The ripple effect in family networks

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Balance in Sibling-Parent-Sibling Triads

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2.1 INTRODUCTION

Many family relationships last a lifetime and are less "escapable" compared with other personal relationships. This involuntary character of family relationships stresses the importance of the web of family relationships keeping its balance to minimize the risk of tensions and stress. Of all family relationships, sibling relationships have the longest duration (Cicirelli, 1995; Matthews, 2002; van Gaalen, Dykstra, & Flap, 2008; Voorpostel, Dykstra, & Flap, 2007; Voorpostel, van der Lippe, & Flap, 2012). The development of strong adult sibling relationships forms an important source of support for adults over the life course (e.g., Cicirelli, 1995; Eriksen & Gerstel, 2002; Kalmijn & Leopold, 2019; Milevsky, 2005; Spitze & Trent, 2006; Voorpostel et al., 2007; Voorpostel & Blieszner, 2008; White & Riedmann, 1992).

Although previous research acknowledges interdependencies between family relationships, which means that the quality and strength of one family relationship is dependent on the quality and strength of other family relationships, relatively few studies examined the association of sibling relationships with other family relationships. Past studies mainly focused on associations between the intergenerational relationship, between parents and children, and the intragenerational relationships, between adolescent and adult siblings, and base their theoretical arguments on attachment theory, social learning theory, or differences in parenting style (see Whiteman et al., 2011 for an overview).

The positive association between the intergenerational and the sibling relationship, found by most studies, is known as "enhancement," "congruence" (Derkman, Engels, Kuntsche, van der Vorst, & Scholte, 2011 during adolescence; Portner & Riggs, 2016 during emerging adulthood), "spill over" (Derkman et al., 2011 during adulthood; Hank & Steinbach, 2018 during adulthood), "reinforcement" (Hank & Steinbach, 2018), or "concordance" (Whiteman et al., 2011). A negative association indicates "compensation"[1] of weak intergenerational relationships by strong sibling relationships. These studies use several dimensions of the parent–child relationship, such as parental care and support (Portner & Riggs, 2016), relationship quality (Voorpostel & Blieszner, 2008 during adulthood), emotional closeness and intimacy (Hank & Steinbach, 2018), support (Derkman et al., 2011; Milevsky, 2005 during emerging adulthood), contact (Hank & Steinbach, 2018; Voorpostel & Blieszner, 2008), and conflict (Hank & Steinbach, 2018). Dimensions of the sibling relationship are for example emotional closeness and intimacy (Hank & Steinbach, 2018), affect (Portner & Riggs, 2016), warmth (Derkman et al., 2011), support (Milevsky, 2005; Voorpostel & Blieszner, 2008), contact (Hank & Steinbach, 2018), conflict (Derkman et al., 2011; Hank & Steinbach, 2018), and behaviours and cognition (Portner & Riggs, 2016).

As discussed in chapter 1, family systems (Cox & Paley, 1997; Minuchin, 1974) can be studied when divided in smaller – empirically analysable – relational units, such as dyads or triads. We propose balance theory (Cartwright & Harary, 1956; Heider, 1946, 1958) to define enhancement,

1 In chapter 4 'compensation' is called 'substitution'. The difference between substitution and compensation will be discussed in the conclusion and discussion (chapter 7).

compensation, and loyalty conflicts, as forms of interdependence within sibling–parent–sibling triads, as well as a way to empirically measure and test systems theory.

The data come from the Netherlands Kinship Panel Study (NKPS), which is a large-scale multi-actor panel study collected in 2002 to 2004 on the nature and strength of family ties in the Netherlands (Dykstra et al., 2005). Based on the multiple dimensions of the solidarity–conflict model (Bengtson, Giarrusso, Mabry, & Silverstein, 2002; Silverstein, Gans, Lowenstein, Giarrusso, & Bengtson, 2010), we focus in this chapter on three dimensions of the relationships between siblings and their parents: support exchange, contact frequency, and conflict.

2.2 THEORY

Family systems theory (Cox & Paley, 1997; Minuchin, 1974) implies that relationships between two family members such as the sibling relationship dyad cannot be studied in isolation as they are part of a larger system and affected by surrounding family relationships such as the intergenerational relationships of both siblings. The first and most straightforward way to take interdependence into account is by studying triads, that is, relationships between three family members, in this study, the sibling–parent–sibling triad. Structural balance is an important characteristic of triads, proposed by Heider (1946, 1958) and further elaborated by Cartwright and Harary (1956). The concept of balance is well known in social network analysis (e.g., Wasserman & Faust, 1994). A recent application of balance theory by Rawlings and Friedkin (2017) provides an extensive general theoretical framework, as well testable hypotheses of balance in triadic configurations in multiple – nonfamily – communities. Using positive and negative – undirected – relationships, balanced triads occur in two forms: either all three individuals have positive – strong – relationships, "the all-positive triad," or two individuals in the triad have a positive relationship, while they both share a negative – weak – tie with the third individual. Thus, in a balanced triad, the multiplication of the three relationships is positive. An imbalanced triad, on the other hand, leads to a negative multiplication result: It is defined by a triad in which one individual has a positive relationship with the two others whose relationship is negative. The "all-negative" triad is imbalanced as well. Heider (1946, 1958) and Cartwright and Harary (1956) argue that individuals in triadic configurations prefer to be part of a balanced triad. An imbalanced triad is not stable because of the tension caused by the two individuals having a weak relationship while sharing a same-valued – strong or weak – relationship with a third individual. This mechanism was shown empirically by Rawlings and Friedkin (2017).

