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Grandparental Childcare for Biological, Adopted, and Step-Offspring: Findings From Cross-National Surveys

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Abstract

Based on kin selection theory, amounts of grandparental investment should reflect the probability to share common genes with offspring. Adoption may represent a special case, however, yet grandparental investment in adopted children has previously been both theoretically misconstrued and little investigated. Here, we study for the first time how grandparental childcare provision is distributed between biological, adopted, and step-offspring. Using Generations and Gender Surveys ($n = 15{,}168$ adult child–grandmother and 12,193 adult child–grandfather dyads) and the Survey of Health, Ageing, and Retirement in Europe ($n = 17{,}233$ grandmother–adult child and 13,000 grandfather–adult child dyads), we find that grandparents were less likely to provide care to stepchildren than to adopted and biological children, but no difference between adopted and biological children. These findings were present in both data sets and for both grandmothers and grandfathers, after several potentially confounding factors were taken into account. The stepchild disadvantage is in line with kin selection theory. The congruent amounts of care provided to adopted and biological children may reflect similar levels of adult–child attachment, selection effects, and greater need in adoptive families, as well as some degree of genetical relatedness in the case of kin adoption. The study provides new evidence of biased kin investments in contemporary societies and stresses the importance of psychological motivation and attachment in evolutionary studies of kin investment.

Keywords

adoption, childcare, GGS, grandchildren, grandparents, psychological attachment, SHARE, stepchildren, stepparents

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Due to increases in life expectancy, health, and wealth, it is currently much more common for grandchildren to live simultaneously with their grandparents than in the past (Chapman et al., 2018; Leopold & Skopek, 2015; Margolis & Wright, 2017), and grandparents have more opportunities to provide care and other resources for their descendants. Grandparental investment, an extended version of parental investment (Trivers, 1972), is defined as investment of various types of resources, such as care, protection, and material support, into one grandoffspring, thereby detracting from investments in other potential recipients (Coall & Hertwig, 2010). Grandparental investments can be channeled either directly to the grandchild or indirectly, via the grandchild's parents. In the case of young children in high-income societies, grandparental investment is often measured by provision of childcare (Euler, 2011), as we do also in the present study. Contemporary grandparents provide a significant amount of childcare: For instance, in Europe, 58% of grandmothers and 49% of grandfathers look after a grandchild at least occasionally (Hank & Buber, 2009). Grandparental childcare is also known to correlate with other types of grandparental investment as well as with perceived emotional closeness between family generations (Danielsbacka et al., 2015), and it may have a beneficial impact on child well-being and development (Sear & Coall, 2011, but see Tanskanen & Danielsbacka, 2018).

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An increasing number of scholars from different disciplines, including psychology, sociology, and biology, have investigated factors associated with grandparental investment (see Hank et al., 2018; Tanskanen & Danielsbacka, 2019, for recent reviews). These studies have shown that grandparental investments in grandchildren tend to vary according to assumed genetical relatedness, so that grandparents usually invest more in genetically more certain kin. For instance, grandparents invest less in their step-grandchildren, with whom they are not related at all, compared to biological grandchildren, with whom they share on average a fourth of their genes (e.g., Gray & Brogdon, 2017; Pashos et al., 2016; Steinbach & Silverstein, 2019). Child adoption, however, represents an intriguing case. Humans belong to the many primates who have the capacity to adopt, that is, to attach to and raise a child which is not its own genetic offspring (Hrdy, 1999; Silk, 1990). Hence, adoption can create a carer–child bond with zero genetical relatedness and very high levels of kin investment. This has generated confusion and unwarranted assumptions regarding the role of genetic relatedness for family dynamics, as outlined below. Furthermore, few empirical studies have concerned investments in adoptive grandchildren in relation to biological and step-grandchildren. In the present study, we compare for the first time differential grandparental investment in these three types of children.

Depending on many factors in the family, children raised as biological, stepchildren, or adopted can have differing degrees of actual genetical relatedness to their adult kin. We will here ignore factors outside the grasp of our data, such as paternity certainty, and refer to a child as "biological" if the child has not been adopted and is not a stepchild. The terms "nonadopted" or "birth child" are used as synonyms to "biological." Children here defined as biological have an assumed 50% of genes shared with their parents and approximately 25% with their grandparents. "Stepchild" refers to the child of a spouse and step-grandchild to the child of an adult child's spouse. "Adopted" refers to a child who has been legally adopted, whether between unrelated families (e.g., international adoption), within a family (e.g., adoption by a stepparent), or between kin (e.g., adoption within an extended family). Adopted children can thus be genetically related to their adoptive parents and grandparents; however, the majority of adoptions in contemporary high-income societies are to "strangers" who have no previous family ties with the child (e.g., Ryan et al., 2010; United Nations, 2009).

It is important to note that grandparents can have adopted- or step-offspring in two ways: Either an adopted child or a stepchild has biological children (i.e., the middle generation is adopted or step related) or the grandparent has a biological child who has an adopted or a stepchild (i.e., the youngest generation is adopted or step related). With the aid of two large-scale and cross-national data sets, we are able to investigate grandparental investment in both of these cross-generational family constellations.

Parenting, Grandparenting, and Relatedness to Child

Kin selection theory (W. D. Hamilton, 1964) predicts that individuals will prefer to invest in their closely related descendants compared to less related or unrelated ones. In line with this prediction, two-generational studies of human parental investment in young children have consistently shown that parents tend to treat their stepchildren worse than their biological children (e.g., Cherlin, 2008; Daly & Wilson, 1985, 1988) and to provide more time and resources to biological compared to stepchildren (see Anderson, 2011, for a review). Because stepchildren join the family through the new spouse, investment in stepchildren may sometimes stem from mating effort rather than from parental investment, meaning that individuals invest in their stepchildren because they wish to act as good spouses to their partners (Daly & Wilson, 1988). Furthermore, investment in a stepchild is modified by several factors, including especially length of coresidence, strength of psychological attachment, and family resources (Rotkirch, 2018). Some children are also eventually adopted by their stepparents.

Contemporary adoption processes in high-income countries are legally regulated and can take several forms. Adoption can be domestic or intercountry and can happen between unrelated families (stranger adoption), within a family (e.g., adoption by a stepparent), or between relatives (kin adoption, e.g., adoption by an uncle or a grandparent). Kin adoption means that in some cases adopted children are genetically related to their adoptive parents and grandparents. Although proportions of kin adoption vary between countries, they represent a minority of all adoptions (Ryan et al., 2010; United Nations, 2009). Within-family adoptions often happen when stepparents adopt children of their spouses, meaning that in these circumstances the adoptive parent and grandparents are not genetically related to the adopted child.

