grandparent age is less clear because due to aging the physical resources might reduce and at the same time nepotistic interest in the grandchildren's well-being might increase (Alexander 1987). Hence, it is difficult to evaluate the actual age-effect.

Life course perspective

The sociological life course perspective predicts that grandparental involvement is bound to the place and time people are living (Elder and Kirkpatrick Johnson 2003; Giele and 1998; Kemp 2007; Settersten 2003), that each relationship between family members are influenced by each other in family connections (Cox and Paley 1997) and that the age and the phase of life of each family member affect the relationships between them (Elder 1994). According to this perspective, we may form following presuppositions about the connections between different variables and the grandparental involvement.

The life course perspective recognizes also the relevance of *the sex of grandparent and the sex of grandchild* but it has not produced clear predictions about the differences based on it. The one prediction concerning the grandparent's sex is that women are, mainly due to norm structures and socially constructed roles, the 'kin-keepers' (Spitze and Ward 1998) and therefore they are more inclined to invest their time and resources into the family. In relation to the sex of grandparent and grandchild it has been said that the same-sex grandparent–grandchild dyads are closer that is to say grandmothers are closer with granddaughters and grandfathers with grandsons. Dubas (2001) detected a closer relationship in same-sex grandparent–grandchild dyads, but many studies have not found evidence for sex discrimination (Block 2000; Mueller and Elder 2003; Triado et al. 2005; Höpflinger and Hummel 2006).

The clearest determinants of grandparental involvement from the life course perspective are the age of grandparent and grandchild. The previous findings on the correlation between *grandparent's age* and grandparental involvement are, however, unclear (see Euler and Michalski 2007; Wood and Liossis 2007) and probably correlate with *grandparent's health* meaning that older grandparents might also be in poorer health than the younger ones. Grandparent's age is also linked to the type of involvement. Involvement that requires physical activity might correlate negatively with the age of a grandparent whereas emotional involvement might not be affected by age of a grandparent. According to a study that concerns grandparenting in Britain, the grandparental involvement and *the age of the grandchild* correlates negatively (Dench and Ogg 2003) that is when the age of a child increases the grandparental involvement decreases. However, it is important to notice that the form of involvement may change when the grandchild is growing. Probably grandparents look after the younger children most while the older grandchildren may receive more financial support and advice from grandparents (Silverstein and Marenco 2001).

Related to the grandparents' phase of life the *labour force participation of grandparent* is of importance here. Many of grandparent-age people are working part time or have already retired. Hank and Buber (2009) have argued that grandmothers' increasing labour force participation may reduce grandparental involvement in grandchildren. They have focused on grandparental child care, but it is possible that the same effect is also valid for other forms of grandparental involvement and that the same effect may also be valid in the case of grandfathers.

From a life course perspective the central importance in family relations is on interdependence among lives (see, e.g. Hagestad 2003). This means that the number of living relatives matters as well as a family structure. Previous findings show that the *number of grandchildren* is related to the amount of grandparents' involvement in one particular grandchild (e.g. Smith 1991). The total number of grandchildren may limit the grandparental involvement in a particular grandchild (Elder and Conger 2000; Mueller and Elder 2003). The number of other grandparents still alive might also make a difference with respect of grandparental involvement. It has been suggested that grandparental involvement decreases if a grandchild has more than one grandparent alive but the theory has not gained support from previous studies (Euler and Weitzel 1996; Pashos 2000). From these presumptions we may form *a dilution effect hypothesis* which states that the number of grandchildren and the number of grandparents have a dilution effect on grandparental involvement.

Related to interdependence among lives the marital status of grandparent and parent is also relevant. It has been illustrated in many studies that if parents divorce, the grandparent–grandchild relationship often suffers, particularly or only on the patrilineal side (Hagestad 2006; Silverstein et al. 2003). The same can be predicted to happen in the case of grandparents divorce.

In addition, *geographical distance* between grandparent and grandchild has a strong influence on the frequency of grandparental involvement and this can also be integrated into the life course perspective. The greater the distance, the lesser grandparents' are involved in their grandchildren's life (see, e.g. Hank and Buber 2009; Pollet et al. 2006, 2007; Euler and Weitzel 1996; Smith 1991).

The present study

In this study, we investigate the associations between different background variables and grandparental involvement with all four grandparents separately. We construct our analysis of the variables that make a difference based on former studies and hypotheses that have been formulated in those studies.