Table 2.1: Balancing mechanism: Expected sibling relationship strength

	Sibling 2 – parent weak	Sibling 2 – parent strong
Sibling 1 – parent weak	*Sibling relationship strong*	*Sibling relationship weak*
Sibling 1 – parent strong	*Sibling relationship weak*	*Sibling relationship strong*

In this chapter, we study sibling–parent–sibling triads, focusing on the base relation formed by two siblings (see Table 2.1). If both siblings have a strong relationship to their parent, a triad with a strong sibling relationship displays structural balance: the all-positive triad. If one sibling has a weak – negative – relationship to the parent and the other sibling a strong – positive – relationship to the parent, structural balance is obtained if the siblings have a weak relationship with each other. If both siblings have a weak relationship to the parent, structural balance is obtained by a strong sibling relationship.

The balanced state of the "all-positive triad" fits in with the enhancement mechanism (see Triad A in Figure 2.1), although in previous literature the relationship between the second sibling and parent was not explicitly evaluated. Therefore, the all-positive triad represents enhancement from both siblings' perspectives. The "other" balanced state – when the siblings in the triad have a strong relationship, while they both do not get along with their parent – fits in with the compensation mechanism as depicted in Triad B, Figure 2.1.

Triad C in Figure 2.1 shows one sibling having a strong relationship with the parent, while the other sibling has a weak relationship with the parent. When the sibling relationship is strong, the triad becomes unbalanced from the perspective of the sibling with the strong relationship to the parent. This situation is indicative for tension in the sibling relationship, as the sibling with the strong relationship to the parent likely has the feeling of having to choose sides between the parent and the sibling with the weak relationship to the parent. Amato and Afifi (2006; see also Sobolewski & Amato, 2007) describe the unbalanced triadic configuration where a child is caught between the negative relationship of his or her parents and his or her own positive relationships with both parents as a loyalty conflict, which we now apply to the intergenerational and sibling relationship. Triad C in Figure 2.1 illustrates that the disparity between both siblings' intergenerational relationships leads to a negative force on the sibling relationship. The balance in the sibling–parent–sibling triad is restored when the sibling tie becomes negative.

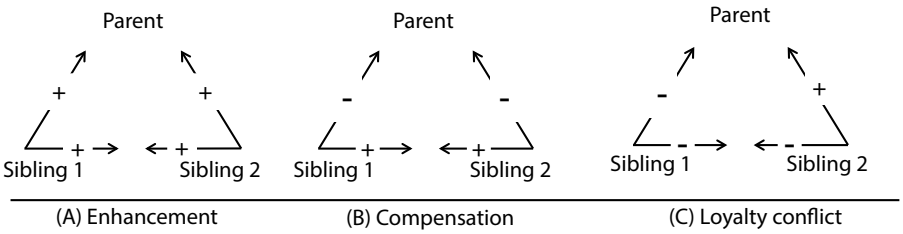

Figure 2.1: Balancing mechanisms in sibling-parent-sibling triads.

To summarize the three triadic configurations reflecting enhancement, compensation, and loyalty conflicts, we formulate three hypotheses on each of the three relational

dimensions: support exchange, contact, and conflict. The stronger the own intergenerational relationship, the stronger the sibling relationship (Hypothesis 1a: enhancement). The weaker the intergenerational relationship, the stronger the sibling relationship (Hypothesis 1b: compensation). Larger dissimilarities between the two intergenerational relationships are negatively associated to the sibling relationship (Hypothesis 2: loyalty conflicts). The hypotheses are tested empirically from the perspective of both siblings simultaneously using multilevel modelling.

2.3 METHOD

The NKPS is a large-scale multi-actor panel study on the nature and strength of family ties in the Netherlands (Dykstra et al., 2005). The NKPS is based on a random sample of addresses in the Netherlands, excluding people living in institutions. At each address, one adult person aged 18 to 79 years was randomly selected for a face-to-face interview. Respondents received a small monetary incentive for their participation. The overall response rate was 45%, which is a little below average for the Netherlands (de Leeuw & de Heer, 2002). Comparisons with population data show that some groups were somewhat underrepresented, that is, men, individuals younger than 30 years or older than 70 years, and individuals living alone (for details, see Dykstra et al., 2005).

2.3.1 Sample

The primary respondent was interviewed face-to-face about his or her family relationships. Family members such as parents, children, and siblings served as secondary respondents. Primary respondents were asked for the address of these family members and if these addresses were given, randomly selected family members received a self-completion questionnaire by postal mail. In this study, we use data from the primary respondents and from their siblings as a secondary respondent, not from parents. The information on primary respondents and their siblings is symmetrical because both report about the relationship with their father, mother, and their sibling. Individual characteristics were also measured in the same way for primary and secondary respondents.

In total, 60% of the primary respondents were willing to share the address of their sibling and of these, 63% returned the questionnaire. While this multi-actor approach in the context of a large national survey was rather new in European research at the time, it is not without problems. Previous studies have shown that nonresponse of secondary respondents in NKPS is selective with respect to relationship quality, although generally not affecting regression parameter estimates (Kalmijn & Liefbroer, 2011).