Some evolutionary scholars have predicted that adoptive children should receive less parental investment compared to birth children (e.g., Salmon, 2005). This prediction has, in turn, led sociologists to argue that kin selection and evolutionary theory favor traditional "biological" families over "alternative" family forms, in which they include adoptive families (L. Hamilton et al., 2007). L. Hamilton and colleagues (2007) claim that possibly evolved parental attachment cues can "misfire," so that parents should invest equally in their biological, adopted, and stepchildren. Hence, some sociologists see adoption as a case that questions the validity of genetical relatedness as an important factor in kin relations.

The capacity to adopt is a species-typical trait, found not only in humans, questioning the usefulness of terms such as "alternative" and "misfire" used in the sociological critique. Furthermore, both the abovementioned sociological and the evolutionary claims ignore the role of psychological attachment and kin recognition for family relations. Psychological attachment between family members grows from coresidence in childhood as well as by other hormonal and social kin recognition cues related to parenting, familiarity, and similarity (Hrdy, 1999; Lieberman et al., 2007; Westermarck, 1921). In

our evolutionary past, such cues would sufficiently often have tracked actual genetical relatedness in order to function as its proxy in the process of natural selection; this does not mean that they always track actual genetical relatedness (Park et al., 2008). Psychological attachment is the proximate mechanism, by which child adoption, especially early in the child's life, often results in a strong family bond with similar levels of psychological attachment as to a birth child (Schnettler & Steinbach, 2011; Silk, 1990). Omitting gestation and lactation, the psychological parental attachment processes toward biological and adopted children are mostly similar to one another, indicating that there should not be substantial differences in the investment in biological and adopted descendants (Segal et al., 2015).

Accordingly, empirical studies have found that parental investment in adopted children usually does not differ from investment in biological children (Gibson, 2009; L. Hamilton et al., 2007; Segal et al., 2015). For instance, a recent nationwide U.S. study of child maltreatment reported lower rates of abuse and of child neglect with two biological or adoptive parents compared to families with a stepparent (Finkelhor et al., 2014). Once children are perceived as their parents' "own," this suggests they are also treated as such. But in addition to strong psychological attachment, several other factors may contribute to a better treatment of adopted children compared to stepchildren. First, in the minority of cases when adoption is implemented as kin adoption, the adoptive parents are actually genetically related to their adopted children, which is likely to favor investment through kin cues such as resemblance (Park et al., 2008). For instance, if an individual adopts the child of his or her full sibling, the adoptive parent will on average be 25% related to the adopted child. Hence by adopting kin, adoptive parents can increase their genetical inclusive fitness (W. D. Hamilton, 1964). This evolutionary benefit may explain why we originally evolved the capacity to adopt, since in the small-scale communities of our evolutionary past, most adopted children would have been at least a distant relative (Volk, 2011).

Second, investment in adoptive children can reflect their higher needs. Adopted children have often experienced some type of stressful event in connection with the separation from their biological parents and may therefore have greater needs for parental support (Gibson, 2009). For instance, adoptive parents of children aged 3–11 years in the UK reported higher parenting stress than other parents did, and these difficulties were related to greater difficulties with the child, including problems related to attachment (Harris-Waller et al., 2016). However, a recent review found only few differences in attachment and feelings of security in parent–child relations of adopted individuals later in life compared to nonadopted individuals (Raby & Dozier, 2018), indicating that possible initial challenges to the parent–child attachment pattern are usually overcome with time.

Third, adoptive parents are typically highly motivated and committed to parenting. They and their support networks are often thoroughly screened and tested before being allowed to adopt. Adoptive parents are also eager to fulfill all the norms of good parenting due to possible social stigma related to their nontraditional family circumstance (L. Hamilton et al., 2007). As a consequence, compared to birth parents, adoptive parents are selected to be highly motivated parents with adequate social and economic resources who may invest in their genetically unrelated children at least as much as average parents invest in their biological children.

Fourth, in the case of stepchild adoption, investment in adoptive stepchildren can reflect high mating effort as well as high commitment to spouses' children, perhaps in situations where strong bonds of attachment between adult and child have already developed. Finally, since adoption is often a result of unwanted medical infertility (United Nations, 2009), it can fulfill the adoptive parents' wishes to have a child and hence increase their psychological well-being providing a proximate if not an evolutionary benefit (Gibson, 2009; Volk, 2011).

What about grandparents? Although there are studies detecting parental investment in adopted children, to the best of our knowledge, no prior studies have compared grandparental investment in biological versus adopted children. Several studies have, however, compared grandparental investment in biological and stepchildren, detecting lower amounts of investment in stepchildren than in biological ones (e.g., Christensen & Smith, 2002; Eggebeen, 1992; Steinbach & Silverstein, 2019; Tanskanen et al., 2014), as would be predicted based on kin investment theory. Two recent studies also found that investment by step-grandparents in grandchildren appeared to be related to mating effort (Gray & Brogdon, 2017; Pashos et al., 2016), rather than grandparental investment, just as investment in stepchildren may be from the stepparents' perspective.

Probably, the most comprehensive study about grandparental investment in biological and nonbiological grandchildren was conducted by Coall and colleagues (2014). Using cross-national data from 11 European countries, they reported that biological grandparents are more likely to provide grandchild care than nonbiological grandparents. The main limitation of the study was, however, that the authors lumped adopted children and stepchildren who had children in the same category and treated them all as "nonbiological." This analytical strategy was likely due to the low number of adopted children; however, it is problematic as it ignores the differences in both psychological attachment processes and likelihood of genetical relatedness that can distinguish adopted and stepchildren, as we have outlined above.

We predict that grandparents treat adopted and biological grandchildren quite similarly, for several reasons. First, as discussed above, most parents attach to their adopted children as strongly as to their biological children, and broadly similar psychological processes can be expected concerning the child's grandparents. Second, although some factors such as physiological resemblance may diminish attachment and hence investment between adopted kin, other factors such as greater need and stronger motivation to provide care may lead both parents and grandparents to raise their investment in adopted

grandchildren. Third, through kin adoption, in some cases, the grandparents are actually related to their adopted grandchildren and can increase their inclusive fitness by investing in their descendants. Finally, modern adoption assessments often specifically investigate how the extended family would accept an adopted child, meaning that families who are granted adoption are likely to have motivated and supportive grandparents.

