

Taking the Temperature: Associations between Sibling Relationship Warmth and Reports of

Daily Interactions in Preadolescence

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ABSTRACT

Taking the Temperature: Associations between Sibling Relationship Quality and Reports of Daily Interactions in Preadolescence

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Although most children grow up with siblings, this relationship is greatly understudied compared to other relationships in a child's life. While much research has focused on sibling conflict, warmth is also important to understanding how to foster a positive relationship. Different positive aspects of the sibling relationship can include disclosure, teaching and learning, prosocial behaviors (e.g., comforting and helping), companionship (e.g., spending free time together) and positive emotionality. This study examined how these features, as well as negative features such as fighting and negative emotionality, in daily sibling interactions were related to warmth. Daily diaries completed by 33 preadolescent children ($M = 11.5$ years; 14 girls) were analyzed. Analyses assessed both between- and within-person patterns. Results indicated that positive emotionality in daily interactions was most closely related to warmth. Furthermore, on days in which siblings reported more negative interactions, they also reported fewer positive interactions. Finally, when children reported a positive behavior towards their sibling on a given day, their sibling was reported to reciprocally engage in similar types of behavior. However, warmth did not significantly moderate either (a) the link between positive and negative daily interactions or (b) daily patterns of reciprocity in the sibling relationship. The results of this study may ultimately inform interventions aimed at fostering warmth in the relationship as well as guide parents on how to help their children develop a warm and positive relationship between their children.

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Dedication

I dedicate this thesis to my own siblings: Lauren, Eric, and Alex. Each of you have had such a pivotal impact on my life and I am very thankful for the memorable positive moments, the intense conflicts we still remember, and the daily interactions that are lost to time but have made us who we are today. I would not be who I am or where I am today without the love, support, and guidance from you. I love and appreciate each of you.

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Taking the Temperature: Associations between Sibling Relationship Warmth and Reports of Daily Interactions in Preadolescence

Throughout their lives, children spend time interacting with a variety of people, such as peers, parents, and siblings. However, while children tend to spend a great deal of time with their siblings, this relationship has been understudied as compared to these other relationships (McHale et al., 2012). Indeed, Google Scholar suggests that, as compared to research on siblings, there are approximately 10 times as many studies of both peer relationships and parent-child relationships. Nevertheless, because of the amount of time siblings spend together, they can have a key impact on children's development. Siblings can affect each other in both positive and negative domains. For example, siblings may influence one another via prosocial interactions (i.e., helping behaviors; Hughes et al., 2018) and teaching exchanges (e.g., Howe & Recchia, 2009). They can also affect and learn from each other in negative domains, such as the skills that are learned via the resolution of conflict (e.g., Howe & Recchia, 2008).

Relationship theory maintains that close relationships (e.g., friends, siblings) consist of interactions that differ from those in less close relationships (e.g., acquaintances; Hartup, 1989; Reis et al., 2000). In closer relationships, there may be more warmth between the partners and a higher degree of agreeableness between them; there may also be less conflict, and the conflicts that do happen usually are resolved in an equal manner (Hartup, 1989). Additionally, close relationships develop over time and reflect the development of each individual as well as dyadic aspects of the relationship itself. Holistic aspects of relationship quality are related to, but distinguishable from, individual interactions between relationship partners; that is, interactions within the relationship affect relationship quality, but the relationship quality also affects the nature of interactions. Thus, relationship can evolve over time due to these bidirectional and

reciprocal processes (Furman 1984; Hinde, 1979; Reis et al., 2000). As such, it is important to go beyond a sole focus on the overall quality of the relationship or on daily interactions between relationship partners, but rather to examine these factors in conjunction with one another.

Related to these considerations, varied types of sibling interactions and behaviors (e.g., positive and negative) can occur on a daily basis, and charting potential (in)consistencies in daily interactions is pertinent to understanding the dynamics of sibling relationships and how relationship quality emerges out of these exchanges. Based on these ideas, the purpose of this thesis was to examine how warmth in the sibling relationship is reflected in children's reports of daily interaction patterns. More specifically, this paper investigated three main research questions: (a) How is warmth related to different types of positive interactions (i.e., disclosing, teaching, comforting, helping, companionship, positive emotionality) and negative interactions (i.e., having a fight, negative emotionality)?; (b) How is warmth related to the association between daily fluctuations in positive and negative dimensions of interactions?; and (c) How is warmth related to reports of positive reciprocity? This study was a first of its kind because daily diary data has not been previously used to simultaneously examine between- and within-dyad variations in siblings' interactions. Thus, this study documents patterns vis-à-vis how siblings report interacting on a daily basis and how these patterns are linked to overall warmth in the relationship. Findings may thus ultimately provide information that is both useful to parents and that may also ultimately inform interventions.

Sibling Relationship Quality

Sibling relationships have a number of unique characteristics as compared to children's other close relationships. First, they are often affectively intense, whether positively, negatively, or both (e.g., Dunn & Kendrick, 1982). Interactions between siblings may fluctuate between

highly conflictual to exceptionally warm, potentially multiple times in the same day. Second, sibling relationships are also characterized by both reciprocal and complementary interactions (Dunn, 1983; Karos et al., 2007). Reciprocal interactions are described as those similar to interactions with peers; this includes egalitarian and mutual exchanges. Complementary interactions, on the other hand, are similar to interactions with parents wherein one person has greater knowledge or authority and can be a caretaker and teacher for another. Although both siblings can take the lead in complementary exchanges, due to the age difference between siblings, older siblings are more likely to exert power in complementary interactions (Harrist et al., 2014). Third, sibling relationships tend to be lifelong, usually lasting longer than parent-child relationships, romantic relationships, and peer relationships. Fourth, siblings know each other quite well because of their long and intimate history of shared interactions. They have spent most, if not all, of their lives together and have a deep understanding of who their sibling is. Research pertaining to the sibling relationship has been limited but has seen a growing interest in recent years (Buist et al., 2013; Kim et al., 2007; Sherman et al., 2006). This relationship consists of many different characteristics, all of which may inform the quality of the sibling relationship.

