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ORIGINAL INVESTIGATION

Intergenerational contact beyond the dyad: the role of the sibling network

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Abstract In this paper we aim to reach beyond the dyadic perspective on intergenerational contact and examine the influence of the sibling network on parent–child contact. We include aggregate sibling network characteristics as well as the adult child's position in the network vis-à-vis siblings, and use data from the Netherlands Kinship Panel Study (2002–2004 NKPS; N = 4,601 dyads). Regarding aggregate network characteristics results show that having sisters, having stepsiblings, increasing geographical distance between siblings, and decreasing levels of network cohesion are associated with less contact per parent–child dyad. Regarding the position of the adult child vis-à-vis his or her siblings, results show that having geographically or emotionally closer siblings has a negative effect on parent–child contact. The impact of differences in emotional distance among siblings is stronger when the analyses are limited to parents in poor health. Suggestions for future research are made.

Keywords Frequency of contact · Parent–child relationships · Sibling network

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Introduction

Studying parent–child face-to-face contact is of high societal interest in present-day society, because it helps to predict under what conditions ageing parents lack practical support and possibly require formal services (Litwak and Kulis 1987). Most research on parent–child contact has focused on the relationship a parent has with a specific child: the oldest, the one who lives nearest, the most supportive, or the one with whom the parent has the closest relationship (Rogerson et al. 1993). A drawback of such a selection is that one is left guessing about the role of the other siblings. In this study we investigate a representative sample of randomly selected parent–child dyads.

Apart from geographic proximity (Litwak 1960), family size has been shown to be a strong determinant of intergenerational contact (Fokkema et al. 2003; Tomassini et al. 2004; Uhlenberg and Cooney 1990). Adult children with several siblings interact less frequently with their parents than those from small families. We will argue that siblings influence the relationships children have with their parents in more ways than just through their numbers (McHale and Crouter 2004).

The sibling tie is the family relationship with the longest duration (Matthews 2002; Voorpostel 2007). Although investments in parent–child relationships are essentially dyadically based, they are subject to the influence of the network in which they are embedded (cf. Uehara 1990). Parent–child ties within a family are characterized by interdependency: A child's interactions with its parents are influenced by the position of that child within the sibling network (cf. Thibaut and Kelley 1959). In this study we examine (a) characteristics of the sibling network, and (b) the position of the adult child vis-à-vis its siblings. Our research question is: To what extent are differences in adult

child-parent contact accounted for by aggregate characteristics of the sibling network and by the position of the adult child in that network?

Dyadic contact within networks

Most studies on intergenerational contact are dyadically based. In general, individuals vary in the need for and opportunities to contact their parents or children. Needs are structured by biographical time (Rossi and Rossi 1990). In the establishment phase of early adulthood the child generally needs more parental attention (Gulbrandsen and Langsether 2000). In old age, health problems occur and the parents' authority tends to decline as their dependency increases and the authority of children over their parents' lives grows (George 1986).

Opportunities for parent–child contact are enhanced if the investment of time and effort to get together are low. Findings consistent with these ideas come from a wide range of North American and European studies. For instance, contact frequency is higher if perceived family values are more traditional: adherence to such values appears to motivate family members to maintain contact (e.g. Tomassini et al. 2003). Contact frequency is lower if the two homes (geographical) or hearts (emotional) are more distant (e.g. Lawton et al. 1994).

Contact can also be seen as a return on investments made by parents in their offspring earlier in life, such as love, care and money (Silverstein 2004). Parent–child contact frequency has also been shown to be higher if parental investments during childhood were larger in terms of time (Grundy 2005; Silverstein et al. 2002) or affection (Downey 1995; Kaufman and Uhlenberg 1998).

In this paper we aim to reach beyond the dyadic perspective and use a social network approach (Widmer and La Farga 2000) based on the influence of the sibling network on parent–child contact. To the extent that network characteristics have been considered, there has been a focus on gender composition (Spitze and Logan 1991), birth-order effects (Houser et al. 1985), and the number of siblings (Downey 1995). In our view much is to be gained from a focus on the adult child vis-à-vis his or her siblings. We argue that parent–child interactions are structured by the presence and behavior of siblings (cf. Hechter 1987). Matthews (2002), who conducted in-depth interviews with complete sets of siblings, showed, for example, that expectations about what siblings will do served in an adult child's decision to provide help and companionship to parents.