Evolutionary theory predictions

Sex and lineage

The rank order of grandparents' goes as follows: (1) maternal grandmother, (2) maternal grandfather, (3) paternal grandmother, (4) paternal grandfather. If the grandchild's sex matters, it should show as paternal grandmother's preference on granddaughters and paternal grandfather's preference on grandsons.

Marital status of grandparent and parent

Grandfathers who live without a spouse should be less involved in their grandchild's life than those grandfathers living with the grandmother of a grandchild (also incidental exposure hypothesis) and children living only with their mother should be less in contact with paternal grandparents as well as children living only with their father should be less in contact with maternal grandparents.

The age of grandparent and grandchild

Older grandparents—in case they are healthy—should be more involved in their grandchildren's life than the younger ones and grandchildren who are at the beginning of their reproductive career (i.e. adolescents) should receive more grandparental involvement.

Life course perspective

Sex and lineage

No clear prediction, but in general grandmothers as 'kin-keepers' should be more involved than grandfathers in their grandchildren's life and same-sex grandparent–grandchild dyads might be closer.

The age of grandparent and grandchild

Grandparent's age might be connected to the grandparental involvement together with grandparent's health thus the older and in poorer health the grandparents are the less they are involved in their grandchildren's life. In addition, the older the grandchildren are the less they receive involvement from grandparents.

The labour force participation of grandparent

We expect that the adolescent grandchildren are reporting more involvement especially from non-working than working grandmothers, but possibly also from non-working grandfathers.

The marital status of grandparent and parent and the family composition

Parents' or grandparents' divorce diminish the grandparental involvement in grandchildren by paternal side. The more there is grandchildren or grandparents the less one particular grandchild receives involvement.

Geographical distance

The further the distance between a grandparent and a grandchild is the lesser they should be in contact with each other.

Methods

We use 'the Involved Grandparenting and Child Well-Being 2007' survey, which is the first nationally representative sample of British and Welsh adolescent aged 11–16. The survey concentrates on adolescents views on their relationships with their grandparents (see also Attar-Schwartz et al. 2009a, b; Griggs et al. 2010; Tan et al. 2010; Tanskanen et al. 2011 who have used the same data). The sample was recruited by GfK National Opinion Polls. 103 schools were randomly selected using probability proportionate-to-size sampling which means that larger schools had greater probability to be included in the final sample. Seventy schools returned the questionnaires (response rate of 68 %). Respondents completed the questionnaire in a school classroom. In every selected school the classes were randomly chosen. The original sample consisted of 1,566 adolescent's but we have excluded those participants who did not have any living grandparent. Hence, the resulting data includes 1,488 adolescents who have at least one grandparent alive. When filling in the questionnaire, respondents were asked to answer questions for only those grandparents who were still alive.

The characteristics of adolescents who participated in the survey are broadly representative by age, gender, ethnic origin, family background (Office for National Statistics 2007, p. 5), and family socio-economic background of adolescents in England and Wales. They were approximately equally males and females and the average of age was 13.4 years. Majority of them were from intact families (65 %), about 17 % from lone-parent families (most were living with their mother) and about 16 % from stepfamilies (most were living with their mother and her new partner). Over 90 % of the adolescents reported their ethnicity as White–Caucasian (Attar-Schwartz et al. 2009b).

In this study, we use as a dependent variable the *grandparental involvement* variable which is made by

Table 1 Grandparental involvement: mean, standard deviation and total *n*

	Maternal grandmother	Maternal grandfather	Paternal grandmother	Paternal grandfather
Mean	12.0	11.5	11.0	10.6
SD	2.3	3.1	2.9	3.0
n	1,162	908	982	757

summing up answers for six different questions which can be interpreted to measure different aspects of grandparent's involvement. The questions are: 'How often do your grandparents look after you? Do they get involved with things you like? Do they come to school or other events that are important to you? How often do you talk to them about problems you have? Can you talk to them about your future plans? Do they give you money or help in any other way?' Each question was assessed on a three-point Likert-type scale (ranging from 1 = never to 3 = usually) and each question was asked separately for each grandparent. The scale of summed involvement variables is growing thus higher number means stronger involvement (scale 6–18). The Cronbach's alpha of the involvement measure for the each grandparent in this study was sufficient (maternal grandmother $\alpha = 0.79$, maternal grandfather $\alpha = 0.81$, paternal grandmother $\alpha = 0.79$, paternal grandfather $\alpha = 0.82$). The descriptive statistics of four grandparental involvement variables are presented in Table 1.