In order to avoid cohort effects and to foster comparability, we selected sibling pairs from the 8,161 sibling pairs who were both 18 to 40 years old, based on the reports of the

primary respondent. This selection resulted in a sample of 2,365 cases. Because information about contact and support related to household tasks and odd jobs between siblings and their parents was only collected if siblings and parents did not co-reside, sibling couples were selected who neither co-resided with each other nor with their parents (N = 761). In the final selection step, sibling couples with incomplete information on intergenerational relationships and the control variables were omitted from the sample, resulting in 549 sibling couples for analysis.

Comparing the analytical sample with the larger sample of 18- to 40-year-old respondents (N = 2,365 if all cases are available; results available upon request) shows that siblings in the analytical sample are older, higher educated, experienced parental divorce and parental conflict less often than siblings in the larger sample. Primary respondents in the analytical sample are more religious. They lived further away from their mother. Secondary respondents in the analytical sample lived further away from the primary respondent and their parents. Primary respondents reported more contact with their sibling and parents, and more support exchange with their father, whereas secondary respondents reported less support exchange with their sibling and more support exchange and contact with their father. The analytical sample was characterized by less conflict between the secondary respondents with their sibling and their mother than the larger sample.

Table 2.2: Descriptive Statistics (*N*=549)

	Sibling 1		*Sibling 2*		
	Mean	S.D.	Mean	S.D.	t or χ^2
Support (exchange) with sibling	1.69[a]	0.36	1.83[b]	0.38	-8.39*
Contact frequency with sibling	4.17	0.86	4.17 [a]	0.86	0.14
Conflict with sibling	0.13		0.24		39.79*
Support (exchange) with father	1.91	0.37	1.94	0.38	-1.50
Contact frequency with father	4.58	0.89	4.62	0.93	-0.84
Conflict with father	0.20		0.31		6.26*
Support (exchange) with mother	2.01	0.38	2.06	0.40	-2.31*
Contact frequency with mother	4.94	0.88	4.88	0.86	1.42
Conflict with mother	0.18		0.34		16.34*
Age	31.34	4.78	31.79	5.02	-2.68*
Gender (0 = *male*)	0.65		0.60		0.076
Education	0.36	0.69	0.28	0.71	2.35*
Religion	1.64	0.93	1.62	0.95	0.73
Geographical distance to father (log)	2.53	1.53	2.40	1.55	1.66
Geographical distance to mother (log)	2.51	1.52	2.40	1.55	1.50
Geographical distance between siblings (log)	2.79	1.52			
Geographical distance to father (km)	32.14	42.24	30.91	45.70	
Geographical distance to mother (km)	31.61	41.82	31.02	45.83	
Geographical distance between siblings (km)	39.38	47.78			
Parental divorce	0.10				
Parental conflict	1.40	0.38			
More siblings in family	0.51				

Note: * *p*-value < 0.05, 2 sided p-value

[a] *N=548*

[b] *N=546*

2.3.2 Relationship Variables

We analyse three relationship characteristics, support exchange, contact, and conflict, and we have six types of reports about these: (a) the primary respondent reporting about the sibling, (b) the primary respondent reporting about the father, (c) the primary respondent reporting about the mother, (d) the sibling (secondary respondent) reporting about the primary respondent, (e) the sibling reporting about the father, and (f) the sibling respondent reporting about the mother.

Support Exchange. The measure for support exchange in the NKPS was based on the family solidarity tradition in sociology where much emphasis is given to the exchange of emotional, instrumental and material support (Bengtson et al., 2002; Silverstein et al., 2010). Since some types of support were frequently missing (e.g., financial support) or not always applicable (e.g., help with childcare), the support exchange measurement in this study is based on emotional and instrumental support. The phrasing of all items was exactly identical for sibling and intergenerational relationships.

The support exchange variable is constructed by combining eight items that questioned whether the siblings during the past 3 months (a) gave help to and (b) received help from each other and their parents regarding household tasks, (c) gave help to and (d) received help from each other and their parents regarding odd jobs in the household, (e) showed interest in (f) received interest from each other and their parents, (g) gave advice to, and (h) received advice from each other and their parents. All items were measured on a 3-point scale ("not at all," "once or twice," "several times"). At least five of these eight items needed to be present, to use their mean as the value of the support exchange variable. The reliabilities of the support exchange variable, reported in the online supplementary material (section 2.B), were good for all sibling–parent and sibling–sibling relationships, ranging from 0.68 (primary respondent–father) to 0.78 (secondary respondent–primary respondent). Table 2.2 shows that intergenerational support exchange is higher than sibling support exchange, and is slightly higher with mother than with father. Furthermore, secondary respondents report higher levels of support exchange with their sibling and their mother compared with primary respondents. Moreover, support exchange between siblings is highly correlated with intergenerational support exchange and with sibling and intergenerational contact. Sibling support exchange is negatively correlated with sibling age, geographical distance between siblings, and having multiple siblings. Support exchange reported by women is higher than support exchange reported by men. Intergenerational support exchange with father and with mother are highly correlated (see section 2.D of the online supplementary material for details).

Contact. The contact variable is constructed by averaging two items; an item that measured face-to-face contact and an item that measured phone, letter, and e-mail contact in the past 12 months. The two items were measured on a 7-point scale ("not at all," "once," a few times a year," "at least once a month," "at least once a week," "a few times a week," and "daily"). If only one of these items was known, we used that single item. Table 2.2 shows that contact with mothers was highest, with small and nonsignificant differences between the two sibling reports. In additional analyses (available upon request), we scaled the contact variable by taking the natural logarithm of the approximate annual frequencies (Kalmijn, 2006; Waite & Harrison, 1992) plus one, which resulted in a distribution with similar shape and similar results. Contact between siblings, similar to support exchange between siblings, is highly correlated with intergenerational contact and negatively correlated with age, geographical distance

between siblings, and having more siblings. Female respondents report more contact than male respondents. Intergenerational contact with father and with mother are highly correlated (see section 2.D of the online supplementary material for details).