Using conceptual tools from social network research, we will venture beyond the dyadic approach in two ways. First, we will focus on the effect of being part of a particular sibling network and formulate hypotheses about aggregate characteristics of the sibling network. The aim here is to explain variation in contact among parent–child dyads across families. Second, we will examine the child's position in the sibling network in order to explain variation in contact between parent–child dyads within the same family. We will do so by comparing frequency of contact in relation to the sibling network average.

Hypotheses

Network characteristics

Size

The investment in an intimate relationship depends strongly on the number of alternative exchange partners (cf. Thibaut and Kelley 1959). A consistent finding is that each additional sibling lowers the average investment (e.g. contact and support) in single parent–child ties (see for overviews: Lye 1996; Steelman et al. 2002). We expect that the larger the size of the sibling network, the lower the frequency of parent–child contact (H1).

Gender composition

The common role of women in families is the one of 'kinkeeping'. Women tend to invest more time in family ties than men do. Sisters are more likely to feel responsible for personal contact, information flow, domestic maintenance, and the organization of ritual occasions (Rosenthal 1985). And if parents need more care due to health problems, daughters tend to be (and are expected to be) the coordinators of care because they are ascribed to have more specialized knowledge about caring than sons do (Hequembourg and Brallier 2005). We are interested to know whether having sisters leads to less contact with parents than having brothers. We expect that the larger the number of sisters in the sibling network, the lower the frequency of parent–child contact (H2).

Spacing

It has been argued in evolutionary psychology that closer age spacing increases competition among siblings for parental resources because the children have similar age-linked needs (Hertwig et al. 2002). Parents of closely spaced siblings are preoccupied with meeting the developmentally dependent demands of their offspring, such as feeding, monitoring, or care during illness. This preoccupation

lowers the quantity and quality of the parental investment per child and consequently leads to fewer mutual time investments in later life (cf. Uehara 1990). We expect that the closer the spacing of siblings, the lower the frequency of parent–child contact (H3).

Stepsiblings

Divorce creates smaller, disrupted family networks, in which primary biological kin grow up in separate households. Repartnered parents invest less in young stepchildren than in their biological offspring (Zvoch 1999). In families with members of mixed biological origin, more ambiguity and stress within parent–child dyads has been found, which relates negatively to contact (Stewart 2005). We expect that the presence of stepsiblings is associated with lower frequency of parent–child contact (H4).

Geographic dispersion

If the siblings' homes are located closer to each other, they have more opportunity for contact. In geographically more dispersed networks, the level of sibling contact tends to be lower. Siblings in such networks might coordinate visiting their parents more often and use the parental home as a meeting point, such as at Christmas or birthdays. On average, however, fewer spontaneous visits will occur. And if the son and daughter live on opposite sides of the country, it is unlikely that parents will visit both. Especially in cases where a parent needs extra care, sibling contact and coordination can be an important instrument to arrange support for the parent more efficiently and more equitably (Ingersoll-Dayton et al. 2003). We expect that the greater the geographic dispersion, the lower the frequency of parent–child contact (H5).

Cohesion

Having said that, siblings may still have strong ties and build a cohesive family group even if they live at a great distance from each other. They can instantly call and send each other e-mails or text messages. Cohesive networks facilitate contact because group norms tend to be stronger and the quality of network ties is higher in cohesive networks (Hechter 1987). Siblings in more cohesive networks are likely to exchange more information about their parents and to coordinate visits to the parental home so that they can also get together themselves. We expect that the lower the network cohesion, the lower the frequency of parent–child contact (H6).

Position in the network

Relative geographical distance

We know that in case of an emergency, adult children visit and support their parents more often than do other network members (Hogan and Eggebeen 1995). But this is not only so in the case of need. If siblings live at varying distances from their parents, there is a high probability that those who live closest will visit their parents and vice versa, even if the difference in traveling time is only a few minutes (Matthews 2002). We expect that if a child has a sibling who lives closer to the parent than him/herself, the frequency of contact with the parent will be lower than if the child is the one who lives closest (H7).