The Present Study

This study tests two hypotheses derived from kin selection, psychological attachment and compensation theories as discussed above. We use provision of grandchild care as a measure for grandparental investment and predict that grandparents invest more in biological grandchildren than in stepgrandchildren and that grandparents invest equally in biological grandchildren and in adopted grandchildren.

Materials and Methods

Generations and Gender Surveys

We use two data sets. The first data set is from the first wave of the Generation and Gender Survey (GGS) from nine countries, namely Bulgaria, Russia, France, Romania, Austria, Belgium, Lithuania, Poland, and the Czech Republic. The surveys were conducted between 2004 and 2011. The GGS provide large-scale, cross-national, and population-based surveys of individuals aged 18–79, and the cross-national response rate was 60% (Fokkema et al., 2016). The aim of GGS is to gather data on family and gender relations from both European and non-European countries, and the survey items include measures of social support, family structures, and socioeconomic characteristics (see Vikat et al., 2007, for the study design). Nonresponse analyses indicate that in many countries underrepresentation exists in the case of younger age-group and overrepresentation in the case of the oldest age-group (Fokkema et al., 2016). Women and individuals living in single-person households are also overrepresented. In most countries, highly educated individuals are overrepresented and individuals with low levels of education are underrepresented. There is also a slight response bias regarding marital status, so that in some countries married individuals are overrepresented and never-married individuals are underrepresented.

For this study, we selected all participants who have at least one child younger than 15 years at the time of the survey. Only respondents whose mother and/or father (i.e., the grandchild's grandmother or grandfather) was still alive were included (79.8% of participants with young children reported having biological mother and 64.2% biological father alive). These selections left us with data on 15,168 adult child–grandmother dyads and 12,193 adult child–grandfather dyads in the sample.

The dependent variable is grandparental childcare. In the GGS, all of the respondents who had children under age 14 in the household were asked: "Do you get regular help with childcare from relatives or friends or other people for whom caring for children is not a job? From whom do you get this help?" The list of possible childcare providers included respondents' mother and father (i.e., the grandchild's grandmother or grandfather), enabling us to measure grandparental childcare. The frequency of investment was measured by asking how many times a year, month, or week respondents' mothers or fathers have provided childcare. These responses were classified into three categories: never (0), a few times a month or less often (1), and at least weekly (2). Because the GGS did not directly ask whether the participant's mother or father have provided childcare, the number of grandparents who were reported to provide any childcare tend to be underestimated (Aassve et al., 2012). Although GGS data may for this reason not be the best source for estimating the total amount of grandparental childcare, it still provides good data for comparing childcare between different groups, which is the main aim of the present study which studies childcare provision to biological, stepchildren, and adopted grandchildren.

The main independent variable measures whether the participants (i.e., the middle generation of adult children) have birth children, adopted children, or stepchildren. From the grandparents' point of view, this variable includes information whether the "grandchild set" (i.e., the set of children of a specific adult child) includes "biological children only" (1), "adopted children only" (2), or "stepchildren only" (3). Families with "biological and adopted children," "biological and step children," and "biological children, adopted children, and stepchildren" were excluded because it was impossible to identify which type of child the grandparent actually looked after. Finally, to avoid unnecessary statistical noise, foster children were excluded from the sample because the GGS does not provide exact information on how they are related to responding parents.

The grandparental childcare variable had three ordered categories without equal spacing between the categories, and the regression models were fitted with ordered logistic regression ("ologit" command in statistical software Stata; see Liu, 2009). We controlled for several potentially confounding variables that have been shown to be associated with grandparental investment in prior studies (Tanskanen & Danielsbacka, 2019). The control variables are respondent's sex, age, financial condition (ranging from 1 = *household manages financially with great difficulty* to 6 = *household manages financially very easily*), marital status, number of children, age of youngest child, age of respondent's mother/father, time distance between respondent and mother/father in minutes, and country. In addition, survey year was controlled for (Mean = 2006.5, $SD = 2.39$). Bivariate correlations of the independent variables are presented in Appendix Tables A1 and A2 and based on them there are no problematic instances of multicollinearity. Descriptive statistics related to GGS measures are provided in Table 1.

Table 1. Descriptive Statistics of GGS (%/Mean).

	Grandmothers		Grandfathers	
	%/Mean	*SD*	%/Mean	*SD*
Adult child's child constellation (%)				
Biological children only	98.4		98.4	
Adopted children only	0.4		0.5	
Stepchildren only	1.2		1.1	
Adult child's sex				
Male	39.6		38.9	
Female	60.4		61.1	
Adult child's age (mean)	34.9	6.30	34.3	6.13
Adult child's number of children (mean)	1.8	0.85	1.8	0.81
Age of adult child's youngest child (mean)	5.8	4.01	5.4	4.03
Adult child's marital situation (%)				
No spouse	9.0		8.4	
Having a spouse	91.0		91.6	
Adult child's financial condition (%)				
Household manages financially with great difficulty	12.4		11.5	
With difficulty	15.5		14.7	
With some difficulty	29.7		28.8	
Fairly easily	28.0		29.4	
Easily	11.1		12.1	
Very easily	3.2		3.6	
Age of adult child's mother/father (mean)	60.6	8.34	59.9	7.83
Distance between adult child and mother/father (mean)	78.0	175.60	72.8	165.04
Country (%)				
Bulgaria	11.6		12.5	
Russia	10.9		9.5	
France	13.7		13.7	
Romania	7.4		7.2	
Austria	11.9		12.2	
Belgium	5.0		9.6	
Lithuania	9.9		9.4	
Poland	19.8		18.3	
The Czech Republic	9.8		7.6	
Grandparental childcare (%)				
Never	78.4		92.9	
Few times a month or less often	6.4		2.5	
At least weekly	15.2		4.6	

Note. In GGS adult children report the grandparental childcare provided by their parents. Grandmothers: $n = 15{,}168$; grandfathers: $n = 12{,}193$. GGS = Generation and Gender Survey.

Survey of Health, Ageing, and Retirement in Europe (SHARE)

The second data set used in the present study was drawn from the SHARE. The target population of SHARE consists of people aged 50 years or above who speak the official language of their country and who did not live abroad or in an institution during the fieldwork period. The aim of SHARE is to collect longitudinal data on the aging process of Europeans. The first SHARE wave was conducted in 2004 and 2005 with a cross-national response rate of 62% (De Luca & Peracchi, 2005). Although women tend to respond more actively than men and the oldest age groups less actively than the younger age groups, the nonresponse patterns in relation to both gender and age can be considered small (De Luca & Peracchi, 2005; see also Bergmann et al., 2017, for SHARE participation rates).