Conflict. The conflict variable is based on one item measuring the amount of conflict and tension during the past 3 months. The variable has three categories: no conflict at all, once or twice, and several times. Because the item is quite skewed with predominantly relationships in the "no conflict at all" category (see section 2.C of the online supplementary material for details), it was transformed into a dichotomous variable, indicating relationships with at least once or twice conflict in the past 3 months. Secondary respondents reported more conflict than primary respondents (see Table 2.2). Due to low occurrence of conflict, the φ coefficients measuring the association of conflict within sibling dyads and between siblings and their parents are weak. Intergenerational conflict with father and with mother are somewhat stronger correlated, especially for secondary respondents (see section 2.D online supplementary material for details).

2.3.3 Control Variables

In this chapter we study dependencies between family relationships, but we do not explicitly study the differences between divorced and non-divorced families. Because parental divorce and parental conflict affect the quality and strength of family relationships (Amato, 2000, 2010, 2014; Poortman & Voorpostel, 2009; Riggio, 2001), these variables will be included as important control variables. Both variables are reported by the primary respondent. Table 2.2 shows that 11% of the primary respondents reported to have divorced parents. The parental conflict scale is constructed by five items measuring whether (a) parents had fierce discussions, (b) parents had strong reproaches, (c) parents did not talk, (d) parents' quarrels escalated, and (e) parents did not live together for some time when the respondent was 15 years old. Unfortunately, no information on parental conflict at the time of the data collection was available. In case parents were divorced or separated, this question referred back to the time period preceding the divorce or separation. The last four items were measured with three answer categories: "not at all," "once or twice," and "several times." The first item was measured with four answer categories, representing "not at all," "once or twice," "several times," and "parents never lived together." Respondents who answered that their parents never lived together were recoded as missing on this item, after which all items consisted of a 3-point scale and were averaged (Mean = 1.40, see Table 2.2, α = .73, see section 2.B of the online supplementary material). At least three items needed to be present in order to obtain a value for parental conflict.

The third family context control variable indicates whether the siblings have more brothers and sisters, as this may imply variability in sibling relationship quality, whereas only one other sibling is included in the analysis. Table 2.2 shows that fifty-one percent of the primary

respondents reported having more siblings than the sibling participating as the secondary respondent.

Geographical distance is an important determinant for support giving between family members (Mulder & van der Meer, 2009). Geographical distance between the four family members, two siblings and both parents, is available based on the X and Y coordinates for these four family members (see Table 2.2). Because of its skewed distributions, the distance variables are obtained by the natural logarithm of the distances in kilometres (Kalmijn, 2006; Waite & Harrison, 1992) plus one. Note that distance is endogenous as it can also be the outcome of a poor sibling relationship.

Individual control variables are age, gender, education, and religion. Whereas primary and secondary respondents are on average 31 years old, secondary respondents are on average 4 to 5 months older than the primary respondents. Sixty-five percent of the primary respondents and 60% of the secondary respondents are female. Education of both siblings is categorized in three levels: low (–1), medium (0), and high (1). Table 2.2 shows that primary respondents are significantly higher educated. Because religious families have different norms about maintaining family relationships (Gans, Silverstein, & Lowenstein, 2009), for both siblings a variable representing attendance frequencies of religious services was included. The answer categories are measured on a 4-point scale: "never/hardly ever," "a few times a year," "a few times a month," and "a few times a week." Average attendance frequencies of religious services for both siblings was around 1.6. The online supplementary material (section 2.D) shows a clear negative correlation of age with sibling support exchange and sibling contact, and a positive correlation of gender with sibling support exchange and sibling contact. Having more siblings is also negatively correlated with sibling support exchange and sibling contact. This implies that female respondents and respondents with more siblings on average reported more support exchange and contact with their sibling.

2.3.4 Plan of Analysis

To investigate – per relational dimension – the hypotheses about the sibling–parent–sibling triads, six relationships are available: the sibling relationship and the intergenerational relationships with each of the parents, reported by both siblings. The pairs of sibling relationships reported by both siblings, that is, sibling dyads, are treated as dependent outcomes, nested within families. Such data are multilevel or nested data, with the dyads at level 1 and the family at level 2, which can best be analysed with a random effects or multilevel model (Voorpostel & Blieszner, 2008; see also Snijders & Bosker, 2012; van Duijn, 2013). By including the intergenerational relationship and other individual (level 1) variables as well family context variables (level 2) as explanatory variables in the model, their effects on the sibling relationships are estimated, while distinguishing variability between sibling–sibling relationships within families and variability between families.

For testing the three hypotheses, the main explanatory variables are the intergenerational relationships, that is, sibling–father and sibling–mother. By distinguishing the – correlated – two intergenerational relationships and including both in the same model, the relative strength of both intergenerational relationships on the mutual sibling relationship is investigated. The individual and family context variables are included in the model as well as control variables. Moreover, a variable indicating the primary respondent is included as control variable to account for the observed difference in sibling reports, especially for support and conflict.