As independent variables we use grandchild's (respondent) sex, age, family structure (with whom the respondent lives most of the time), the number of living grandparents, the distance between a grandparent and a grandchild, grandparent's age, labour market status, marital status, health and the number of grandchildren (see Table 2). Almost all independent variables (except for the age of grandchild) are classified and thus for the linear regression model we transformed them into the dummy variables.

We use linear regression analysis to explore what kind of connections different background variables have on grandparental involvement when all other background variables are controlled for. Linear regression models are formed and presented for each of the grandparents separately. These four models show statistical significances in differences within a particular background variable and how it is connected to a particular grandparent's involvement (increasing or decreasing it compared to comparison group).

Results

Figure 1 illustrates the descriptive results of the dependent variable with 95 % confidence intervals. The results are presented firstly by each grandparent separately and secondly within those children who have all four grandparent alive. Grandparents' involvement follows the well known pattern: maternal grandmother is reported to be most involved in her grandchild's life, next paternal grandfather following paternal grandmother and finally paternal grandfather. The pattern holds even when all grandparents are alive and the importance of maternal grandmother actually becomes emphasized further.

The results from four linear regression models are presented in the Table 3. In general, the girls are reporting more involvement from their grandparents but the difference between boys and girls is statistically significant only in the case of maternal grandmother. Grandchild's age on the other hand makes statistically significant difference in relation to every grandparent. The older the grandchild is the less he or she reports involvement from his or hers particular grandparent.

Grandchild's family structure has an impact on the grandparental involvement. Those children who live only with their mother report statistically significantly less involvement from their paternal grandmother than those children who live with both parents. Likewise those children who live only with their father report statistically significantly less involvement from their maternal grandmother and maternal grandfather and they also report significantly more involvement from their paternal grandmother than those children who live with both parents.

Distance between a grandchild and a grandparent matters as expected: the further grandchild and grandparent live from each other the smaller the grandparental involvement is. Grandparent's age has also an effect in the case of maternal grandmother, paternal grandmother and paternal grandfather. The younger the grandparent is the more grandchildren are reporting involvement from him or her.

Grandparent's labour force participation also differentiates the involvement reported by grandchildren. Those maternal grandmothers, paternal grandmothers and paternal grandfathers who are working part time compared to those grandparents who are working full time are more involved in their grandchildren's life. The ones who are not working at all are also more involved in their grandchildren's life but not as much more as those who have a part time job. Only in the case of maternal grandfathers not working at all makes a bigger difference than working part time compared to those maternal grandfathers who are working full time.

Grandparent's marital status has an effect only on grandfathers' involvement. Grandfathers who have never been married or who have divorced are statistically significantly less involved with their grandchildren's life than those grandfathers who are married (with the grandmother of his grandchildren). In addition, remarrying reduces maternal and paternal grandfathers' involvement in his

Table 2 Descriptive statistics of background variables (*n* and %/mean)