Here, we used the first (data collection in 2004 and 2005), second (2006 and 2007), fourth (2011 and 2012), and fifth (2013) waves of SHARE data including participants from 10 European countries, namely Austria, Germany, Sweden, the Netherlands, France, Denmark, Switzerland, Belgium, the Czech Republic, and Estonia. The third wave was a retrospective life history data collection wave, SHARELIFE, with different questionnaires and therefore excluded from the current study sample. We pooled all first-time respondents from SHARE Waves 1, 2, 4, and 5 in the analytic sample to achieve larger sample size. Only respondents who had at least one grandchild 14 years of age or younger were included. For the present study, the sample was constructed so that observations are the original respondent's (the grandparent's) adult children, resulting in a total of 45,522 observations of the middle generation (with on average 2.9 adult children per respondent). These represent 17,233 grandmother–adult child and 13,000 grandfather–adult child dyads.

The dependent variable measures grandparental childcare. In SHARE, all grandparents were first asked whether they had looked after their grandchildren without the presence of the parents. After that, grandparents were asked how often they have looked after their grandchildren. The alternatives were never (0), less often (than almost every month) (1), almost every month (2), almost every week (3), and almost daily (4). Grandparents were asked separately about providing childcare to the children of each of their four oldest adult children.

The main independent variable measures relationship type between grandparents and adult children. This variable indicates whether grandparents' adult children are biological children (1), adopted children (2), or stepchildren (3). SHARE does not have data on the relatedness between adult children and their children (i.e., the grandchildren for grandparents; Hank et al., 2018). To avoid unnecessary statistical noise, we again excluded foster children from the sample, as was done with the GGS sample.

The method of analysis is ordered logistic regression models. We control for several potentially confounding variables, including respondent's age, financial condition (ranging from 1 = *household manages financially with great difficulty* to 4 = *manages financially easily*), health (ranging from 1 = *no limited activities because of health* to 3 = *severely limited activities because of health*), marital status, gender of adult child, age of adult child, age of the youngest child of adult child, geographical distance between respondent and adult child (ranging from 1 = *living in same household* to 9 = *living more than 500 km away*), and country. We also included survey year in the list of covariates (Mean = 2008.6, $SD = 3.45$). Geographical distance was treated as continuous variable in the analyses. Because our data are clustered so that a respondent (i.e., a grandparent) may have grandchildren via several adult

Table 2. Descriptive Statistics of SHARE (%/Mean).

	Grandmothers		Grandfathers	
	%/Mean	*SD*	%/Mean	*SD*
Type of adult child who has children (%)				
Biological children	96.7		94.5	
Adopted children	0.5		0.7	
Stepchildren	2.8		4.8	
Adult child's sex (%)				
Male	48.0		47.9	
Female	52.0		52.1	
Adult child's age (mean)	37.7	6.51	37.2	6.43
Age of youngest child of adult child (mean)	6.13	4.24	5.8	4.18
Grandparent's age (mean)	63.7	7.85	65.7	7.82
Grandparent's financial condition (%)				
Household manages financially with great difficulty	9.2		5.5	
With some difficulty	25.4		20.6	
Fairly easily	33.8		35.1	
Easily	31.6		38.9	
Grandparent's health (%)				
No limited activities because of health	15.0		14.3	
Some limited activities	31.9		28.5	
Severe limited activities	53.1		57.2	
Grandparent's marital situation (%)				
No spouse	41.0		18.7	
Having a spouse	59.0		81.3	
Distance between grandparent and adult child (mean)	4.98	1.67	5.1	1.64
Country (%)				
Austria	8.6		7.8	
Germany	9.4		10.0	
Sweden	11.1		12.7	
Netherlands	9.8		10.6	
France	11.3		11.7	
Denmark	8.8		8.6	
Switzerland	4.5		5.8	
Belgium	11.8		13.0	
The Czech Republic	13.8		11.3	
Estonia	11.0		8.6	
Grandparental childcare (%)				
Never	44.2		51.7	
Less often (than almost every month)	16.9		16.6	
Almost every month	13.7		12.9	
Almost weekly	19.2		14.9	
Almost daily	6.1		4.0	

Note. In SHARE grandparents report how often they have looked after their adult children's children. Grandmothers: $n = 17{,}233$; grandfathers: $n = 13{,}000$. SHARE = Survey of Health, Ageing, and Retirement in Europe.

children, we used the statistical software Stata's (Version 15) cluster option to compute the standard errors. This method takes into account the nonindependence of grandparental childcare reported by the same respondent. The descriptive statistics related to SHARE data can be found in Table 2. Bivariate correlations of the independent variables are available in Appendix Tables A3 and A4 and they indicate no problematic instances of multicollinearity.

Results

Grandparental Childcare to Sets of Biological, Adopted, and Stepchildren (GGS)

First, we investigate with GGS data whether grandparents provide differential amounts of childcare toward their adult children who have biological, adopted, or stepchildren. Table 3 shows the results for grandmothers and Table 4 for grandfathers. The first regression models include only the child constellation variable. There is no statistically significant difference in the likelihood of childcare provided by grandmothers or grandfathers when grandchild sets include "adopted children only" compared to the reference category "biological children only." However, grandchild sets including "stepchildren only" have significantly lower probability to receive grandparental childcare than sets including "biological children only." The second regression model also includes characteristics of the adult children: gender, age, number of children, age of youngest child, marital situation, and financial condition. After adding these variables, the difference between "biological children only" and "stepchildren only" remained statistically significant, although for grandmothers the magnitude of the coefficient decreased from -1.10 to -0.82 (Table 3) and for grandfathers from -1.63 to -1.54 (Table 4). The third regression model additionally included grandparental age, geographical distance between adult children and grandparents, and country. After these variables were controlled for, grandmothers and grandfathers still have a higher probability to provide childcare to grandchild sets including "biological children only" compared to sets including "stepchildren only." Adding these variables influenced coefficients so that in the case of grandmothers they increased from -0.82 to -0.97 and in the case of grandfathers decreased from -1.54 to -1.51. The final regression model contained no statistically significant difference between sets including "biological children only" and sets including "adopted children only."