All independent continuous intergenerational support exchange and contact variables, as well as all geographical distance variables, parental conflict, and age of both siblings are centered around the grand mean but not standardized. Centering is done to improve the interpretation of main effects in the interaction model (Afshartous & Preston, 2011). Moreover, positive (negative) values of the relationship variables indicate values above (below) average, that is, a stronger (weaker) relationship. This is helpful in interpreting their effects in relation to the research hypotheses, especially for the loyalty conflicts hypotheses requiring interaction effects.

For testing the enhancement and compensation hypotheses, intergenerational relationships with both parents are used as explanatory variables. The direction of the sibling relationship is distinguished by indicating the reporting sibling as ego, and the non-reporting sibling by alter. A positive effect of the intergenerational relationship reported by ego provides support for the enhancement hypothesis, whereas a negative effect is in line with compensation. For testing the loyalty conflicts hypothesis, we need the intergenerational relationships reported by ego and alter, as well as the interaction between ego's and alter's reports on the intergenerational relationships with both parents. Dissimilar intergenerational relationships, that is, one relationship above the mean (positive), the other below (negative), lead to a negative value of the interaction variable. Evidence for the loyalty conflicts hypothesis requires a positive interaction effect on the sibling relationship. In addition, to evaluate the overall magnitude of loyalty conflicts, the estimate of the interaction variables has to be compared with the main effects of both intergenerational relationships.

Each of the models for the three relational dimensions, support exchange, contact, and conflict, was built in three steps, including the following (a) ego's reported intergenerational relationships and individual characteristics as well as the variable "is primary respondent" (b) alter's reported intergenerational relationships and individual characteristics, as well as the family level (level 2) control variables, and (c) the interaction of ego's and alter's intergenerational relationship reports. Because the intergenerational relationships are highly correlated (see section 2.D of the online supplementary material for details), care is needed in the interpretation: Finding a small and therefore possibly non-significant effect might mean that a larger – possibly significant – effect in a similar analysis including only one of the intergenerational relationships is reduced by including the second intergenerational

relationship due to multicollinearity. Where applicable, such effects are reported based on the separate intergenerational analyses that are available in the online supplementary material (section 2.E).

The multilevel analyses were performed by using Stata's XTREG MLE random effects model for the support exchange and contact models and Stata's XTLOGIT RE logistic multilevel model for the conflict models (StataCorp., 2015).

2.4 RESULTS

The estimates of the key variables in the complete models are presented in Table 2.3. The table consists of three columns, one for each of the three relational outcomes, that is, support exchange, contact, and conflict. In Appendix 2.A, the results of the full model including control variables and of the first two models can be found. Estimates for separate models including intergenerational relationships with either father or mother are available in section 2.E of the online supplementary material, showing all three model steps.

2.4.1 Support Exchange

Table 2.3, first column, shows a positive and significant effect of ego–father support exchange on support exchange in the sibling relationship (b = 0.173, S.E. = 0.037). There is also a strong effect of ego–mother support exchange on sibling support exchange (b = 0.304, S.E. = 0.035). The effects of the alter–parent relationships are positive but smaller and not significant. The interactions of ego–parent relationship and alter–parent relationship are positive but not significant, where the interaction effect pertaining to the mother is relatively large. Thus, although the positive parameter estimates are in line with the loyalty conflicts hypothesis, where siblings' dissimilar intergenerational relationship values, represented by a negative value for their interaction, reduce the sibling relationship, no clear support is found for this hypothesis. In the separate analyses with one intergenerational relationship, the interaction effect is larger and significant for the analysis with mothers.

In conclusion, the positive main effects of ego–parent relationships contradict the compensation hypothesis, thus providing support for the enhancement hypothesis. They also show that the mother–child relationship has a stronger effect than the father–child relationship.

2.4.2 Contact

A weak positive and significant effect of ego–father contact (b = 0.103, S.E. = 0.034) and a medium strong effect of ego–mother contact (b = 0.238, S.E. = 0.036) are found (see Table 2.3). The effect of the alter–parent relationship is much smaller and only significant for the alter–mother relationship (b = 0.164, S.E. = 0.037). The variables referring to loyalty conflicts, that is, the interactions of ego–parent relationship and alter–parent relationship, are positive

and for mothers also significant (b = 0.116, S.E. = 0.040). The positive effect is in line with the loyalty conflict hypothesis. The effect is modest, as the parameter estimate is small in comparison to the main effect. In the separate analysis, the interaction effect of the ego and alter intergenerational relationship with the father is also significant although smaller than the intergenerational relationship with the mother.

In conclusion, the positive main effects of intergenerational relationships are in line with the enhancement hypothesis, with again a stronger effect for the mother–child relationship than for the father–child relationship.