	Maternal grandmother		Maternal grandfather		Paternal grandmother		Paternal grandfather	
	n	%/mean	*n*	%/mean	*n*	%/mean	*n*	%/mean
Grandchild's sex (%)								
Boy	577	50.7	458	51.5	488	50.4	382	51.3
Girl	560	49.3	431	48.5	480	49.6	362	48.7
Total	1,137		889		968		744	
Grandchild's age (%)								
11	92	8.0	77	8.5	77	7.9	64	8.5
12	290	25.1	217	24.1	235	24.0	180	23.8
13	230	19.9	188	20.8	201	20.5	153	20.3
14	272	23.5	207	22.9	220	22.5	171	22.6
15	198	17.1	153	17.0	176	18.0	132	17.5
16	74	6.4	60	6.7	70	7.2	55	7.3
Total	1,156		902		979		755	
Grandchild's family structure								
Lives with mother and father	741	65.5	563	64.0	628	66.0	482	65.3
Lives only with mother	181	16.0	149	16.9	146	15.3	118	16.0
Lives only with father	17	1.5	13	1.5	17	1.8	13	1.8
Lives with mother and her new partner	175	15.5	139	15.8	140	14.7	111	15.0
Lives with father and his new partner	18	1.6	16	1.8	21	2.2	14	1.9
Total	1,132		880		952		738	
Distance (%)								
Same town or together	507	44.7	317	43.4	344	37.0	233	33.5
Within 10 km (not in same town)	282	24.9	205	24.0	246	26.5	202	29.1
Further (in the UK)	256	22.6	215	25.1	270	29.1	209	30.1
Further (overseas)	89	7.8	64	7.5	69	7.4	51	7.3
Total	1,134		801		929		695	
Grandparent's age (%)								
Fifties or below	183	18.1	89	11.8	77	9.7	44	7.4
Sixties	480	47.4	366	48.5	394	49.7	282	47.3
Over seventy	349	34.5	299	39.7	322	40.6	270	45.3
Total	1,012		754		793		596	
Grandparent's labour force participation (%)								
Full time job	110	10.3	131	16.5	73	8.7	79	12.9
Part time job	190	17.8	146	18.4	114	13.5	82	13.4
Not working	770	72.0	516	65.1	656	77.8	452	73.7
Total	1,070		793		843		613	
Marital status of grandparent (%)								
Married	806	76.4	651	76.8	684	80.8	541	80.6
Never married or divorced	183	17.3	122	14.4	119	14.0	84	12.5
Remarried	66	6.3	75	8.8	44	5.2	46	6.9
Total	1,055		848		847		671	
Grandparent's health (%)								
Very poor or poor	157	14.8	158	19.4	145	16.8	151	23.3
Good	593	55.8	409	50.2	483	55.9	316	48.8
Very good	313	29.4	247	30.3	236	27.3	181	27.9
Total	1,063		814		864		648	
Number of grandchildren (%)								
Only respondent	39	3.5	25	3.0	28	3.1	25	3.7

Table 2 continued

	Maternal grandmother		Maternal grandfather		Paternal grandmother		Paternal grandfather	
	n	%/mean	*n*	%/mean	*n*	%/mean	*n*	%/mean
2 or 3	317	28.8	256	30.7	255	28.4	189	28.1
4 or more	743	67.6	553	66.3	614	68.5	458	68.2
Total	1,099		834		897		672	
Number of living grandparents (%)								
Only one	98	8.4	24	2.6	43	4.4	11	1.5
Two	254	21.9	174	19.2	157	16	96	12.7
Three	375	32.3	289	31.8	363	37	233	30.8
All four	435	37.4	421	46.4	419	42.7	417	55.1
Total	1,162		908		982		757	

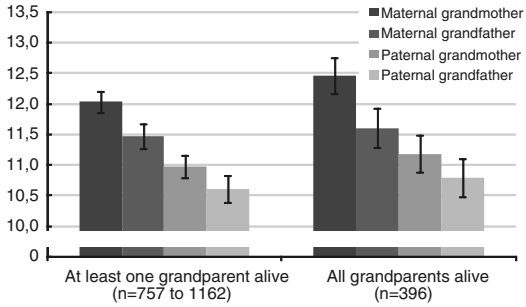

Fig. 1 Mean involvement by each grandparent and 95 % confidence intervals reported from grandparents separately and within those respondents who have all four grandparents alive

grandchild's life but the difference compared to those grandfathers who are married with the child's grandmother is statistically significant only in the case of maternal grandfather. In the case of either grandmother the marital status makes no statistically significant difference between married ones and others. In addition, we examined the correlations between the involvements of grandmother–grandfather-couple (not shown in the Table 3). The correlations were very high between the maternal grandmother and the maternal grandfather involvement ($r = 0.703$, $p < 0.01$) as well as between the paternal grandmother and the paternal grandfather involvement ($r = 0.814$, $p < 0.01$). This can also be interpreted to confirm the effect of marital status.

Grandparent's health makes a difference in respect of all grandparents. The better the grandchildren evaluate their grandparents' health to be the more they also report their grandparents' to be involved in their life. The number of grandchildren, especially when it is two or three, enhances statistically significantly maternal grandfather's, paternal grandmother's and paternal grandfather's involvement in their particular grandchild's life compared to those who have only one grandchild (i.e. the respondent). Those grandfathers' who have four or more grandchildren are also statistically significantly more involved their particular grandchild's life than those grandfathers' who have only one grandchild. However, number of living grandparents does not produce any differences except in the case of maternal grandmother. Those grandchildren who have all four grandparents alive are reporting statistically significantly more involvement from their maternal grandmother than those grandchildren who have only the maternal grandmother alive.