To illustrate the main findings, we calculated the adjusted means of grandparental childcare by adult children's child constellation from the linear regression models (Figure 1). In the fully adjusted regression model, the adjusted mean for grandmaternal childcare to biological children is 0.36 (95% confidence intervals [CIs] = [0.36, 0.38]), for adopted children 0.27 [0.09, 0.44]), and for stepchildren 0.19 [(0.09, 0.30]. The adjusted mean for grandfathers' childcare to biological children is 0.12 [0.11, 0.13], for adopted children 0.12 [0.01, 0.23], and for stepchildren 0.05 [−0.02, 0.12].

The final regression model in Tables 3 and 4 also show that, in addition to the child constellation variable, several other factors are associated with grandparental childcare. In the case of both grandmothers and grandfathers having fewer children, a lower age of the youngest grandchild in the set, a better financial situation and smaller geographical distance are associated

Table 3. Grandmothers' Childcare to Grandchild Sets Including Biological, Adopted, and Step-Grandchildren (GGS).

	Model 1			Model 2			Model 3		
	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*
Adult child's child constellation									
Biological children only	Ref			Ref			Ref		
Adopted children only	−0.38	0.34	.265	−0.43	0.35	.223	−0.39	0.36	.282
Stepchildren only	−1.10	0.27	<.001	−0.82	0.27	.003	−0.97	0.28	.001
Adult child's sex									
Male				Ref			Ref		
Female				0.38	0.04	<.001	0.36	0.05	<.001
Adult child's age				−0.02	0.004	<.001	−0.01	0.01	.101
Adult child's number of children				−0.18	0.03	<.001	−0.21	0.03	<.001
Age of adult child's youngest child				−0.07	0.01	<.001	−0.07	0.01	<.001
Adult child's marital situation									
No spouse				Ref			Ref		
Having a spouse				−0.64	0.07	<.001	−0.70	0.07	<.001
Adult child's financial condition									
Household manages financially with great difficulty				Ref			Ref		
With difficulty				0.09	0.08	.277	0.11	0.08	.171
With some difficulty				0.26	0.07	<.001	0.33	0.07	<.001
Fairly easily				0.26	0.07	<.001	0.36	0.08	<.001
Easily				0.52	0.08	<.001	0.51	0.09	<.001
Very easily				0.87	0.12	<.001	0.64	0.13	<.001
Age of adult child's mother							−0.01	0.004	.015
Distance between adult child and mother							−0.01	0.0004	<.001
Country									
Bulgaria							Ref		
Russia							0.46	0.08	<.001
France							0.40	0.11	<.001
Romania							−0.50	0.13	<.001
Austria							1.37	0.28	<.001
Belgium							0.67	0.33	.042
Lithuania							−0.31	0.16	.058
Poland							0.94	0.40	.019
The Czech Republic							−1.20	0.13	<.001
−2 log likelihood	19,752.186			19,108.605			17,830.116		
AIC	19,760.190			19,136.600			17,880.120		
BIC	19,790.690			19,243.380			18,070.790		

Note. In GGS adult children report the grandparental childcare provided by their parents. Grandmothers: $n = 15{,}168$. AIC = Akaike information criterion; BIC = Bayesian information criterion; GGS = Generation and Gender Survey.

with an increased probability for childcare. Parents who do not have a spouse are more likely to receive childcare help from their own mothers and fathers. In addition, when adult children and their mothers (i.e., grandmothers) were younger, there was an increased likelihood of grandmaternal childcare (there was no similar association with age for grandfathers). Furthermore, grandmothers are more likely to look after their daughters' children than their sons' children. Grandmothers and grandfathers are also more likely to provide childcare help when the adult children do not have a spouse. As the financial condition of adult children improves, also the probability of grandparental childcare increases. Both an increased number of grandchildren and an increased age of grandchildren are associated with decreased likelihood of childcare provision, and childcare is more likely with lower geographical distance. Country differences indicated that, Bulgaria being the reference, grandmaternal childcare provision is more likely in Russia, France, Austria, Belgium, and Poland, but less likely in Romania and the Czech Republic, while grandpaternal childcare provision is more likely in Russia and Austria and less likely in Lithuania.

Grandparents Look After Biological, Adopted, and Stepchildren's Children (SHARE)

Then, we investigate grandparental childcare provided to biological, adopted, and stepchildren (Tables 5 and 6). In the case of grandmothers and grandfathers and in all three steps (i.e., unadjusted, moderately adjusted and fully adjusted regression models), participants are as likely to look after their biological children's children and adopted children's children, and no statistically significant difference was detected in this regard. However, grandmothers and grandfathers were less likely to look after stepchildren's children than biological children's children.

Table 4. Grandfathers' Childcare to Grandchild Sets Including Biological, Adopted, and Step-Grandchildren (GGS).

	Model 1			Model 2			Model 3		
	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*
Adult child's child constellation									
Biological children only	Ref			Ref			Ref		
Adopted children only	0.02	0.52	.965	−0.04	0.53	.947	−0.07	0.53	.892
Stepchildren only	−1.63	0.71	.022	−1.54	0.72	.032	−1.51	0.72	.035
Adult child's sex									
Male				Ref			Ref		
Female				0.08	0.08	.283	0.05	0.08	.567
Adult child's age				0.004	0.01	.589	−0.01	0.01	.612
Adult child's number of children				−0.15	0.05	.003	−0.16	0.05	.002
Age of adult child's youngest child				−0.04	0.01	.001	−0.04	0.01	<.001
Adult child's marital situation									
No spouse				Ref			Ref		
Having a spouse				−0.86	0.11	<.001	−0.93	0.11	<.001
Adult child's financial condition									
Household manages financially with great difficulty				Ref			Ref		
With difficulty				0.01	0.15	.929	0.03	0.15	.828
With some difficulty				0.23	0.13	.074	0.27	0.13	.042
Fairly easily				0.16	0.13	.228	0.27	0.14	.060
Easily				0.33	0.15	.027	0.35	0.16	.031
Very easily				0.51	0.20	.012	0.34	0.22	.118
Age of adult child's father							0.01	0.001	.345
Distance between adult child and father							−0.004	0.00	<.001
Country									
Bulgaria							Ref		
Russia							0.33	0.15	.024
France							−0.03	0.19	.859
Romania							−0.44	0.23	.053
Austria							1.12	0.46	.015
Belgium							−0.14	0.54	.796
Lithuania							−0.64	0.29	.027
Poland							0.97	0.67	.145
The Czech Republic							0.11	0.20	.571
−2 Log likelihood	7,368.787			7,269.361			6,962.505		
AIC	7,376.787			7,297.361			7,012.505		
BIC	7,406.421			7,401.082			7,197.721		

Note. In GGS adult children report the grandparental childcare provided by their parents. Grandfathers: $n = 12{,}193$. AIC = Akaike information criterion; BIC = Bayesian information criterion; GGS = Generation and Gender Survey.