Table 2.3: Multilevel analyses of support exchange, contact, and conflict between siblings: Unstandardized coefficients [*N*=549 sibling dyads, 1098 siblings]

	Support exchange		Contact		Conflict	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	1.829***	(0.038)	4.198***	(0.087)	-3.334***	(0.588)
Relationship ego-father	0.173***	(0.037)	0.103**	(0.034)	1.273***	(0.364)
Relationship ego-mother	0.304***	(0.035)	0.238***	(0.036)	1.576***	(0.378)
Relationship alter-father	0.003	(0.037)	-0.011	(0.034)	0.124	(0.398)
Relationship alter-mother	0.064	(0.035)	0.164***	(0.037)	0.579	(0.410)
Relationship ego-father * alter-father	0.019	(0.093)	0.020	(0.036)	-0.457	(0.637)
Relationship ego-mother * alter-mother	0.124	(0.082)	0.116**	(0.040)	0.024	(0.612)

Note: Controlling on the individual sibling level for siblings' age, gender, education, and religion, sister-sister composition, whether ego is the focal respondent, geographical distance (log) between ego-father, ego-mother, sibling-father, sibling-mother and on the family level for geographical distance (log) between siblings, parental divorce, parental conflict, and whether the siblings have more siblings (Appendix 2.A presents the full models, including the first two models of support exchange, contact, and conflict).
Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2.4.3 Conflict

Finally, Table 2.3 shows that a conflict with either parent increases the probability of reporting a conflict in the sibling relationship considerably (b = 1.273, S.E. = 0.364 for ego–father and b = 1.576, S.E. = 0.378 for ego–mother). This is in line with the enforcement hypothesis. The interactions of intergenerational relationships, are negative but not significant for the relationship with the father and close to zero for the mother. In the separate analyses, both effects are negative and not significant. That the interaction is negative and smaller than both main effects implies that when both siblings report conflict in the intergenerational relationship, the probability of conflict in the sibling relationship is actually higher. In other words, for conflict the "all-negative" triad is more likely than a balanced triad where both siblings report conflict with their parent(s). Therefore, no support is found for the loyalty conflict hypothesis for conflict.

2.4.4 Covariates and Explained Variance

The coefficients of the control variables in all analyses confirm results from earlier research (for details, see Appendix 2.A). Here, the main findings are reported. Sisters have stronger support exchange and contact but also more conflict (although the latter is not significant). Female respondents indicate lower contact with their brother than male respondents with their brother or sister. Gender (composition) effects were stronger than the intergenerational relationship effects of both siblings on contact, but weaker than ego's intergenerational effect on support exchange.

Higher educated egos have slightly more support exchange with their sibling, while higher educated alters report more contact with their sibling. No evidence was found for differences in the three relationships due to siblings' religion. Egos living further away from their father have more contact with their sibling.

Siblings who live further away from each other have lower support exchange and contact. Support exchange was higher between siblings with divorced parents and the probability of conflict between siblings was smaller when they had more siblings. Parental conflict did not reduce support or contact or increase conflict.

The percentages of explained variance both at the dyad level (1) and at the family level (2), cf. Snijders and Bosker (2012), are slightly lower for the support exchange than for the contact relationships, 0.37 and 0.43 at level 1, and 0.46 and 0.56 at level 2, respectively. The explained variance of 26% for conflict was slightly lower.

2.5 DISCUSSION AND CONCLUSION

Combining a family systems approach with the principles of balance theory, this study derived hypotheses on enhancement, compensation, and loyalty conflicts in triadic configurations of two siblings and their parents. The hypotheses were tested for three relational dimensions: support exchange, contact, and conflict. Strong evidence was found for enhancement, especially for support exchange. Although both intergenerational relationships (father–child and mother–child) turn out to be important predictors for the sibling relationship, the relationship with mother is the most important predictor for sibling support exchange and contact, in line with the notion that kinkeeping is a predominantly female affair (Hagestad, 1986). Some indication was obtained for the effect of loyalty conflicts on sibling relationships but only for contact and not for support exchange and conflict. Thus, the results of this study substantiate interdependency between intergenerational and adult sibling relationships.

A loyalty conflict was defined as the discrepancy in siblings' intergenerational relationships and connected with balance theory by defining positive (stronger) and negative (weaker) relationship in terms of the difference with the (overall) mean, which induced a well interpretable interaction effect. To investigate the sensitivity of our findings to this choice in

defining the loyalty conflict, an alternative specification by the absolute difference between the siblings' intergenerational relationships was tested as well. The multilevel analyses led to quite similar parameter estimates and substantively equal conclusions (analyses available upon request). Although we distinguished between siblings' gender composition and their intergenerational relationships with fathers and mothers, specific intergenerational gender combinations such as father–son or mother–daughter were not taken into account. Additional analyses (available upon request) show that adding intergenerational gender combinations to the separate father and mother models also would lead to the same conclusions.

In addition to lack of statistical power due to most family relationships not showing conflict, a possible explanation for the difference in results for on the one hand support exchange and contact, and on the other hand conflict, may be derived from the operationalization of balance theory. Structural balance theory is expressed in terms of "positive" and "negative" relationships, which we translated into "stronger" and "weaker" family relationships, whereas conflict is more easily interpreted as a "negative" or "weaker" characterization of the family relationship. The reverse of no conflict is not the same as a strong relationship. In addition, the tendency toward the "all-negative" triad may be due to a confounding underlying family conflict style that affects all ties in the family. Moreover, in this study we performed separate analyses for each relational dimension, whereas family relationships are often simultaneously characterized by "positive" and "negative" dimensions, here support exchange and contact versus conflict, that are not mutually exclusive. The co-occurrence of positive and negative relational dimensions is also known as ambivalent relationships (Bengtson et al., 2002; Lüscher & Pillemer, 1998; Priester & Petty, 2001; Widmer, Girardin, & Ludwig, 2018, and chapter 3 of this thesis).