Relative emotional distance

Emotional closeness is associated with relational strength, which is a tie-specific asset and cannot be transferred from one tie to another (Lawler and Yoon 1996). Parents and children who are emotionally close are likely to invest more in their relationship and spend more time together than parents and children who are not emotionally close (Rohde et al. 2003). We expect that if a child has a sibling who is emotionally closer to the parent than him/herself, the frequency of contact with the parent will be lower than if the child is the one who is emotionally closest (H8).

Unequal financial support

Although parents generally strive to treat their children equitably (Silverstein 2004), some children end up receiving more financial support than others because their needs are greater and parents respond to these needs (Kunemund et al. 2005). Siblings on their part tend to compare what parents give each of them, and are sensitive to acts of favoritism. What happens if the parent gives a large sum of money to one child, but not to the other? From an exchange perspective, the prediction is that contact with the 'relatively neglected' child is negatively affected. We expect that if a child has a sibling who receives financial support whereas he/she does not, the frequency of contact with the parent is lower than if the child is the one who is financially benefited (H9).

Birth order

The first-born has a unique status within the sibling network, contrary to the middle child and last-born (Kidwell 1981). Studies on social mobility have shown that parents invest more in first-born than they do in later-born children (see for an overview, Steelman et al. 2002). Based on exchange arguments, we expect that in later life the return on these investments between first-born and parents is higher than in other parent–child dyads. We expect that later-born children have less contact with their parents than do first-borns (H10).

Method

Data

The data are from the public release file of the Netherlands Kinship Panel Study (NKPS), a large-scale survey on the nature and strength of family ties in the Netherlands (Dykstra et al. 2005). Between 2002 and 2004 computer-assisted personal interviews were held with 8,161 men and women aged 18–79 who formed a random sample of adults residing in private households in the Netherlands. Approximately 5% of respondents were non-native Dutch, meaning that both parents were born outside the Netherlands. The response rate was 45%, which is comparable to that of other large-scale family surveys in the Netherlands (see Dykstra et al. 2005).

One advantage of the NKPS data set is that it provides information about many different kinds of family relationships: ties with the partner, with parents, siblings, children, in-laws, and with friends. We focus on those individuals (N = 2,583) who had at least two adult children (i.e. 18 years or over)—either biological, adoptive or stepchildren. During the computer-assisted interview with these parents, background information, including frequency of contact and residential address, was first collected on all living offspring. Subsequently, two adult children were randomly selected (if the parent had more than two children), and additional questions (e.g. emotional closeness) were asked about the relationship with them. The parent and these two randomly selected children form the dyads under study, with the exception of 507 adult children who were living outside the Netherlands or were living in the same household as the parent. We also left out 29 parents for whom we had insufficient information about their children. As a result we had 2,554 parents (i.e. primary NKPS respondents) in the analyses who reported on 4,601 adult children. Note that only 0.71% of the adult children were adopted; given the small number we did not introduce the characteristic 'adopted' as a separate variable in the analyses.

Measures

Dependent variable

Frequency of contact We have information on contact frequency (visiting) between the parent (i.e. the primary NKPS respondent) and all of his/her children. We used two types of measures for our dependent variable. First, to investigate differences among all dyads we used a continuous measure: Contact frequency is expressed as the number of times an adult child and his/her parent met in the past 12 months. For convenience of interpretation of our results, we constructed a continuous measure by recoding the variable in the following way: Daily contact (300), a few times a week (156), weekly (52), monthly (12), a few times (4), once (1) and not at all (0) (Kalmijn 2006). Secondly, to investigate differences within networks, we used a dichotomous measure: Whether (1) or not (0) the adult child in the dyad under study had fewer contacts with the parent than the network average.