Conclusions

In this article, we have studied grandparents' involvement in their grandchildren's life reported by adolescent grandchildren. Many of our findings are consistent with the previous studies but the major advantage of this study is that here we have an analysis for each grandparent separately and with several background variables (cf. Tan et al. 2010). Firstly, we can conclude that grandparents do differ from each other as for the amount of the involvement. British and Welsh adolescents are reporting most involvement from maternal grandmother, next from maternal grandfather, then from paternal grandmother and the least from paternal grandfather. This is consistent with the prediction of evolutionary theory. Interesting result was that maternal grandmother's involvement actually increases in relation to other grandparents when the respondent has all four grandparents alive. This result emphasizes even further the importance of maternal grandmother. Cases where maternal grandmother is lost early require more investigation, because the other grandparents may substitute this lost and this may have an effect on the grandparents' ranking order. In addition, it would be worth

Table 3 Linear regression analyses of grandparental involvement and background variables in case of each grandparent

	Maternal grandmother				Maternal grandfather				Paternal grandmother				Paternal grandfather			
	B	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*
Grandchild's sex																
Boy (ref.)																
Girl	0.655	0.161	4.059	0.000	0.223	0.186	1.197	0.232	0.328	0.174	1.891	0.059	0.072	0.204	0.352	0.725
Grandchild's age	−0.291	0.058	−5.033	0.000	−0.205	0.066	−3.113	0.002	−0.362	0.062	−5.859	0.000	−0.346	0.073	−4.743	0.000
Grandchild's family structure																
Lives with mother and father (ref.)																
Lives only with mother	−0.054	0.226	−0.238	0.812	−0.112	0.256	−0.439	0.661	−0.668	0.250	−2.666	0.008	−0.505	0.286	−1.767	0.078
Lives only with father	−1.334	0.664	−2.009	0.045	−2.115	0.797	−2.653	0.008	1.399	0.659	2.124	0.034	−0.339	0.772	−0.439	0.661
Lives with mother and her new partner	0.231	0.232	0.993	0.321	0.133	0.263	0.506	0.613	−0.287	0.256	−1.123	0.262	0.062	0.299	0.209	0.835
Lives with father and his new partner	−0.994	0.661	−1.504	0.133	−0.413	0.712	−0.579	0.563	1.007	0.609	1.654	0.099	0.722	0.771	0.936	0.350
Distance																
Same town or together (ref.)																
Within 10 km (not in same town)	−0.386	0.203	−1.907	0.057	−0.142	0.236	−0.602	0.547	−0.025	0.219	−0.113	0.910	0.257	0.258	0.996	0.320
Further (in the UK)	−1.409	0.209	−6.728	0.000	−1.035	0.237	−4.365	0.000	−0.898	0.214	−4.205	0.000	−0.457	0.253	−1.805	0.071
Further (overseas)	−1.785	0.317	−5.637	0.000	−1.521	0.374	−4.067	0.000	−1.130	0.352	−3.206	0.001	−0.946	0.432	−2.187	0.029
Grandparent's age																
Sixties (ref.)																
Fifties or below	0.586	0.237	2.477	0.013	0.512	0.324	1.580	0.115	1.101	0.335	3.281	0.001	1.493	0.450	3.319	0.001
Over seventy	0.005	0.194	0.024	0.980	0.084	0.214	0.392	0.695	0.285	0.199	1.435	0.152	0.360	0.235	1.533	0.126
Grandparent's labour force participation																
Full time job (ref.)																
Part time job	0.853	0.277	3.078	0.002	0.264	0.294	0.896	0.371	1.132	0.320	3.535	0.000	1.166	0.372	3.130	0.002
Not working	0.838	0.232	3.609	0.000	0.766	0.235	3.262	0.001	0.950	0.231	4.118	0.000	0.985	0.255	3.855	0.000
Marital status of grandparent																
Married (ref.)																
Never married or divorced	−0.303	0.221	−1.372	0.170	−2.095	0.273	−7.682	0.000	−0.290	0.267	-1.087	0.277	−1.412	0.326	−4.338	0.000
Remarried	−0.243	0.349	−0.697	0.486	−1.014	0.344	−2.945	0.003	−0.061	0.414	−0.147	0.883	−0.449	0.426	−1.053	0.293
Grandparent's health																
Very poor or poor (ref.)																
Good	1.438	0.206	6.972	0.000	1.343	0.224	5.989	0.000	1.232	0.213	5.796	0.000	1.334	0.241	5.528	0.000
Very good	2.095	0.236	8.879	0.000	2.460	0.253	9.735	0.000	2.078	0.251	8.275	0.000	1.872	0.281	6.661	0.000