Features of Sibling Relationships

Early research by Furman and Buhrmester (1985) indicated that the sibling relationship is typified by four characteristics that inform the quality of the relationship: conflict, rivalry, warmth, and relative power. Additionally, McGuire et al. (1996) observed four patterns of sibling relationships: affect-intense (high conflict, high warmth), hostile (high conflict, low warmth), harmonious (low conflict, high warmth), and uninvolved (low conflict, low warmth). These patterns have also been replicated in other studies (Buist & Vermande, 2014; Sheehan et al., 2004; Sherman et al., 2006; Whiteman & Loken, 2006). In a large study of Mexican-origin

families, affect-intense was the most prominent pattern characterizing adolescents' sibling relationships (70%; Killoren et al., 2017). This may be due to the fact that conflict peaks in adolescence and warmth in the relationship remains relatively stable from childhood to adolescence (Kim et al., 2006). Furthermore, while siblings in affectively intense relationships demonstrate both high warmth and high conflict, they display low levels of depressive symptoms, in line with the harmonious group (high warmth, low conflict; Killoren et al., 2017). Thus, although there is high conflict in this pattern (i.e., affect-intense), siblings who feel that they are emotionally close and have a positive sibling relationship may confide more in their sibling (Howe et al., 2001; Howe et al., 2000), thereby potentially reducing the possibility of depressive symptoms.

Sibling relationships may also be characterized by their interactional reciprocity. In a study by Abramovitch et al. (1986), siblings' reciprocal behaviors were shown to be intercorrelated. More specifically, in families where one sibling frequently behaved in a prosocial or agonism manner, the other sibling was more likely to engage in prosocial or agonism behaviors as well. A similar finding was described in Howe et al. (1998). Additionally, Kibblewhite (2006) found that when late adolescent and young adult sister sibling dyads reciprocally displayed positive affect, they reported a more positive relationship. The inverse was also evident; when the sister dyads reciprocally displayed negative affect, they reported a sibling relationship characterized by conflict. Thus, sibling relationships appear to be characterized by both positive and negative reciprocity in ways that are meaningfully linked to relationship quality. When taken together, these results suggest that children might be influencing one another's behavior in both positive and negative directions. For example, if a child is aggressive during conflict, this might lead the other child to be aggressive as well.

Positive Interactions in Sibling Relationships. Warm sibling relationships may be associated with a number of positive psychosocial outcomes for children. It has been shown that siblings with a warmer, more intimate relationship were more socially competent with peers (Buist & Vermande, 2014; Kim et al., 2007). The affective qualities of sibling relationships are also linked to varied internalizing and externalizing outcomes, such as anxiety, depressive mood, aggression, and other antisocial behaviors (Dirks et al., 2015). Indeed, in a meta-analysis of 34 studies analyzing sibling relationship quality and internalizing and externalizing problems, a warmer and less conflictual relationship was inversely linked to problem behaviors, such as depression and delinquency (Buist et al., 2013).

Additionally, warmth in the sibling relationship may be a protective factor in the face of conflict. In a study of adolescent siblings, those who reported less aggression (i.e., verbal, physical) during their conflicts had higher levels of emotional closeness. Thus, although sibling conflict itself may be normative, it may be less intense and resolved more constructively in the context of a positive relationship (Raffaelli, 1992). Furthermore, McGuire et al. (1996) found that, compared to both hostile and uninvolved patterns, affect-intense relationships were rated more positively. While this seems intuitive, it is also important to underscore; that is, in the face of high levels of conflict, high levels of relationship warmth may be a protective factor. In other words, while conflict is typically seen as negative, a warm and positive relationship may be a safer space for the children to air their grievances.

With respect to the interactions that characterize warm sibling relationships, disclosure may be one such feature. Siblings disclose more in the context of warm relationships (e.g., Howe et al., 2001; Howe et al., 2000). In a study on siblings' conversations about body self-disclosure, Greer et al. (2015) also found that siblings in a positive, supportive relationship were more likely

to disclose to one another. This finding was also supported in Campione-Barr et al. (2015), who furthermore discussed that the pattern was moderated by gender; boys who were disclosed to about multifaceted issues reported more positive relationships, especially when it was a brother disclosing. As discussed, if a sibling perceives their relationship to be warm, this may lead to more disclosure between the siblings.

An additional positive interactional feature of the sibling relationship may be companionship. Companionship can be defined as spending time and playing with another person (Buhrmester & Furman, 1987). When fifth- and sixth-grade students were asked about their sibling relationship, 93% mentioned companionship as a quality of the relationship; this was also the most reported feature, followed by antagonism (91%), admiration of sibling (81%), quarrelling (79%), and prosocial behaviors (77%), among others (Furman & Buhrmester, 1985). Indeed, siblings may be a primary source of companionship in a child's life. Siblings were reported to be as important companions as same-sex peers in early childhood with a slight decrease in importance into adolescence (Buhrmester & Furman, 1987). Moreover, companionship may align with other positive features, such as prosocial behaviors, intimacy, and affection, in informing the overall warmth of the relationship (Furman & Buhrmester, 1985).

Prosocial behavior is also a documented feature of positive sibling relationships. Prosocial behavior includes caring, comforting, sharing, and helping behaviors, which can be fostered during the preschool years (Dunn & Munn, 1986). These behaviors may both help contribute to the warmth of the relationship as well as develop due to the positivity in the relationship (see Hughes et al., 2018 for review). A positive relationship between siblings has been shown to predict later prosocial behaviors towards siblings (Pike & Oliver, 2017; Pike et al., 2005; Smorti & Ponti, 2018). In addition, when older brothers and younger sisters reported a

positive relationship, younger sisters tended to have higher empathy and older brothers tended to display more positive behaviors as compared to other dyads (Tucker et al., 1999). Padilla-Walker et al. (2010) also found that when early adolescent siblings reported a more positive relationship, they also reported more prosocial behaviors.