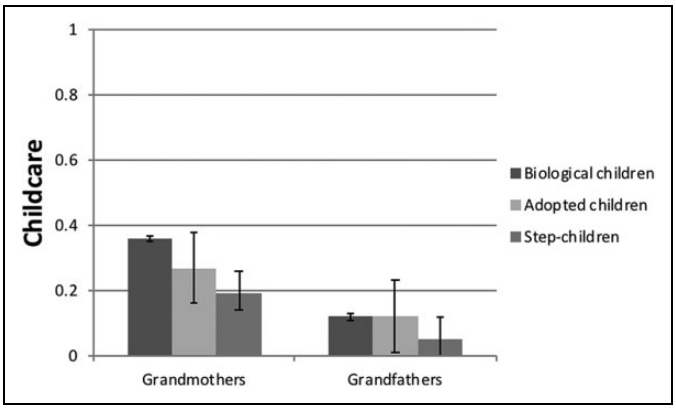

Figure 1. Grandparental childcare to grandchild sets including biological, adopted, and step-grandchildren (GGS; adjusted means and 95% confidence intervals).

These main results are illustrated by calculating adjusted means of grandparental childcare by adult children's child constellation from the linear regression models (Figure 2). In the fully adjusted regression model, the adjusted mean for grandmaternal childcare to biological children is 1.28 (95% CIs [1.26, 1.30]), for adopted children 1.34 [1.07, 1.62], and for stepchildren 0.64 [0.55, 0.73]. The adjusted mean for grandfathers' childcare to biological children is 1.04 [1.01, 1.06], for adopted children 1.09 [0.88, 1.31], and for stepchildren 0.90 [0.81, 0.98].

The final regression models also indicate other factors correlating with grandparental childcare (Tables 5 and 6). Grandmothers and grandfathers are more likely to channel care to their daughters' children compared to their sons' children, to younger adult children, and to those adult children who have younger children. Being younger, having a better financial

Table 5. Grandmothers' Childcare to Biological, Adopted, and Stepchildren (SHARE).

	Model 1			Model 2			Model 3		
	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*
Type of adult child who has children									
Biological children	Ref			Ref			Ref		
Adopted children	0.05	0.20	.804	−0.04	0.21	.834	0.14	0.22	.525
Stepchildren	−1.11	0.10	<.001	−1.22	0.10	<.001	−1.19	0.11	<.001
Adult child's sex									
Male				Ref			Ref		
Female				0.36	0.03	<.001	0.46	0.03	<.001
Adult child's age				−0.04	0.003	<.001	−0.02	0.004	<.001
Age of youngest child of adult child				−0.07	0.004	<.001	−0.08	0.005	<.001
Grandparent's age							−0.01	0.003	<.001
Grandparent's financial condition									
Household manages financially with great difficulty							Ref		
With some difficulty							0.22	0.07	.002
Fairly easily							0.32	0.07	<.001
Easily							0.43	0.07	<.001
Grandparent's health									
No limited activities because of health							Ref		
Some limited activities							0.31	0.05	<.001
Severe limited activities							0.40	0.05	<.001
Grandparent's marital situation									
No spouse							Ref		
Having a spouse							0.25	0.04	<.001
Distance between grandparent and adult child							−0.45	0.01	<.001
Country									
Austria							Ref		
Germany							0.21	0.09	.017
Sweden							0.23	0.08	.005
The Netherlands							0.18	0.09	.039
France							0.33	0.08	<.001
Denmark							0.23	0.08	.005
Switzerland							0.33	0.10	.001
Belgium							0.50	0.09	<.001
The Czech Republic							0.18	0.09	.038
Estonia							−0.05	0.09	.601
−2 Log likelihood	48,794.06			47,406.07			44,738.98		
AIC	48,806.06			47,424.07			44,792.98		
BIC	48,852.59			47,493.86			45,002.35		

Note. In SHARE grandparents report how often they have looked after their adult children's children. Grandmothers: $n = 17{,}233$. AIC = Akaike information criterion; BIC = Bayesian information criterion; SHARE = Survey of Health, Ageing, and Retirement in Europe.

condition, having better health, having a spouse, and living closer to the adult child are all associated with an increased likelihood to provide childcare among both grandmothers and grandfathers. Country comparisons show that in reference to Austria, grandmothers and grandfathers were more likely to provide childcare in Germany, the Netherlands, France, Denmark, Switzerland, and Belgium, and grandmothers were also more likely to provide grandchild care in the Czech Republic and Sweden, while grandfathers were less likely to do so in Estonia.

Discussion

We have investigated grandparental childcare channeled toward biological, adopted, and step-offspring with two cross-national surveys. The two data sets used here allow us to study grandparental behavior in two family situations, when the grandparents' adult children are biological, adopted, or stepchildren (SHARE) and when grandparents' adult children's children are biological, adopted, or stepchildren (GGS). Results from both data sets show that grandmothers and grandfathers provide more childcare to their biological than to their step-grandchildren. These findings are in line with inclusive fitness theory, predicting that individuals are more inclined to invest time and resources in their closely related biologically kin compared to nonrelated individuals (W. D. Hamilton, 1964) and with previous studies of variations in parental investment (Anderson, 2011). The results are also in accordance with prior studies showing that grandparents invest more in biological grandchildren than in step-grandchildren (e.g., Gray &

Table 6. Grandfathers' Childcare to Biological, Adopted, and Stepchildren (SHARE).