Independent variables

Network characteristics The network characteristics pertain to all, not only to the two selected adult children. *Size* is the number of living siblings. *Gender composition* is (a) the number of sisters and (b) the number of brothers in the network. We will explore whether it is more informative to use overall network size or the two-gender composition measures instead. *Spacing* is the number of years between the births of all siblings in a family, divided by the total number of spaces between siblings (= number of siblings minus 1). *Stepsiblings* is a dichotomous measure of whether (1) or not (0) there are stepsiblings in the network. *Geographic dispersion* is the average logged geographical distance between the homes of all siblings in a family. For those residing in the Netherlands, geographic distance was based on six-digit postal code information. The geographic dispersion network measure includes all siblings. We inserted the maximum distance if a particular sibling lived abroad or if two siblings lived in two different countries outside the Netherlands (300 km.). We inserted the average distance between siblings (36 km.) if there was no address information on one sibling or if two siblings lived abroad but in the same country. *Cohesion* is a family-level measure using a scale of four items. An example is: 'The ties between members of my family are tightly knit' (Cronbach's $\alpha = 0.85$). This information is obtained from the parent's supplemental self-completion questionnaire. The scores range from 0 (no cohesion) to 16 (strong cohesion).

Position in the network As described previously, the NKPS dataset has information on the residential location of all adult children. We use a dichotomous measure for *relative geographical distance*. The score is (1) if any other adult child lives nearer to the parent than the adult child in the dyad under study and (0) if this is not the case. We only have information on emotional distance and the receipt of financial support for two, randomly selected children. *Relative emotional distance* is also based on a dichotomous measure. The adult child is (1) or is not (0) emotionally more distant from the parent than the other randomly selected adult child. Emotional distance is assessed with the (reversed) measure for relationship quality, scaled from 0 through 3, as an answer to the question: 'Taking everything together, how would you describe the relationship with your child: not great (3), reasonable (2), good (1), or very good (0)?' *Inequitable financial support* is whether the randomly selected child did not (1) receive a large sum of money (>500 Euros) in the past three months or regular financial support whereas the other randomly selected adult child did (0). If both received financial support or if neither received financial support a score of (0) is assigned. Finally, the adult child may be the first-born (1) or not (0).

Control variables The *gender* of the parent and the adult child were introduced as controls. The *age* of the parent was measured continuously; age squared checks for linearity. The *health* of the parent is a dichotomous measure: (0) not limited, (1) somewhat or severely limited, based on self report. The question was as follows: '*To what extent are you limited in your daily activities by prolonged illnesses, health disorders or handicaps? Do you have severe limitations, mild limitations, no limitations?'* A dummy variable was constructed to distinguish whether the parent (1) ever *divorced* or (0) not, as divorce has been shown to be associated with lower levels of intergenerational contact in later life (Dykstra 1998). We also control for whether the adult child (1) is step or (0) biological offspring. *Geographical distance* was measured as the logged kilometers between the homes of the adult child and the parent. We controlled for the *emotional distance* within the dyad under study, and for whether the adult child had not (1) or had (0) received *financial support*.

Analysis

We first used OLS regression analysis to analyze the *continuous measure for contact frequency* within the dyads under study. Before doing so, we checked whether recoding the ordinal measure into a continuous one was a valid decision by conducting an ordered logistic regression model using the original coding: Recoding did not affect our main results (results can be obtained from the first author upon request). We then applied logistic regression analysis and estimated the likelihood that the adult child in the dyads under study had *less contact with the parent than the sibling network average*. As parent–child contact is more critical and differences in the network position between siblings might become more important if the parent is in greater need of support due to health problems, we also carried out both analyses for the dyads of parents reporting to be limited due to health problems.

As we used a large-scale survey and concentrated our analysis on one or two randomly selected parent–child dyads per family network, we have a highly differentiated sample of dyads from a representative pool of families. In addition, our data have a hierarchical structure: some variables were measured at the level of each child and some at the level of the parent and sibling network. Because parent–child dyads within the same families cannot be treated as independent observations—as siblings share the same parent and the same sibling network—we used the *cluster* option in the Stata SE/9 statistical package to correct the biased standard errors (see, e.g., De Graaf and Fokkema 2007). We also estimated multilevel latent variable models (using *gllamm* in Stata SE/9), but ultimately opted for the more straightforward analyses as the results were basically the same.