Given complementary features of the relationship, many studies tend to find that older siblings engage in more prosocial behaviors with their younger siblings than vice versa, thus serving as a model to their younger counterparts (Pepler et al., 1981; Pike & Oliver, 2017; Tavassoli et al., 2019; Tucker et al., 1999). However, few studies have explored the potential bidirectional effect of siblings' socialization impact on each other (e.g., Jambon et al., 2019). Findings confirm that while older siblings do have an impact on the development of younger siblings, younger siblings also have an impact on the development of older siblings in the prosocial domain (Jambon et al., 2019; Tavassoli et al., 2019).

While siblings may reciprocate actions and behaviors in an egalitarian manner, they may also teach and learn from one another in a hierarchical way. Given the nature of sibling relationships, one sibling, usually the older sibling, may take on the teacher or caretaker role and the other sibling receives the help or support (e.g., Abramovitch et al., 1979; Howe et al., 2016). While some research indicates that sibling relationships become more egalitarian in their interactions and power structure as the siblings get older (Buhrmester & Furman, 1990; Campione-Barr, 2017), other work shows that the hierarchical structure still remains throughout adolescence (Tucker et al., 2010). In Tucker et al. (2001), older adolescent siblings provided more complementary support in social life and schoolwork than their younger siblings did. In other words, younger siblings may look to their older siblings for guidance in nonfamilial areas. Additionally, sibling positivity was linked to sibling support in these areas (Tucker et al., 2001).

While older siblings tend to be the teacher in complementary interactions, younger siblings also play an important role in these exchanges. For example, Howe et al. (2019) examined both the older and younger siblings' teaching and learning roles in preschool to middle childhood and found that when the younger sibling reported a more positive relationship with their sibling, they were more likely to imitate their older siblings' behaviors in the learning task. Thus, while older siblings typically take on a teacher role, the younger siblings' perception of the relationship is more closely linked to how teaching exchanges play out. In contrast, Karos et al. (2007) indicated that relationship quality in preadolescence was negatively associated with complementary interactions. More specifically the researchers found that reciprocal (i.e., egalitarian) interactions were positively correlated with happy daily exchanges whereas complementary interactions were positively correlated to more negative daily exchanges. This may be due to complementary interactions being inherently hierarchical in the sense that there is a teacher and a learner; one participant has more power or knowledge over the other (Lindell & Campione-Barr, 2017).

Some features of positive quality sibling relationships are moderated by birth order and gender. Research on different sibling dyads has shown that sister-sister pairs, compared to mixed-sex or brother-brother pairs, report a warmer relationship overall and brother-brother pairs report the most conflict (Buist & Vermande, 2014; Dunn et al., 1994). Additionally, brother-brother dyads reported the lowest number of positive qualities in their relationship compared to those with other dyadic gender compositions (Cole & Kerns, 2001). Kim et al. (2007) found that sisters benefited most from a positive sibling relationship and displayed a decrease in depressive symptoms when in a warm sibling relationship. In turn, Kim et al (2006) found that intimacy between same-sex dyads remained more consistent from childhood to adolescence. More

specifically, sister-sister dyads remained the most consistent, mixed-sex dyads displayed a curvilinear change in intimacy, and brother-brother dyads reported the lowest levels of intimacy but remained relatively constant. Tucker et al. (1999) noted that younger brothers had greater empathy development when their older siblings were more positive. Finally, Tucker et al. (2001) observed that sibling positivity was related to older siblings' support in nonfamilial areas (e.g., social life).

Negative Interactions in Sibling Relationships. Negative forms of interaction in sibling relationships can include conflict and rivalry. Conflict between siblings can stem from numerous sources, such as issues of power (Raffaelli, 1992), property related issues (McGuire et al., 2000), and perceived provocations (Recchia et al., 2015). In one large scale study, children in fourth, seventh, and tenth grades reported conflict with siblings more frequently when compared to children's and adolescents' other personal relationships (e.g., parents, peers; Furman & Buhrmester, 1992). Campione-Barr and Smetana (2010) indicated that sibling conflict peaks in adolescence. However, Kim et al. (2006) observed that when the older sibling, but not the younger sibling, reaches adolescence, the conflict between the two siblings peaked, meaning that the conflict between the siblings was at its highest level when the siblings were in different developmental periods. High levels of sibling conflict have been shown to have detrimental effects on the child and the relationship, for example, an increased risk for depressive moods, anxiety, and delinquent behavior (Dirks et al., 2015; Stocker et al., 2002).

On the other hand, although conflict in the sibling relationship can be detrimental in some respects, it can also be developmentally meaningful. When siblings are in a positive relationship, they tend to report more constructive conflict resolution skills (e.g., Recchia & Howe, 2009). Sibling relationships can be a beneficial training ground for learning skills such as conflict

resolution and compromising (Howe & Recchia, 2008). Indeed, in a review of the sibling literature, Campione-Barr and Killoren (2019) advocate for the value of a sibling relationship characterized by ambivalence. The authors explain that a sibling relationship consisting of only positive interactions is not the most beneficial because, unlike negative interactions, positive relationship features do not teach different skills that arise from conflict, such as conflict resolution and perspective taking. As mentioned previously, sibling relationships lacking positive qualities are linked to internalizing and externalizing problems (Campione-Barr & Killoren, 2019; Dirks et al., 2015). Nevertheless, it is possible that relationships simultaneously characterized by warmth and conflict may confer developmental benefits.

In sum, the sibling relationship has unique features and sibling interactions are rich in a variety of areas (e.g., prosocial, conflict). The studies discussed above display the importance of studying the sibling relationship quality in conjunction with sibling interactions. The interplay between relationship quality and its interactions are important to analyze together in order to obtain a full understanding of the sibling relationship. Further, siblings are important to research because these relationships are lifelong and can have an impact on children's development in various domains.

Daily Fluctuations in Sibling Interactions

To date, no research has been conducted that directly examines daily fluctuations in the sibling relationship, such as the fluctuations in amount of conflict or sharing and disclosing to one another. While standard questionnaires can assess global associations between different relationship features, it is worthwhile to look more closely at variations in aspects of siblings' day-to-day interactions. Arguably, it is these everyday interactions that serve as building blocks of overall relationships. That is, major conflicts or significant positive events do not occur as

often as the mundane daily interactions of siblings, such as helping with homework or talking about their day.