Table 3 continued

	Maternal grandmother				Maternal grandfather				Paternal grandmother				Paternal grandfather			
	B	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*	*B*	Std. error	*t*	*p*
Number of grandchildren																
Only respondent (ref.)																
Two or three	0.511	0.316	1.620	0.106	1.130	0.336	3.360	0.001	0.998	0.320	3.119	0.002	0.820	0.347	2.361	0.019
Four or more	0.082	0.291	0.282	0.778	0.675	0.308	2.189	0.029	0.524	0.292	1.793	0.073	0.676	0.308	2.195	0.028
Number of living grandparents																
Only one (ref.)																
Two	0.380	0.330	1.151	0.250	−0.305	0.609	−0.500	0.617	0.109	0.461	0.237	0.812	−1.145	0.877	−1.305	0.192
Three	0.331	0.316	1.046	0.296	−0.651	0.597	−1.091	0.275	−0.221	0.433	−0.509	0.611	−1.144	0.846	−1.348	0.178
All four	0.789	0.320	2.463	0.014	−0.131	0.592	−0.222	0.825	0.102	0.435	0.234	0.815	−0.816	0.844	−0.967	0.334
n	1.132				884				965				742			
Adjusted R^2	19.0				24.0				18.7				19.8			

studying how the absence of other grandparents may affect the involvement pattern.

Secondly, we can conclude that different factors played somewhat different roles within each grandparent. As we focused our analyses towards each grandparent we found out that different factors were differently connected to involvement in case of each grandparent. Some background factors systematically increase or decrease the grandparental involvement in relation to every grandparent. The first is the age of a grandchild. Contrary to the evolutionary prediction of age-dependent fitness effect (beginning of biological reproduction age should increase grandparental involvement in grandchild) each grandparent's involvement decreases the older the grandchild is (range 11–16 years old). This finding is, however, consistent with former sociological studies (see, e.g. Dench and Ogg 2003) and it is consistent with the life course perspective. The diminution of contact between a grandparent and a grandchild the older the grandchild is, is probably related to life course and the matter that adolescents usually try to disengage oneself from family and integrate more in their own peer group at certain age. The relationship with a particular grandparent might, however, come closer again when the grandchild is past adolescence.

The second is distance. The further the distance between grandparent and grandchild, the lesser is the grandparental involvement. The effect of the distance is quite self-evident and consistent with the former results (e.g. Hank and Buber 2009). Furthermore it integrates into life course perspective quite easily.

The third is grandparents labour force participation. Those maternal grandmothers, paternal grandmothers and paternal grandfathers who are working part time are more involved in their grandchildren's life than those equivalent grandparents who are working full time. Not working at all increased every grandparent's involvement as compared to full time workers but only in the case of maternal grandfather the increase in involvement is larger than if they are working part time. Reduction in labour force participation makes the presupposed difference which is congruent with former results (e.g. Hank and Buber 2009) and with the assumption made by life course perspective. However, it is interesting that the labour force participation has an effect on grandfathers' involvement too and in respect to most grandparents the involvement increases more when grandparent is working part time, not when he or she is not working at all. The latest result might be due to the fact that not working grandparents are also older and maybe in poorer health. In fact the fourth factor which makes similar distinctions in respect of every grandparent is grandparent's health. The better the grandparent's health, the more involvement grandchild reports from he or she.

Besides the sex and the lineage of a grandparent, the clearest factor which seems to separate grandmothers and grandfathers from each other is a marital status of a grandparent. In this respect, our study gives strong support for the matrilateral effect predicted by evolutionary theory and also for the incidental exposure hypothesis. Grandfathers' who are not married with the grandmother of a grandchild are less involved in their grandchild's life. Also correlations between grandmother and grandfather-couple involvements support the incidental exposure hypothesis. However, our results do not seem to follow accurately the pattern formed of incidental exposure hypothesis. According to Euler and Michalski (2007) the presence or the absence of spouse should not effect on the involvement made by maternal grandmother, but it should matter little for paternal grandmother, more for maternal grandfather and the most for paternal grandfather. In our analyses, the difference between married and not married ones is statistically significant only in the case of grandfathers and not significant in the case of either grandmother. It is also interesting to see that remarrying seems to affect only the involvement made by maternal grandfather and that the effect is negative that is to say remarrying reduces maternal grandfathers' involvement. These results might further highlight the remarkably important role of the maternal grandmother.