Our results are in line with some previous research findings on enhancement (e.g., Derkman et al., 2011; Hank & Steinbach, 2018; Portner & Riggs, 2016, although the former and the latter are applicable to younger siblings). The compensation in support found in other studies (e.g., Hank & Steinbach, 2018; Milevsky, 2005; Voorpostel & Blieszner, 2008) was not replicated in our study. Because previous research did not use the same relational dimension for the intergenerational as for the sibling relationship, the strong result for contact found in our study is hard to compare with previous research into enhancement. Hank and Steinbach (2018), for example, found support for compensation by testing the cross-dimensional relationship associations of intergenerational conflict with adult sibling intimacy.

The results in Voorpostel and Blieszner (2008)'s study, using a larger sample from the same NKPS data set with a similar objective, methodological, and statistical approach, shows enhancement in the support relationship. Their main interest however is in cross-dimensional relationship associations, where they find an indication of a compensation mechanism between intergenerational contact frequency and sibling support. Therefore, these results are not easily

comparable to the results in the current study, which in accordance with balance theory studied compensation, as well as enhancement and loyalty conflict, within one relational dimension.

The sample used in this study suffered from selection bias, leading to a sample with respondents who are slightly though significantly older, better educated, and coming from more harmonious families (analyses available upon request). Indeed, the results from our study indicate that sibling–parent–sibling configurations are most likely to resemble the "all-positive" situation, where support exchange and contact is high and conflict is low between all family members. Additional analyses (available upon request) showed that applying weights including demographic adjustments for Sibling 1 and weights correcting for underrepresentation of Sibling 2 (as secondary respondents) having a poorer relationship with Sibling 1, did not substantially affect the regression effects.

Due to the cross-sectional character of the study, its findings cannot be interpreted causally nor can we make inferences about the effect of changes in the intergenerational relationship on the sibling relationship. Although our study was focused on the sibling relationship, it is reasonable to assume that the sibling relationship also affects the intergenerational relationship (Derkman et al., 2011). As balance theory could of course be applied from the perspective of the parent to either sibling, or to the parental relationship, it would be an interesting next step to investigate further associations within family triadic configurations. In the current data, adding parental reports would lower the sample size by 50% because only one parent was interviewed. In addition, the considerable nonresponse among parents would even further decrease the sample size (Kalmijn & Liefbroer, 2011).

Analysing family data with more information, either through a longitudinal design or by including more or larger family configurations seems a natural extension of the current study. By distinguishing more detailed triadic configurations (Rawlings & Friedkin, 2017, chapter 3), applying more elaborate multilevel models (cf. Gerlsma, Snijders, van Duijn, & Emmelkamp, 1997, chapter 4), or social network analysis, further insight can be obtained in the interdependence of – and association between – family relationships. As will be discussed in chapter 5, obtaining such data for a large and representative sample is obviously exceedingly complex.

APPENDIX 2.A: FULL MODELS

Table 2.4: Multilevel analyses of support (exchange) between siblings: Unstandardized coefficients

	Model 1		Model 2		Model 3	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	1.829***	(0.025)	1.832***	(0.038)	1.829***	(0.038)
Support ego-father (EF)	0.166***	(0.037)	0.173***	(0.037)	0.173***	(0.037)
Support ego-mother (EM)	0.282***	(0.036)	0.302***	(0.035)	0.304***	(0.035)
Support alter-father (AF)			0.003	(0.037)	0.003	(0.037)
Support alter-mother (AM)			0.061	(0.035)	0.064	(0.035)
Support EF *AF					0.019	(0.093)
Support EM * AM					0.124	(0.082)
Dyad level						
Age ego	-0.0080***	(0.0022)	-0.0045	(0.0023)	-0.0044	(0.0023)
Age alter			-0.0037	(0.0023)	-0.0037	(0.0023)
Gender ego (0 = *male*)	0.014	(0.019)	-0.079*	(0.035)	-0.077*	(0.035)
Gender alter (0 = *male*)			-0.033	(0.035)	-0.031	(0.035)
Sister-sister composition (0 = *no*)			0.212***	(0.046)	0.206***	(0.046)
Education ego	0.036*	(0.014)	0.045**	(0.014)	0.045**	(0.014)
Education alter			0.009	(0.014)	0.009	(0.014)
Religion ego	-0.012	(0.011)	0.002	(0.011)	0.002	(0.011)
Religion alter			-0.017	(0.011)	-0.017	(0.011)
Ego is focal respondent (0 = *no*)	-0.141***	(0.015)	-0.139***	(0.015)	-0.139***	(0.015)
Geographical distance EF	0.041	(0.027)	0.046	(0.027)	0.046	(0.027)
Geographical distance EM	-0.037	(0.027)	-0.024	(0.026)	-0.023	(0.026)
Geographical distance AF			0.015	(0.027)	0.015	(0.027)
Geographical distance AM			-0.012	(0.026)	-0.011	(0.026)
Family level						
Geographical distance EA			-0.048***	(0.010)	-0.049***	(0.010)
Parental divorce (0 = *no*)			0.103*	(0.041)	0.093*	(0.042)
Parental conflict			-0.035	(0.030)	-0.036	(0.030)
More siblings (0 = *no*)			-0.036	(0.022)	-0.036	(0.022)
S.d. between (sigma_u)	0.203		0.177		0.176	
S.d. within (sigma_e)	0.248		0.243		0.243	
Intraclass correlation (Rho)	0.402		0.346		0.342	
Number of siblings	1094		1094		1094	
Number of sibling dyads	549		549		549	
Log likelihood	-258.1		-203.2		-201.2	

Note: Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.5: Multilevel analyses of contact between siblings: Unstandardized coefficients