Daily Diaries as a Method for Measuring Fluctuations in Sibling Interactions

Daily diaries have been garnering more attention in recent years as a useful tool to study processes in various social and psychological domains (for reviews, see Gunthert & Wenzel, 2012; Iida et al., 2012). Specifically, this method has been used to examine peer relationships (Chung et al., 2011; Nishina & Juvonen, 2005; Sandstrom & Cillessen, 2003), family relationships (Laurenceau et al., 2005; Tucker & Winzeler, 2007), and mental health assessments (Beidel et al., 1991), among other topics. These diaries allow for exploration in individual changes over time (within a person) as well as variations between people. However, to date, sibling research has not used daily diary methods in this manner; while studies based on daily diary methods have been used to assess between-group differences in siblings (e.g., Howe et al., 2011), they have yet to be used to analyze within-group differences in siblings.

Diary studies allow for different types of exploration within and between individuals. These differences can be described as analyzing how a person differs from themselves from one day to the next (variation within a person/dyad) and how a person differs compared to another person or group (variation between people/dyads). More specifically, daily diaries consist of multiday assessments in which participants answer questions regarding certain aspects of their day. For example, in a study of peer victimization, participants responded daily to indicate whether they had experienced physical or social victimization, exclusion, as well as positive interactions with peers (Sandstrom & Cillessen, 2003). Compared to typical assessments that ask a participant to retrospectively recall certain instances or situations, daily diaries minimize this

potential source of bias by allowing the participant to report on these situations closer in time to when they actually happened, usually within minutes or hours compared to weeks or months.

Daily diaries can also allow for examining the reciprocity of relationships or situations. For instance, Knoll et al. (2006) examined giving and receiving support in college student dyads preparing for an exam. The results showed that on days when a person received support, they were also more likely to reciprocally provide support (e.g., emotional support). This reciprocal aspect of the daily diary method can be useful in sibling research to examine how siblings work and interact together and examine children's perceptions of relational reciprocity. For example, are siblings more likely to disclose to the other on a given day if they describe the other as also disclosing to them? This type of information can easily be disentangled through a daily diary.

Relatedly, the fluctuations evident in children's daily lives can also be observed via the daily diary method. For example, Morrow et al. (2014) found fluctuations in the children's day-to-day emotional states depending on their experience of victimization that day. More precisely, greater negative emotions were reported on days when more victimization occurred. As above, these results could not be observed by using a one-time questionnaire because of the complexities of daily life. Arguably, small variations in day-to-day living can have a large impact on a child's overall emotional state and relationship quality with others, such as their siblings.

In sum, daily diaries are a useful method in varying fields, such as research on peer (Morrow et al., 2014) and family relationships (Laurenceau et al., 2005). Nonetheless, their use in sibling research is lacking. Sibling relationships are shaped and formed not just by its pivotal interactions, but by the seemingly mundane day-to-day interactions and fluctuations. Studying these oscillations of the sibling relationship will help to build a deeper understanding of what this

unique relationship consists of and how interventions and support systems can aid this relationship, if necessary. Although some existing sibling research is based on a daily diary method, analyses have generally collapsed across days, and thus have only examined between-dyad variations (e.g., Howe et al., 2000; Howe et al., 2011).

Current Study

The current study was based on a re-analysis of an existing dataset consisting of daily diaries on sibling interactions from 40 pre-adolescent children (Howe et al., 2000; Howe et al., 2011; Karos et al., 2007). Although there is a growing body of research on the features of sibling relationships (e.g., Campione-Barr & Killoren, 2019; Kramer, 2010) and the importance of sibling relationship qualities in influencing children's adjustment (e.g., Dirks et al., 2015; Pike et al., 2005), little is known about the characteristics of siblings' daily lives and how these day-to-day interactions relate to their overall sibling relationship quality. While previous research has assessed children's experiences with their siblings, these studies do not address daily fluctuations within the sibling relationship. Furthermore, more global assessments of features of relationships may depend on retrospective memory, in which only the most emotional or memorable instances are recalled, and these memories could be flawed due to retrospective biases (Bolger et al., 2003).

Siblings may show daily fluctuations and consistencies in both positive and negative interactions. Exploring the daily lives of siblings may also help shed light on the potentially ambivalent nature of the sibling relationship, in which positive and negative interactions may co-occur to a greater extent in some dyads (see Campione-Barr & Killoren, 2019). It is useful to explore how these patterns of positive, negative, and ambivalent interactions may be linked to overall relationship quality. Finally, sibling interactions may vary in the extent to which they are

defined by positive reciprocity; some children may report greater reciprocity in daily patterns of helping, comforting, teaching, and disclosure than others (Howe et al., 2001).

Accordingly, the current thesis investigated the associations between the overall warmth in the sibling relationship and the aforementioned characteristics of daily interactions. The study had three aims. First, in terms of between-dyad variability, we assessed which features of daily interactions are most closely linked to overall levels of warmth in the sibling relationship. More specifically, we examined how warmth in sibling relationships was associated with reports of positive features of interactions such as disclosing, teaching, helping, comforting, positive emotionality, and companionship. Similarly, we examined how warmth in the relationship was linked to more negative features of daily interactions, including negative emotionality and reports of fighting. In previous analyses of this dataset conducted by Howe and colleagues (Howe et al., 2000; Howe et al., 2011; Karos et al., 2007), some of these dimensions were analyzed separately, but the current study directly compared the strength of the associations. It was expected that warmth would be most closely associated to disclosing and positive emotionality, with weaker negative links to negative emotionality and fighting.

Second, with respect to within-dyad variability, we explored how the warmth in a sibling relationship was associated with daily fluctuations in positive and negative dimensions of sibling interactions. For example, was a warmer relationship associated with more ambivalence, in which positive and negative interactions co-occur within the same day? This question was largely exploratory, based on the paucity of past research addressing this issue. It could be expected that a warmer sibling relationship would be positively linked to an ambivalent relationship in which positive and negative interactions tend to co-occur on the same days (Campione-Barr & Killoren, 2019). On the other hand, it was also plausible that the warmth of

sibling relationships is simply linked to the consistent presence of positive interactions and the absence of negative ones.