Results

Descriptive results

Table 1 gives a description of the dependent variables used in the analyses. We computed the means on a sample of one randomly selected adult child per parent. The ordinal

Table 1 Descriptive information on the frequency of contact between the primary respondent and a randomly selected adult child (N = 2,554)

	M	Range
Frequency of annual face-to-face contact (ordinal)		
Daily	0.07	0–1
A few times a week	0.17	0–1
At least once a week	0.30	0–1
At least once a month	0.30	0–1
A few times	0.12	0–1
Once	0.01	0–1
Not at all	0.03	0–1
Number of annual face-to-face contact (continuous)	69.27	0–300
Annual face-to-face contact less than network average (%)	0.32	0–1

Note: Analyses based on weighted data and means are computed on a sample of one randomly selected adult child per parent

measure of annual face-to-face contact reveals that about 55% of the Dutch parents and randomly selected non-coresident adult children see each other at least once a week. This is a lower percentage than that found in other Dutch studies (e.g. Fokkema et al. 2003) where the adult child had not been selected randomly, but on the basis of importance (e.g. the geographically closest, the most supportive). The claim that we are using a more differentiated sample of dyads appears to be justified. On average, adult children and parents have about 70 face-to-face contacts a year. 32% of all adult children have fewer contacts than the network average, 31% have more contacts with their parent than the network average, and 37% have as many contacts as the network average.

Table 2 gives a description of the independent variables used in the analyses.

Network characteristics

The 2,554 parents studied had an average of 2.86 adult children; 1.42 sons and 1.44 daughters. The average spacing between siblings was 3.37 years. In 5% of the cases, at least one stepchild was present in the networks. Dutch adult siblings lived approximately 36 km apart.

Table 2 Descriptive information on the network and dyadic predictors of contact frequency (N = 2,554)

	M	Range
Network characteristics		
Number of siblings	2.86	2–11
Number of brothers	1.42	0–9
Number of sisters	1.44	0–8
Spacing (years)	3.37	0–28
Stepsibling(s) (yes)	0.05	0–1
Geographical dispersion (in km)[a]	35.88	0–300
Cohesion	10.81	0–16
Position in the network		
Relative geographical distance (higher)	0.46	0–1
Relative emotional distance (higher)	0.10	0–1
Inequitable financial support (yes)	0.05	0–1
First-born (yes)	0.45	0–1
Control variables		
Mother (yes)	0.49	0–1
Age parent (years)	61.01	34–79
Parent poor health (yes)	0.30	0–1
Parent ever divorced (yes)	0.18	0–1
Daughter (yes)	0.51	0–1
Stepchild (yes)	0.01	0–1
Geographical distance parent-child (inn km)[a]	29.82	0–264
Emotional distance	0.57	0–3
Financial support received by the child (no)	0.81	0–1

Note: Analyses based on weighted data and means are computed on a sample of one randomly selected adult child per parent

[a] Zero km if living in the same postal code area

Position in the network

Forty-six percent of the adult children had at least one sibling living closer to the parental home. Ten percent had a greater emotional distance from the parent than the other randomly selected adult child (the majority (78%) of the parents rated the emotional bond with both children equally). One-tenth of the adult children did *not*, whereas a brother or sister did receive a large sum of money or regular payments in the past three months. Forty-five percent of the adult children were first-born.

Control variables

Approximately equal numbers of fathers and mothers and of sons and daughters were in the sample. Thirty percent of the parents were somewhat or severely limited due to health problems. About one-fifth of the parents had ever separated or divorced. Dutch parents and children lived approximately 30 km apart; on a scale from 0 to 3 the average emotional distance was 0.57. Of all adult children, 19% had received a large sum of money in the past three months or received regular payments.

Multivariate results

Contact frequency

Table 3 presents the results of the OLS regression estimating the frequency of annual face-to-face contact in the parent–child dyads.