	Model 1		Model 2		Model 3	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	4.211***	(0.057)	4.224***	(0.088)	4.198***	(0.087)
Contact ego-father (EF)	0.123***	(0.033)	0.115***	(0.034)	0.103**	(0.034)
Contact ego-mother (EM)	0.154***	(0.036)	0.235***	(0.036)	0.238***	(0.036)
Contact alter-father (AF)			0.0018	(.0343)	-0.011	(0.034)
Contact alter-mother (AM)			0.160***	(0.037)	0.164***	(0.037)
Contact EF * AF					0.020	(0.036)
Contact EM * AM					0.116**	(0.040)
Dyad level						
Age ego	-0.0118*	(0.0050)	-0.0067	(0.0044)	-0.0071	(0.0044)
Age alter			-0.0124**	(0.0044)	-0.0128**	(0.0044)
Gender ego (0 = *male*)	-0.025	(0.039)	-0.286***	(0.080)	-0.266***	(0.079)
Gender alter (0 = *male*)			-0.221**	(0.080)	-0.202*	(0.079)
Sister-sister composition (0 = *no*)			0.640***	(0.107)	0.599***	(0.106)
Education ego	-0.041	(0.030)	0.021	(0.030)	0.034	(0.029)
Education alter			0.068*	(0.030)	0.080**	(0.029)
Religion ego	-0.009	(0.025)	0.007	(0.022)	0.003	(0.022)
Religion alter			-0.007	(0.022)	-0.012	(0.022)
Ego is focal respondent (0 = *no*)	0.008	(0.027)	0.009	(0.026)	0.009	(0.026)
Geographical distance EF	0.096	(0.059)	0.147**	(0.054)	0.143**	(0.053)
Geographical distance EM	-0.088	(0.059)	-0.077	(0.053)	-0.078	(0.053)
Geographical distance AF			0.069	(0.054)	0.064	(0.053)
Geographical distance AM			-0.051	(0.053)	-0.052	(0.053)
Family level						
Geographical distance EA			-0.222***	(0.024)	-0.208***	(0.024)
Parental divorce (0 = *no*)			0.187	(0.098)	0.124	(0.100)
Parental conflict			-0.054	(0.071)	-0.057	(0.070)
More siblings (0 = *no*)			-0.077	(0.053)	-0.087	(0.052)
S.d. between (sigma_u)	0.640		0.496		0.484	
S.d. within (sigma_e)	0.448		0.433		0.433	
Intraclass correlation (Rho)	0.671		0.567		0.555	
Number of siblings	1097		1097		1097	
Number of sibling dyads	549		549		549	
Log likelihood	-1120.9		-991.9		-982.5	

Note: Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2.6: Multilevel logistic analyses of conflict between siblings: Unstandardized coefficients

	Model 1		Model 2		Model 3	
	Estimate	S.E.	Estimate	S.E.	Estimate	S.E.
Intercept	-3.216***	(0.414)	-3.311***	(0.580)	-3.334***	(0.588)
Conflict ego-father (EF)	1.086***	(0.291)	1.131***	(0.299)	1.273***	(0.364)
Conflict ego-mother (EM)	1.510***	(0.289)	1.607***	(0.311)	1.576***	(0.378)
Conflict alter-father (AF)			-0.060	(0.304)	0.124	(0.398)
Conflict alter-mother (AM)			0.610*	(0.304)	0.579	(0.410)
Conflict EF * AF					-0.457	(0.637)
Conflict EM * AM					0.024	(0.612)
Dyad level						
Age ego	-0.047	(0.025)	-0.053	(0.031)	-0.053	(0.031)
Age alter			0.023	(0.031)	0.023	(0.031)
Gender ego (0 = *male*)	0.483	(0.247)	0.060	(0.469)	0.057	(0.468)
Gender alter (0 = *male*)			0.138	(0.467)	0.141	(0.466)
Sister-sister composition (0 = *no*)			0.952	(0.600)	0.954	(0.599)
Education ego	-0.032	(0.180)	0.006	(0.187)	0.004	(0.187)
Education alter			0.095	(0.185)	0.091	(0.185)
Religion ego	0.076	(0.132)	0.230	(0.155)	0.224	(0.155)
Religion alter			-0.093	(0.158)	-0.096	(0.158)
Ego is focal respondent (0 = *no*)	-0.726***	(0.217)	-0.797***	(0.227)	-0.799***	(0.227)
Geographical distance EF	0.106	(0.294)	-0.141	(0.373)	-0.142	(0.372)
Geographical distance EM			0.549	(0.362)	0.556	(0.361)
Geographical distance AF	0.005	(0.293)	0.283	(0.370)	0.285	(0.369)
Geographical distance AM			-0.645	(0.357)	-0.652	(0.357)
Family level						
Geographical distance EA			-0.055	(0.124)	-0.056	(0.125)
Parental divorce (0 = *no*)			-0.435	(0.499)	-0.447	(0.497)
Parental conflict			0.209	(0.368)	0.214	(0.367)
More siblings (0 = *no*)			-0.881**	(0.286)	-0.852**	(0.288)
S.d. between (sigma_u)	1.716		1.698		1.690	
S.d. within (sigma_e)						
Intraclass correlation (Rho)	0.472		0.467		0.465	
Number of siblings	1098		1098		1098	
Number of sibling dyads	549		549		549	
Log likelihood	-442.7		-425.2		-424.9	

Note: Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$