Finally, we assessed how warmth was related to descriptions of positive reciprocity in the sibling relationship, in terms of daily diary reports of disclosure, teaching, helping, and comforting. For example, if a child disclosed information to their sibling on a given day, did the child also describe their sibling as reciprocally disclosing information as well? Or was one sibling consistently disclosing, teaching, comforting, or helping while the other one reportedly did not? It was hypothesized that a warmer relationship would be characterized by positive reciprocity, rather than one-sidedness.

Associations with the focal child's age, dyadic gender composition, and birth order were also considered in this study. However, because of the small size of the sample and the inconsistent patterns observed in past research, these effects were analyzed in an exploratory manner.

Method

Participants

Participants in the original study included 40 children in grades 5-6 (22 boys, 18 girls), henceforth referred to as the focal sibling. However, the final analytical sample size for this thesis was 33 for reasons specified below. The average age of children was 11.5 years old ($SD = 8.6$ months, range = 10.3 – 13.0 years). Each participant was asked to report on their interactions with a sibling who was closest in age (nonfocal sibling). Approximately 52% of the nonfocal siblings were younger ($M_{\text{age}} = 9.3$, $SD = 16.6$) and 42% were older ($M_{\text{age}} = 14.5$, $SD = 12.3$); 6% of the sample reported on a twin sibling. The dyads consisted of 11 same-sex pairs (5 and 6 sets of boys and girls, respectively), and 20 mixed-sex pairs (10 older brother, 10 older sister); as for

the twins, there was one set of twin boys and one set of twin girls. The sample was predominantly White, lower to middle SES, and lived in a rural, bilingual community (population = 25,000) in Eastern Canada. The English-speaking families who participated in this study were part of the linguistic minority in their largely French-speaking community; in other ways, they were representative of the community from which they were drawn. These children attended the only English-speaking elementary school in their community. Their participation in the study was obtained via both parental consent and child verbal assent after a letter was sent home with the children (over 90% of eligible students received permission to take part).

Procedure

The data were drawn from a larger study of sibling relationships (see Howe et al., 2001; Howe et al., 2000; Howe et al., 2011; Karos et al., 2007, for more detailed descriptions of the method); only aspects of the methodology relevant to the current proposal are described here. The participants first completed the Sibling Relationship Questionnaire (SRQ; Furman & Buhrmester, 1985) in a group setting in their classroom. The children were then given a packet of color-coded Daily Diaries, which consisted of 14 days of diaries. Also included were a pen and two stamped envelopes in which the Daily Dairies would be returned after Week 1 was completed and then followed by Week 2. Children were compensated \$5 for completing and returning Week 1 and an additional \$10 for completing and returning Week 2 diaries.

Measures

Sibling Relationship Questionnaire (SRQ)

The SRQ (Furman & Buhrmester, 1985) was used as a self-report of the quality of the sibling relationship. The participants responded in relation to the nonfocal sibling. Furman and Buhrmester (1985) identified four subscales pertaining to sibling relationships and developed the

questionnaire accordingly: a) warmth/closeness (22 items; e.g., How much do you and your sibling go places and do things together?), b) relative power/status (12 items; e.g., How much does your sibling make you do things?), c) conflict (6 items; e.g., How much are you and your sibling mean to each other?), and d) rivalry (9 items; e.g., How much do you and your sibling compete with each other?). The participants answered the 49 questions based on a 5-point Likert scale, ranging from 1 (*hardly at all*) to 5 (*extremely much*). To assess reliability of these items, Cronbach alphas were used. The resulting reliability scores were determined: warmth/closeness = .93, relative power/status = .76, conflict = .90, and rivalry = .84. For the purposes of this thesis, only the warmth/closeness subscale was used.

Daily Diaries

For 14 days, a checklist and brief short answer method was utilized to collect data on children's reports of their daily interactions with their closest in age sibling (see Appendix A). Participants were instructed to complete the diary right before bed on that day's interactions with their sibling to ensure systematic responses. The checklist included one question regarding how the child's day went and 20 yes or no questions on different types of interactions with their sibling. The short answer questions solicited more detail about the day, such as if anything really good or really bad happened with their sibling, as well as what the siblings talked about that day. The questions were adjusted to be in line with the gender of the sibling (e.g., Did you help your brother today? versus Did you help your sister today?). A score of 0 or 1 was given to the responses on the checklist questions, with a score of 1 meaning yes and a score of 0 meaning no. Three children did not return any diaries. Additionally, there were four sets of siblings reporting on one another in the original sample. In order to align the data with the rest of the sample, one child from each of the four dyads was randomly removed. Thus, the final analytic sample size

was $N = 33$. Five children from this subsample only returned one week of diaries but were nevertheless included in analyses.

This study focused on a subset of questions from the diary reports that addressed the constructs of interest (see Appendix A). More specifically, the questions were used to capture eight aspects of daily interactions (i.e., disclosure, teaching, helping, comforting, positive emotionality, companionship, negative emotionality, and fighting; see Appendix B). Overall positive behavior was calculated by averaging mean scores for disclosure, teaching, helping, comforting, positive emotionality, and companionship; overall negative behavior was computed by averaging mean scores for negative emotionality and fighting. Four of the eight variables (i.e., disclosure, teaching, helping, comforting) had a reciprocal feature to them, in which the focal child reported on their own behavior and that of their sibling (see Appendix C for reciprocal questions). As discussed below, scores for the disclosure measures were adjusted in order to balance the self disclosure and sibling disclosure items; the three other reciprocal dimensions were dichotomous, as they were based on one item for each sibling per day.

Results

Plan of Analysis

To begin, each of the daily diary variables (i.e., disclosure, teaching, helping, comforting, companionship, positive emotionality, negative emotionality, fighting, overall positive behavior, and overall negative behavior) were averaged across all 14 days to compare differences between participants on these different aspects of interactions. Similarly, the four variables for which reciprocity was assessed (i.e., disclosure, teaching, helping, comforting) were averaged across all 14 days, separately for self and sibling.