Network characteristics

Model 1 supports hypothesis one, that having siblings is associated with lower frequency of contact per dyad. However, Model 2 reveals that it is better to distinguish between numbers of brothers and sisters than to consider network size alone. The explanatory power lies in the number of sisters (H2). The more sisters, the lower the contact frequency per dyad. We continue with the full model (Model 3), which includes the network characteristics, the position in the network, controlled for dyadic variables. Sibling spacing (H3) shows no significant effect. Having stepsiblings reduces the contact frequency by more

Table 3 OLS regression contact frequency

Models	(1) (N = 4,601)	(2) (N = 4,601)	(3) Full model (N = 4,601)	(4) Parent poor health (N = 1,496)
Network characteristics				
Number of siblings	−2.33	–	–	–
Number of brothers	–	−.83	−.91	−1.11
Number of sisters	–	−3.79*	−3.62**	−3.39*
Spacing (years)	0.77	0.80	0.79	0.08
Stepsibling(s) (yes)	−14.26*	−14.30*	−15.09**	−7.15
Geographical dispersion (logged)[a]	−2.56*	−2.50*	−2.41*	−1.84
Cohesion	1.54**	1.55**	1.56**	1.34
Position in the network				
Rel. geograph. distance (higher)			−2.28	−2.97
Rel. emotional distance (higher)			−13.63**	−12.35*
Inequitable financial supp. (yes)			−6.96	1.53
First-born (yes)			−1.58	−1.03
Control variables				
Mother (yes)	3.57	3.58	3.89	0.87
Age parent (years)	−4.66*	−4.69*	−4.54*	−5.58
Age parent (squared)	0.03	0.03	0.03	0.03
Parent poor health (yes)	6.17*	6.15*	6.09*	–
Parent ever divorced (yes)	−15.09**	−15.20**	−14.85**	−14.62**
Daughter (yes)	13.22**	16.18**	15.48**	18.61**
Stepchild (yes)	−1.10	−1.22	0.42	–
Geogr. dist. parent-child (logged)[a]	−26.32**	−26.36**	−26.01**	−27.61**
Emotional distance	−15.20**	−15.17**	−12.27**	−14.24**
Fin. supp. received by child (no)	−8.32*	−8.27*	−7.84*	−12.80
Constant	317.65**	316.93**	312.07**	364.07**
R-squared	0.31	0.33	0.35	0.34

Note: Standard errors are corrected for clustered observations within families

* $P < 0.01$

** $P < 0.001$

[a] Zero km if living in the same postal code area

than 15 annual contacts (H4). Furthermore, we can confirm that a higher average geographical distance (H5) between siblings decreases, whereas a higher cohesion (H6) increases the annual frequency of contact per parent–child dyad.

Position in the network

We can only partly confirm the idea that relative attributes play a role in the frequency of contact in parent–child relationships. The relative distance separating the child and parent (H7) and financial support given to one child but not to the other (H9) do not make a difference in terms of contact frequency. The birth order of siblings has no explanatory power either (H10). Only a situation where an adult child is more emotionally distant relative to another randomly selected adult child is associated with a lower frequency of contact in the first dyad (H8). If in the same family one parent–child bond is stronger than another the number of annual face-to-face contacts is about 14 times higher in the former.

Control variables

In the controls we see a positive association between parental health limitations and parent–child contact frequency. Adult children see their parents more often if the latter are ill or handicapped, taking into account differences by age, parental divorce, geographical distance and so on. Daughters have considerably more contact with their parents than sons, and parental divorce is associated with a lower frequency of intergenerational contact. Note that we also estimated a model in which we controlled for a situation where a parent lived with a new partner (5% of all parents).This factor did not have an effect on contact frequency over and above parental divorce and having stepsiblings (H4). Finally, greater emotional distance and the absence of financial support were associated with fewer annual contacts.

Parent poor health

Model 4 is the result of an analysis among the dyads of parents experiencing health problems and consequently, probably need more care. Given the small numbers, we did not control for whether the parent–child dyad was a step tie in this analysis. None of the hypothesized effects were found to be significant. The controls show that contact is lower for ever-divorced parents, and for parents who are separated by larger geographical and emotional distances from their offspring. The controls also show that daughters interact with their parents considerably more often than sons.

Less contact than network average

Table 4 presents the results of the logistic regression estimating the likelihood that an adult child has less contact with the parent than the sibling network average.