	Model 1			Model 2			Model 3		
	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*	Coefficient	*SE*	*p*
Type of adult child who has children									
Biological children	Ref			Ref			Ref		
Adopted children	0.08	0.19	.691	0.05	0.18	.792	0.11	0.18	.536
Stepchildren	−0.21	0.08	.008	−0.25	0.08	.001	−0.21	0.08	.012
Adult child's sex									
Male				Ref			Ref		
Female				0.35	0.03	<.001	0.45	0.04	<.001
Adult child's age				−0.03	0.003	<.001	−0.02	0.01	.001
Age of youngest child of adult child				−0.04	0.01	<.001	−0.05	0.01	<.001
Grandparent's age							−0.01	0.004	.036
Grandparent's financial condition									
Household manages financially with great difficulty							Ref		
With some difficulty							0.20	0.12	.094
Fairly easily							0.31	0.12	.008
Easily							0.52	0.12	<.001
Grandparent's health									
No limited activities because of health							Ref		
Some limited activities							0.23	0.07	.001
Severe limited activities							0.35	0.07	<.001
Grandparent's marital situation									
No spouse							Ref		
Having a spouse							1.05	0.06	<.001
Distance between grandparent and adult child							−0.42	0.01	<.001
Country									
Austria							Ref		
Germany							0.44	0.10	<.001
Sweden							0.19	0.10	.055
Netherlands							0.27	0.10	.007
France							0.49	0.10	<.001
Denmark							0.40	0.10	<.001
Switzerland							0.35	0.12	.002
Belgium							0.72	0.10	<.001
The Czech Republic							0.10	0.11	.336
Estonia							−0.25	0.12	.034
−2 Log likelihood	34,201.186			33,768.424			31,525.084		
AIC	34,213.190			33,786.420			31,579.080		
BIC	34,258.020			33,853.680			31,780.850		

Note. In SHARE grandparents report how often they have looked after their adult children's children. Grandfathers: $n = 13{,}000$. AIC = Akaike information criterion; BIC = Bayesian information criterion; SHARE = Survey of Health, Ageing, and Retirement in Europe.

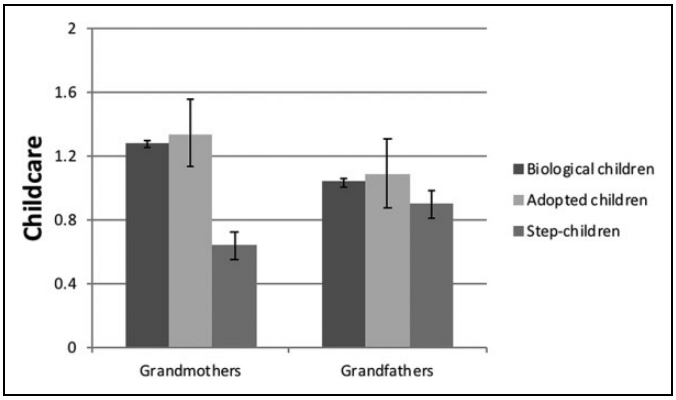

Figure 2. Grandparental childcare to biological, adopted, and step-children (SHARE; adjusted means and 95% confidence intervals).

Brogdon, 2017; Pashos et al., 2016; Steinbach & Silverstein, 2019).

Also as predicted, grandparents provided as much care to biological and adopted descendants. This was true for both grandmothers and grandfathers, as well as among both data sets used in the present study. Our predictions and results contradict the explanation proposed by some evolutionary scholars (e.g., Salmon, 2005), who suggested a straightforward relation between degree of genetical relatedness and parental investment. It also differs from the explanation by L. Hamilton and colleagues (2007) who posited no relation at all between degree of genetical relatedness and parental investment. In their two-generational study of parents and small children, the latter authors detected equal parental investment in biological and adopted children. The authors claim that nepotistic efforts

developed in the environment of evolutionary adaptiveness may "misfire" the kin selection mechanism of adoptive parents, which then invest in adopted children just as they would in biological ones. If parental and grandparental attachment mechanisms toward biological and adopted children are similar, the proposed "misfire effect" should also lead grandparents to invest more resources in adopted children than expected by genetical relatedness alone, which is exactly what we found in the present study.

However, the misfire hypothesis cannot explain why natural selection would not have acted against that capacity to adopt, that is, species-typical in humans and in many other species. Furthermore, L. Hamilton and colleagues (2007) argued that because of the misfire effect, individuals should invest equally also in biological and step-offspring. This was not the case in our study, or in other studies of parental and grandparental investments. The argument by L. Hamilton and colleagues (2007) appears to ignore the frequent differences in the family environment in adoptive parent and stepparent families. Adoptive children are acquired intentionally, meaning also that adoptive parents tend to be highly motivated to execute parental duties and responsibilities. This obviously also involves children adopted by their stepparents, which reflects an extremely high involvement in spouses' children. In contrast, investment in stepchildren may be more related to mating effort than an involvement in stepchildren as such, especially if the stepparent or step-grandparent does not join the family when the child is very young (Daly & Wilson, 1988; Gray & Brogdon, 2017). Overall, there appears to be a different evolutionary logic, different proximate attachment processes, and different kin recognition cues behind the investment channeled toward adopted offspring and step-offspring. Future research should take this complexity into account when investigating biased kin investments; such an investigation would necessitate more information from all family members involved than was available in our data.

Adopted children are often in a more vulnerable position than nonadopted children and, consequently, in greater need of kin support (e.g., Gibson, 2009). Hence, the similar investments in biological and adopted grandchildren may also reflect a tendency to channel investments to the descendants who need them most (Snopkowski & Sear, 2015). It has also been suggested that adoptive parents may overcompensate the investment they make in their adopted children, for instance, in order to live up to social norms (L. Hamilton et al., 2007; Segal et al., 2015); this argument can be extended to grandparents, although we are not aware of empirical support for this hypothesis. Our data do not allow us to distinguish between the different processes possible channeling investment decisions, and more research is needed in the various factors boosting grandparental investments in adopted grandchildren.

The present study has several strengths. One of the advantages is that we used two population-based and cross-national surveys from mostly European countries. These had self-reported data from both adult children (GGS) and grandparents (SHARE). Results from both these data lead to similar conclusions, underscoring the robust and convincing nature of our findings. These surveys are also valuable since population-based data need to be sufficiently large to include a sufficient number of adoptions. Even in countries with the largest number of adoptions, only less than 500 adoptions are executed to every 100,000 births (United Nations, 2009). Moreover, large-scale surveys that gather information on both adoptive families and grandparental relations are rare: The GGS and SHARE data sets analyzed here belong to this exceptional group of surveys. These two surveys also include information on several factors, which have been shown to associate with grandparental investment in prior studies, enabling us to control for potential confounding variables. In line with previous research, we found regarding these controlling variables that grandparental investment tends to be larger among maternal kin, younger grandparents, with close geographical proximity, and with fewer grandchildren (Szydlik, 2016; Tanskanen & Danielsbacka, 2019). One interesting exception from previous findings was that in the GGS data, an improved financial situation of the grandchild's family was associated with more grandparental care, although other studies have found that grandparental childcare provision often increases during duress (Tanskanen & Danielsbacka, 2019), in line with the view that grandparental investment reflects both their capacity to invest and the need of the recipient. The GGS result reported here may of course still reflect need, for example, greater need for childcare if the household situation improves due to longer working hours of the child's parents but would merit further exploration in future research.