Preliminary analyses were used to explore associations with structural variables such as age, gender, and birth order. We then computed correlations between ratings of warmth and each

of the daily diary variables, followed by the Meng et al. (1992) procedure to analyze the differences in the magnitude of associations; this procedure was used to answer the first research question.

The second and third research questions were centered on variations across days within participants and were thus addressed using multilevel modeling in HLM. We computed daily scores for (a) overall positive and negative behaviors, and (b) separate scores for self and sibling for the four reciprocal dimensions. Three of the reciprocal variables (teaching, helping, and comforting) were based on a single-item dichotomous measure (i.e., one item for self and sibling on each day). As such, to make the measurement comparable across all four dimensions, the disclosure variable was also transformed into a dichotomous score on each day. More specifically, the disclosure variable had a total of nine items, six regarding disclosure to sibling and three regarding disclosure from sibling. If the focal child disclosed at least once to their sibling out of the six possible choices, the “self-disclosure” item was scored as yes (1); the same method was applied to the “sibling disclosure” items. If there was no disclosure, it was scored as no (0).

For the second research question, daily reports (L1) were nested within child (L2). More specifically, within-child variations in negative interactions were entered at L1 as a predictor of positive interactions, with overall sibling warmth entered at L2. We tested our second research question by computing a cross-level interaction between negative interactions at L1 and warmth at L2. A similar analysis was conducted to analyze the third research question. Children’s reports of their own behavior towards their sibling were entered at L1 as a predictor of their siblings’ behavior towards them, with sibling warmth entered at L2 as a predictor of this association.

Differences in the magnitude of the association between self and sibling across the four reciprocal dimensions were also explored at L1. Results for all analyses are described below.

Descriptive Statistics

Means, standard deviations, and the range of scores for each of the daily diary variables are reported in Table 1. It is interesting to note that 75% of the children reported being happy with their sibling on any given day compared to only 30% who reported fighting. Moreover, all participants reported being happy with their sibling on at least one day, inasmuch as scores for individual children ranged from 14% to 100%. Nevertheless, a counterpoint to this finding was that some children reported high rates of negative interactions, suggesting substantial individual differences in both positive and negative dimensions of interactions.

Table 1*Descriptive Statistics and Correlations of Study Variables with SRQ Warmth*

Feature of Interaction	<i>M</i> proportion of days (SD)	Range	Correlation with SRQ warmth
Overall positive behavior	.41 (.15)	.12-.77	.47
Disclosure	.35 (.18)	.06-.70	.09 ^c
Self disclosure	.37 (.22)	.05-.88	-.01
Sibling disclosure	.32 (.17)	.00-.72	.18
Teaching	.24 (.22)	.00-.73	.28 ^b
Self teach	.23 (.23)	.00-.71	.30
Sibling teach	.27 (.27)	.00-1.00	.24
Helping	.44 (.27)	.00-.96	.39
Self help	.47 (.33)	.00-1.00	.35
Sibling help	.45 (.30)	.00-1.00	.36
Comforting	.24 (.24)	.00-.85	.14 ^d
Self comfort	.26 (.27)	.00-.93	.04
Sibling comfort	.22 (.24)	.00-.83	.24
Companionship	.46 (.17)	.13-.79	.34 ^a
Positive emotionality	.75 (.23)	.14-1.00	.65^{a,b,c,d}
Overall negative behavior	.25 (.22)	.00-.96	-.26
Fighting	.30 (.26)	.00-.93	-.38^e
Negative Emotionality	.20 (.21)	.00-1.00	-.08 ^e

Note. Bolding in the final column represents variables significantly related to SRQ warmth at $p < .05$. The superscripts in the same column denote the results of the Meng et al. (1992) procedure. Similar alphabetic superscripts indicate significant pairwise differences between the magnitude of correlations with warmth (e.g., the correlation with fighting was significantly greater than the correlation with negative emotionality).

Repeated measures ANOVAs were used to compare the mean levels of different aspects of interactions (see Table 1). Overall positive and negative interactions were compared first, followed by more specific types of positive (e.g., companionship vs. disclosure) and negative interactions (i.e., fighting and negative emotionality). We also compared reports of self and siblings' behaviors within the reciprocal dimensions (e.g., self help vs. sibling help). The findings indicated that overall positive behavior was reported significantly more than negative behavior, $F(1, 32) = 14.98, p = .001, \eta^2 = .32$. Additionally, there were significant differences among the types of positive interactions, $F(5, 160) = 37.71, p < .001, \eta^2 = .54$. Specifically, post hoc pairwise comparisons with a Bonferroni correction revealed that positive emotionality was reported significantly more than the other five positive variables (i.e., disclosure, teaching, helping, comforting, companionship). Furthermore, helping and companionship were reported more than both comforting and teaching. In terms of more specific negative dimensions, fighting was reported more often than negative emotionality, $F(1, 32) = 11.08, p = .002, \eta^2 = .26$. There were no significant mean differences between reports of self and sibling behaviors for any of the reciprocal dimensions.

Preliminary Analyses of Structural Variables

Pearson correlations and *t*-tests were used to assess associations between each of the study variables and (a) the focal child's age, (b) birth order¹, (c) each child's gender, and the (d) age gap between siblings. There were no significant associations with SRQ ratings of warmth. In terms of daily diary variables, focal child age was not significantly related to any of the

¹ The sample size was adjusted due to two sets of twins being included in the study – as noted in the method, one child from each family with multiple participating siblings was excluded a priori from the sample, and the remaining twin from these two families was omitted from analyses involving birth order and age gap.

measures. Focal child birth order was significantly related to companionship, $t(29) = 3.59, p = .001$ and self teaching, $t(20.97) = 2.27, p = .03$. Focal children with a younger sibling reported more companionship ($M = .53, SE = .03$) than those with an older sibling ($M = .35, SE = .04$). Furthermore, focal children with a younger sibling reported teaching their sibling more ($M = .35, SE = .08$) than those with an older sibling ($M = .15, SE = .03$).