Network characteristics

As was the case in the former analysis, having siblings is associated with a lower contact frequency per dyad. Every additional sibling increases the likelihood (1.46) that single adult children see their parents less than average (H1). Moreover, having sisters in the sibling network is associated with greater differentiation among parent–child dyads than having brothers (H2). Two measures, one for having brothers and one for having sisters, provide a better explanation of differences in contact frequency than just one measure for network size. Our further discussion of the results concerns the full model (Model 3). We find no evidence that the age spacing of siblings has an effect on parent–child contact within networks (H3). Earlier, we found strong effects of the presence of stepsiblings within the network on average parent–child contact, but this characteristic has no effect at all on differences among parent–child dyads within the same network (H4). Consistent with H5 greater geographical dispersion enhances

Table 4 Logistic regression contact frequency: less than network average (odds ratios)

Models	(1) (N = 4601)	(2) (N = 4,601)	(3) Full model (N = 4,601)	(4) Parent poor health (N = 1,496)
Network characteristics				
Number of siblings	1.46**	–	–	–
Number of brothers	–	1.31**	1.21**	1.13
Number of sisters	–	1.63**	1.48**	1.34**
Spacing (years)	1.01	1.01	1.03	1.04
Stepsibling(s) (yes)	0.86	0.86	0.89	0.80
Geographical dispersion (logged)[a]	1.11**	1.10**	1.13**	1.11*
Cohesion	1.04**	1.04**	1.03*	1.02
Position in the network				
Rel. geograph. distance (higher)			4.57**	4.26**
Rel. emotional distance (higher)			2.98**	4.11**
Inequitable financial supp. (yes)			1.37	1.60
First-born (yes)			1.12	1.20
Control variables				
Mother (yes)	1.13	1.13	1.05	1.06
Age parent (years)	1.28**	1.29**	1.13*	1.14
Age parent (squared)	1.00**	1.00**	1.00	1.00
Parent poor health (yes)	1.09	1.10	1.06	–
Parent ever divorced (yes)	0.83	0.83	0.85	0.83
Daughter (yes)	0.65**	0.53**	0.54**	0.60**
Stepchild (yes)	1.43	1.43	1.49	–
Geogr. dist. parent-child (logged)[a]	1.46**	1.47**	1.22**	1.30**
Emotional distance	1.58**	1.58**	1.35**	1.33**
Fin. supp. received by child (no)	1.59**	1.59**	1.50**	1.39*
R-squared	0.13	0.14	0.23	0.25

Note: Standard errors are corrected for clustered observations within families

* $P < 0.01$

** $P < 0.001$

[a] Zero km if living in the same postal code area

the likelihood that an adult child has less contact with the parent than the sibling network average. The expectation (H6) that greater cohesion enhances the likelihood that an adult child has less contact with the parent than the sibling network average finds no support.

Position in the network

If one or more adult children live closer to the parent or if one of the siblings is emotionally closer to the parent than another child, this strongly increases the likelihood that the more distant child sees the parent less frequently than the network average (H7-8) by 4.57 and 2.98 times, respectively. Although bivariate analyses revealed that giving financial support to one child but not to another enhances differences between children with respect to contact with parents, this effect was not substantiated in the multivariate analyses (H9). Thus we find that factors that point at important differences between dyads (especially proximity and emotional support) strongly determine differences in contact frequency among parent–child dyads within the same network. Again, birth order was found to have no effect at all (H10).

Control variables

We found that parents and adult children see each other less often with increasing age. Here, we found that over the life course differences among parent–child ties increase, so parents are more likely to have more frequent contact with one child than with another as they age. Other factors that in principle affect all siblings alike (e.g. gender of parent; health of parent; parental divorce) do not increase differences among parent–child dyads within the same network. Finally, differences among siblings in terms of contact with the parent are likely to be greatest where the emotional distances are considerable, or if the adult child does/did not receive financial support.

Parent poor health

Model 4 is based on parents who reported that they were limited due to health problems (again, we left out the stepchild control). We will focus on the most important results, namely the position in the sibling network. Children who are geographically and emotionally distant from their parents are 4.26 and 4.11 times more likely to have less contact with their parents than the average of all children. Furthermore, differences in financially supporting children increase the probability that differences occur among parent–child dyads regarding face-to-face contact. Sons are more likely to have fewer interactions with their limited parents than daughters are.