Among the limitations of the present study is that, due to the low number of adoptees, statistical power decreases. In addition, grandparental investment was measured by only one variable, grandparental childcare. Although it has been shown that different grandparental investment variables tend to correlate with one another (e.g., Pollet et al., 2009), it would be worthwhile to use other factors such as contact frequency, emotional support, or financial transfers while investigating biased grandparental investment. This would also allow for a better picture of grandparental investment patterns when the grandchildren are older and no longer in need of childcare providers. A limitation of the GGS is that we could study grandparental childcare toward "grandchild sets," but not to individual grandchildren. One of the limitations in the SHARE data is that it lacks information about the relatedness between adult children and their children (Hank et al., 2018). Despite these data limitations, GGS and SHARE provide unique information on grandparental investments toward adopted descendants that is rarely available in other studies, as stressed above.

Due to the very low number of adoptees in the data for each country studied in SHARE and GGS, it was impossible to study country-based differences in grandparental investment toward adopted grandchildren. Neither could we here distinguish between adoptions between unrelated families, kin adoptions, and adoptions by stepparents. In contemporary Western societies, most adoptions take place between nonkin (i.e., children are adopted either by stepparents or between unrelated families), meaning that in most cases grandparents are not

genetically related to their adopted offspring. However, future studies would benefit from data enabling a more detailed study of the potential effect of the type of adoption on kin investment.

Finally, the GGS and SHARE data lack information on how long adopted and stepchildren have lived with their current parents and thus on how much time grandparents have had to develop close relationships with these children. Duration of coresidence and close contacts in childhood should affect attachment between family members and may thus substantially influence kin relationships and grandparental investments (Rotkirch, 2018); however, we are not aware of any studies on this topic. How long the child has been living in the family may also have different consequences for adopted children and stepchildren, especially when grandparental investment in stepchildren is based on mating effort rather than (grand)parental investment (Gray & Brogdon, 2017; Pashos et al., 2016). Future studies should carefully consider how duration of childhood coresidence relates to grandparental investment in different family types.

The present study is to the best of our knowledge the first to investigate grandparental investment distinguishing between biological children, stepchildren, and adopted children. As expected, grandparents invested more in their biological children than in their stepchildren. Crucially, we demonstrated for the first time that grandparental investment directed toward biological and adopted grandchildren tends to be of similar magnitude. These findings provide arguments for a more nuanced view of how genetical relatedness and adoption shape family behavior in contemporary societies. The case of adoption illustrates how the human capacity to adopt and attach to a child can create strong grandparent–grandchild bonds and yet belong to the biological repertoire of human family behaviors.

Appendix

Table A1. Bivariate Correlations of Dependent Variables for Grandmothers (GGS).

	1	2	3	4	5	6	7
1. Adult child's sex	—						
2. Adult child's age	**−.16**						
3. Adult child's number of children	**.03**	**.30**					
4. Age of adult child's youngest child	**.03**	**.52**	.003				
5. Adult child's marital situation	**−.21**	**−.04**	**.04**	**−.12**			
6. Adult child's financial condition	**−.04**	**.06**	**−.07**	**−.06**	**.17**		
7. Age of adult child's mother	**−.12**	**.77**	**.23**	**.38**	**−.03**	**.09**	
8. Distance between adult child and mother	**.02**	**.04**	**.02**	−.01	**−.02**	−.01	**.04**

Note. Grandmothers $n = 15{,}168$. GGS = Generation and Gender Survey. Boldface numbers indicate significant associations: $p < .05$.

Table A2. Bivariate Correlations of Dependent Variables for Grandfathers (GGS).

	1	2	3	4	5	6	7
1. Adult child's sex	—						
2. Adult child's age	**−.17**						
3. Adult child's number of children	**.03**	**.32**					
4. Age of adult child's youngest child	**.03**	**.52**	**.02**				
5. Adult child's marital situation	**−.19**	**−.04**	**.04**	**−.12**			
6. Adult child's financial condition	**−.04**	**.10**	**−.05**	**−.05**	**.16**		
7. Age of adult child's father	**−.12**	**.76**	**.25**	**.39**	−.02	**.11**	
8. Distance between adult child and father	**.03**	.02	.01	**−.02**	−.01	−.01	**.03**

Note. Grandfathers: $n = 12{,}193$. GGS = Generation and Gender Survey. Boldface numbers indicate significant associations: $p < .05$.

Table A3. Bivariate Correlations of Dependent Variables for Grandmothers (SHARE).

	1	2	3	4	5	6	7
1 Adult child's sex	—						
2 Adult child's age	**−.13**						
3 Age of youngest child of adult child	**.02**	**.55**					
4 Grandparent's age	**−.10**	**.79**	**.41**				
5 Grandparent's financial condition	−.01	**.06**	**−.04**	**.10**			
6 Grandparent's health	**.02**	**−.07**	**−.07**	**−.06**	**.20**		
7 Grandparent's marital situation	.0001	**−.16**	**−.11**	**−.18**	**.24**	**.07**	
8 Distance between grandparent and adult child	.01	**.09**	**−.03**	**.07**	**.06**	**.03**	.01

Note. Grandmothers: $n = 17{,}233$. SHARE = Survey of Health, Ageing, and Retirement in Europe. Boldface numbers indicate significant associations: $p < .05$.

Table A4. Bivariate Correlations of Dependent Variables for Grandfathers (SHARE).

	1	2	3	4	5	6	7
1. Adult child's sex	—						
2. Adult child's age	**−.13**						
3. Age of youngest child of adult child	**.02**	**.56**					
4. Grandparent's age	**−.09**	**.77**	**.40**				
5. Grandparent's financial condition	.01	**.12**	−.004	**.14**			
6. Grandparent's health	.01	**−.05**	**−.06**	**−.07**	**.21**		
7. Grandparent's marital situation	−.01	**.02**	**−.02**	.01	**.08**	**.02**	
8. Distance between grandparent and adult child	**.02**	**.06**	**−.05**	**.04**	**.08**	**.04**	**−.03**

Note. Grandfathers: $n = 13{,}000$. SHARE = Survey of Health, Ageing, and Retirement in Europe. Boldface numbers indicate significant associations: $p < .05$.

Declaration of Conflicting Interests

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