Although focal child gender was not significantly associated with any of the measures, non-focal sibling gender was significantly related to companionship, $t(31) = -2.51, p = .017$; and positive emotionality, $t(30.78) = -.2.62, p = .013$. When the non-focal sibling was a girl, focal siblings reported less companionship ($M = .40, SE = .03$) and positive emotion ($M = .68, SE = .06$) than when the non-focal sibling was a boy ($Ms = .54$ and $.86$, respectively, $SEs = .05$ and $.04$). In terms of the reciprocal dimensions, non-focal child gender and reports of helping the sibling were significantly related, $t(31) = -2.18, p = .037$; participants reported helping sisters ($M = .38, SE=.07$) less than brothers ($M = .62, SE=.09$).

Pearson correlations were used to assess the age gap between the siblings and its relation to the study variables. Age gap was expressed as an absolute value to avoid confounding age gap with birth order. Results revealed that the absolute value of the age gap scores was inversely related to fighting ($r = -.37, p = .043$), overall comforting ($r = -.36, p = .045$) and comforting by siblings in particular ($r = -.41, p = .021$). In other words, children reported more fighting, more overall comforting, and more comforting by their sibling when the age gap between children was smaller.

How is Warmth Related to Between-Person Differences in Positive and Negative Features of Sibling Interactions?

Correlations were used to examine how sibling warmth (as assessed by the SRQ; Furman & Buhrmester, 1985) was related to each daily diary variable. Bolded values in the last column of Table 1 are used to indicate significant correlations at $p < .05$. Overall, warmth was related positively to overall positive behavior, overall helping, the focal child's helping of their sibling, the sibling helping the focal child, and positive emotionality. Warmth was also inversely related to fighting.

Subsequently, the Meng et al. (1992) procedure was used to assess differences in the magnitude of the associations with warmth. This procedure was conducted using the absolute values of the correlations. That is, negative correlations (e.g., $-.20$) were transformed into positive correlations (e.g., $.20$) inasmuch as our goal was to compare the relative strength rather than direction of the associations. Contrary to hypotheses, the association between warmth and overall positive behaviors was not significantly different than between warmth and overall negative behaviors. However, the analyses revealed variations in the magnitude of the links with the more specific types of positive and negative interactions. Partially in line with our expectations, the link between positive emotionality and warmth was of significantly greater magnitude than between warmth and (a) disclosure ($z = -3.08, p = .007$), (b) teaching ($z = -2.23, p = .042$), (c) comforting ($z = -2.66, p = .018$), and (d) companionship ($z = -2.17, p = .044$) (see Table 1). Additionally, with respect to specific negative dimensions, the association between fighting and warmth was of significantly greater magnitude than between negative emotionality and warmth ($z = -2.91, p = .01$) (see Table 1).

How is Warmth Associated to Fluctuations in Positive and Negative Features of Interaction?

The second research question concerned whether warmth moderated the association between daily fluctuations in positive and negative dimensions of sibling interactions. Analyses were conducted using multilevel modeling in HLM7. To begin, we computed an unconditional model with positive interactions entered as the dependent (i.e., outcome) variable. This analysis indicated that 44% of the variance was between groups and 56% was within groups. Following this analysis, the linear effect of day (from 0 to 13) was first controlled at L1. Then, overall positive interactions were entered at L1. The results indicated that, on any given day, when children reported more negative interactions with siblings, they also reported fewer positive interactions (see Model 1 in Table 2). The moderating effect of sibling warmth on this association was then tested at L2. Contrary to hypotheses, sibling warmth did not significantly moderate the association between positive and negative daily interactions (see Model 2 in Table 2).

Table 2*Daily Associations between Positive and Negative Sibling Interactions*

Effect	Positive Interactions	
	Model 1	Model 2
Fixed Effects		
	<i>b (SE)</i>	<i>b (SE)</i>
Intercept		
Intercept	.422 (.028)***	.094 (.106)
Warmth		.106 (.034)**
Which day?		
Intercept	.00002 (.003)	.005 (.01)
Warmth		-.001 (.003)
Negative Interactions		
Intercept	-.079 (.038)*	.053 (.118)
Warmth		-.041 (.045)
Random Effects		
Variance Component		
Intercept	.018	.013
Which day?	.0001	.0001
Negative Interactions	.023	.017

Note. * $p < .05$ ** $p < .01$ *** $p < .001$

How is Warmth Related to the Reciprocal Nature of Siblings' Daily Interactions?

The final set of analyses investigated how warmth was related to daily reports of sibling interactional reciprocity. This analysis also was conducted in HLM7 using a Bernoulli model appropriate for dichotomous outcomes. Results are reported based on unit-specific models with robust standard errors. The presence or absence of siblings' positive behaviors were entered as the dependent variables, with the corresponding behaviors for self as the predictor variables. Dummy variables were also used to test differences in the magnitude of the associations between

self and sibling for the various positive dimensions (i.e., disclosure, teaching, helping, comforting) at L1, by computing interactions at L1 between the type of dimension and scores for the self variables. Sibling warmth was entered at L2 to examine whether it moderated associations between self and siblings' positive behaviors.

The results showed that on days when focal children reported positive behaviors towards their siblings, they were also more likely to report that siblings engaged in positive behaviors towards them on the same dimension (see Model 1 in Table 3). However, contrary to the hypothesis, this association was not moderated by warmth at L2 (see Model 2 in Table 3). Furthermore, exploratory analyses indicated that the magnitude of this link did not vary significantly across the different positive dimensions at L1.