Conclusion and discussion

Regular household help with personal care requires frequent face-to-face contact (Litwak 1960). Most studies on contact analyze the most important parent–child dyad, that is, the relationship with the oldest, the one living closest to the parent, the most supportive or the emotionally closest adult child (Rogerson et al. 1993). To investigate more general patterns, we used a national representative sample of randomly selected parent–child dyads. Our first finding was that the average frequency of parent–child contact is lower—and more realistically describes parent–child dyads in general—than that found in previous studies in which selective samples were used.

A consistent conclusion in previous studies on intergenerational contact is that having additional children reduces contact in single parent–child dyads (see e.g., Lye 1996). Given the decline in family size as a result of the drop in fertility rates, siblings are becoming increasingly precious, a development that has been widely neglected by family scholars (McHale and Crouter 2004). In this study, we used theoretical ideas from social network theory (Uehara 1990) and formulated hypotheses about the influence on parent–child contact of aggregate characteristics of the sibling network and about the position in the sibling network. We investigated (a) the frequency of contact among all dyads and we modeled (b) the likelihood that parent–child contact differs among dyads within the same networks, controlling for dyadic characteristics that influence parent–child contact.

We were able to substantiate a straightforward exchange mechanism such as financial support given in the past. We also found evidence that the network in which siblings are embedded structures interactions with parents. First, we found that it is very informative to include two network size measures—number of sisters *and* number of brothers—instead of using only one. Having sisters lowers parent–child contact more than having brothers. Second, the presence of stepsiblings lowers contact in parent–child ties in later life. Third, both geographic network dispersion and network cohesion are important determinants of contact between parents and adult children. If siblings live further apart, it appears that contact with the mutual parent is harder to coordinate from a practical point of view. As we hypothesized, stronger network cohesion is associated with higher levels of contact per parent–child dyad. Also, stronger network cohesion correlates with differences among parent–child dyads within the same families. An

alternative explanation could be that in cohesive families there is more acceptance of differences in contact among parent–child dyads.

Our fourth finding confirms that expanding exchange arguments with network elements contributes importantly to explaining differences among parent–child dyads. If one adult child is geographically or emotionally closer to the parent than another, this has a negative effect on intergenerational contact with the latter child. Fifth, spacing and birth order have no effect at all on parent–child contact in adulthood. Sixth, investigating the special situation in which the parent is limited due to health problems, the most important sibling network factors are differences between siblings in geographical and emotional distance towards their mutual parent and the leading role of daughters.

In general, we can conclude that the network perspective adds to our understanding of differences in the frequency of contact between parents and adult children. We could show that variation in network characteristics best predicts differences among dyads across family networks, whereas variation in the position in the same networks is able to predict contact differences within these networks. Besides individual restrictions like proximity and emotional distance, parent–child dyads are also influenced by the network. Individual family members take each other as a point of reference, as has been suggested in qualitative studies (Matthews 2002).

A limitation of our study is the moderate response rate. Analyses of the representativity of the NKPS sample (Dykstra et al. 2005) revealed an under-representation of men, an under-representation of young adults, and an overrepresentation of women with children living at home. Residents of highly urban and highly rural areas are also underrepresented in the sample, a pattern one often sees in survey research (De Leeuw and De Heer 2001). It is also reasonable to assume that there is also an overrepresentation of high-quality relationships and related to this, a selectivity towards parent–child relationships with a relatively high level of face-to-face contact.

Four suggestions for future research can be made. First, birth order and sibling spacing are not important factors influencing parent–child contact in adulthood, despite plausible predictions using the exchange perspective. It might be that more precise parental time investments in childhood are better predictors of contact in adulthood. Past parental favoritism or, for example, sibling rivalry in young age might have consequences for contact (and support) in later life (Feinberg et al. 2003; Rohde et al. 2003). Second, future research should focus more on developmental differences of siblings, dyadic problems, and the consequences for parent–child contact in adulthood. Third, more effort is needed to understand the consequences of repartnering and step ties for family relationships. Such research requires an over-sampling of stepfamilies, yielding sample sizes like in US studies (e.g., Coleman et al. 2000). Fourth, an approach similar to the one adopted in this paper could be applied to investigate contacts within the complete personal network of kin and non-kin, like friends, colleagues and neighbors.

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