The effect of grandchild's family structure emphasises the difference between maternal and paternal side. As the evolutionary theory predicts, the ties towards one's own relatives are stronger than towards in-laws. Those children who live only with their mother compared to those children who live with their mother and father are reporting significantly less involvement from their paternal grandmother. Likewise those children who are living only with their father compared to those children who live with their mother and father are reporting significantly less involvement from their maternal grandmother and maternal grandfather and in addition they are reporting more involvement from their paternal grandmother. Thus, the grandparent–grandchild relationship in general does not necessarily suffer from parents divorce and the effect of divorce does not necessarily show only on paternal side as the life course perspective assumes (Hagestad 2006; Silverstein et al. 2003) but the reduction in grandparental involvement depends on the lineage.

The result for the effect of grandchild's sex is mixed and weak. Girls are reporting more involvement from each grandparent but the difference between girls and boys is statistically significant only in relation to maternal grandmother. Hence, our results do not support unequivocal either the evolutionary predictions (preference according the sex chromosome relatedness) or life course perspective (same-sex preference). Not finding any consistent pattern in relation to sex of a grandchild is partly consistent with another study made with the same data but with wider range of involvement variables where authors did not found any biases particularly in paternal grandmothers' involvement with granddaughters and grandsons. However, there was some bias in total noninvolvement made by paternal grandmother in disadvantage to granddaughters (Tanskanen et al. 2011).

The number of grandchildren and the number of living grandparents does not appear to produce any dilution effect in relation to grandparental involvement. On the contrary the maternal grandfathers, paternal grandmothers and paternal grandfathers are more involved in one particular grandchild's life when they have two or three grandchildren compared to those grandparents who have only one grandchild. The number of living grandparents does not affect any grandparents involvement except the maternal grandmother's, who, on the contrary to the dilution hypothesis, is more involved in her grandchild's life when the child has all four grandparent alive compared to the situation that the maternal grandmother is the only one alive.

There are some limitations relating to the data used in this study. Children being the respondents has its' advantages and disadvantages. Grandparents might not be the ideal source of information, as they may wish to present their involvement as equal in all children (see Euler and Weitzel 1996; Euler et al. 2001; Laham et al. 2005; Danielsbacka et al. 2011) and in this respect the children as a source of information might be more reliable. Although children aged 11–16 years old might not be aware of their grandparents labour force participation, their health or even their age quite accurately, they are still the best information source in the case of complex research frame such as one interested in here. Because of the lineage, it would come too complicated to ask either grandparents or parents about grandparental involvement in relation to each grandparent and a particular grandchild.

In spite of the limitations, the empirical results of this article which concern the sex and the lineage of a grandparent, marital status of parents and marital status of grandparents indicate that there are clear differences between men and women in their behaviour within the family context. From evolutionary viewpoint sex-specific reproductive strategies suggest that women are more inclined to be in close contact with kin and the results support these presuppositions. The results are also in line with sociological hypothesis that states women are the kin-keepers (see, e.g. Dubas 2001). The main difference between sex-specific reproductive strategies and its effects on human behaviour and kin keeper theory is that the former takes starting point from biology and evolution whereas the latter argues the distinctions are merely due to

the different learned behaviour and role expectations made for men and women.

However, the predictions made by evolutionary theory and sociological life course perspective are not mutually exclusive but rather complementary to each other in most cases. To conclude, observing grandparental involvement from the viewpoint that takes the sex and the lineage of a grandchild and a grandparent into account offers new and fruitful direction for grandparenting research. In the forthcoming studies especially the lineage and the sex of a parents' generation should take more into account in order to see for example are parents favouring their own kin and disfavouring their spouse's kin. The influence of the sex of a grandchild requires also more investigation. Open question is for example, is there any coherent theory which explains the effect of grandchild's sex on the grandparent's involvement.

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Chapter 10

Grandfather involvement in Finland: Impact of divorce, re-marriage, and widowhood

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