Table 3*Daily Associations between the Positive Behaviors of Self and Sibling*

Effect	Sibling			
	Model 1		Model 2	
	Fixed Effects			
	<i>b (SE)</i>	<i>OR</i>	<i>b (SE)</i>	<i>OR</i>
Intercept				
Intercept	-1.466 (.172)***	.231	-3.13 (.644)***	.044
Warmth			.547 (.292)*	1.727
Which day?				
Intercept	.002 (.015)	1.002	.008 (.073)	1.008
Warmth			-.002 (.023)	.998
Self				
Intercept	1.947 (.182)***	7.008	2.546 (.509)***	12.755
Warmth			-.196 (.162)	.822
Random Effects				
Variance				
Component				
Intercept		.475		.36
Which day?		.001		.001
Self		.559		.58

Note. * $p < .05$ *** $p < .001$ **Discussion**

The goal of the present study was to document varied features of siblings' daily interactions. Specifically, this study first examined overall links to structural variables such as age, gender, and birth order, and subsequently addressed three research questions: (a) How is warmth related to between-family differences in various types of positive and negative interactions?; (b) How is warmth related to the association between daily fluctuations in positive

and negative interactions?; and (c) How is warmth associated with reported positive reciprocity? The following sections will address each of these questions in turn.

Associations between Sibling Interactions and Structural Features of Relationships

To begin, when the focal child was the older sibling, reports of companionship (i.e., spending free time together, having fun together; Buhrmester & Furman, 1987) were higher than if they were the younger sibling. Older siblings may be more likely to instigate activities with their younger sibling that involve spending free time together. For example, Abramovitch et al. (1986) observed that older siblings were more likely to initiate a variety of behaviors (e.g., play, prosocial behaviors) and younger siblings were more likely to imitate. Furthermore, in the current study, focal children who were younger siblings had older siblings in the adolescent years. As such, their older sibling may have been spending more time out of the home, for example with peers. Indeed, Buhrmester and Furman (1990) found that siblings in adolescence spent less time participating in positive activities than those who were younger. Finally, in line with previous research (e.g., Dunn, 1983), older focal children reported teaching their younger siblings more than those with an older sibling. Older siblings tend to take on leadership or teaching roles more than their younger counterparts, possibly because of their greater knowledge and power within the dyad (Tucker et al., 2010).

With respect to associations with age gap, siblings who were closer in age reported more overall comforting within the dyad and by being comforted by one's sibling as compared to those with a wider age gap. Children who are closer in age may be more attuned to each other's emotions and feelings, which allows them to better comfort and support one another, although additional research is needed to confirm this hypothesis. By the same token, siblings with a smaller age gap may tend to spend more time at home together (Dunifon et al., 2017).

Additionally, in line with previous research (e.g., Furman & Buhrmester, 1985), children reported more fighting when the age gap was smaller. This may be due to the fact that when children are close in age, they have similar interests, and may want to play with or use the same toy or object (Volling, 2003, as cited by Dirks et al., 2015). They may also be spending more time together, as mentioned above, which could lead to more fighting in general. There is also less differentiated power between siblings who are closer in age (Tucker et al., 2010).

Regarding the gender of the siblings, focal children with sisters reported less companionship and positive emotion than those with brothers. Additionally, focal children reported helping sisters less than they did their brothers. Findings for sibling gender effects in the literature are mixed. Our findings are inconsistent with some research suggesting that sister-sister pairs tend to be the warmest of relationships, followed by mixed-sex and brother-brother pairs (Buist & Vermande, 2014; Cole & Kerns, 2001). Other studies have shown that relationship quality and sibling effects depend not only on the gender of the sibling, but also on the birth order of the sibling (e.g., Buist, 2010). The sample size in this study did not allow us to test whether birth order moderated our findings, and in general, the current results should be interpreted cautiously given the small sample.

Positive and Negative Features of Sibling Interactions and their Associations with Warmth

Overall, focal children reported positive interactions with their sibling significantly more than negative interactions. As mentioned, sibling relationships tend to be viewed as rife with negative and conflictual interactions, especially as compared to children's other close relationships; in fact, one study found that children in fourth, seventh, and tenth grades participate in negative interactions (i.e., conflict) more with their siblings than with other significant people in their lives (e.g., parents, peers; Furman & Buhrmester, 1992). However, the

results of the current study provide a counterpoint to these findings; children reported not only regular positive interactions with their sibling, but also frequently experiencing positive emotions with their sibling. Indeed, children reported being happy with their sibling on more days, as compared to other specific types of positive interactions, such as comforting or helping. They also reported helping and companionship more often than teaching and comforting. This may be partially due to the fact that opportunities to comfort may not arise as often; cheering up a sibling may not be a daily interaction, whereas helping can encompass a variety of tasks, such as with chores or homework. Additionally, companionship includes various aspects, such as playing at home or playing sports together, which allowed for more variability and also the possibility of engaging in multiple activities on a given day. In general, these findings are consistent with Furman and Buhrmester (1985), wherein two of the main positive aspects of the sibling relationship noted by children aged 11 to 13 years old were companionship (mentioned by 93% of siblings) and prosocial behaviors (77%).

In regard to negative interactions, fighting was reported on more days than negative emotionality (i.e., being mad or sad). This distinction is interesting, inasmuch as fighting and negative emotions might be assumed to go hand in hand. However, it could be that the children reported a fight on that day but did not necessarily feel upset with their sibling when they were filling out the diary. Additionally, since the diary asked about two different negative emotions, children may have reported one and not the other (e.g., mad but not sad), thus accounting for the lower overall mean.

In terms of associations with self-reported warmth of the sibling relationship, warmth was negatively related to fighting. Again, this finding is consistent with previous research indicating that conflictual sibling relationships are characterized by lower levels of warmth in

their relationship (e.g., Howe et al., 2011; Stoneman & Brody, 1993). Moreover, warmth was related to overall positive behavior, overall helping, the focal child helping their sibling, the sibling helping the focal child, and positive emotionality. Warmer relationships may lead to more prosocial behaviors, such as helping, but it may also be that positive behaviors may lead to the perception of a warmer relationship (e.g., Jambon et al., 2019). Future work is needed to disentangle the direction of this relationship.

Being happy with a sibling, in particular, was more closely related to warmth than all of the other positive features of sibling interactions that were assessed (i.e., disclosure, teaching, helping, comforting, and companionship), which partially supported our hypothesis. Specifically, focal children in a warmer relationship reported positive emotion on more days (i.e., being happy with their sibling) than those in less warm relationships. This suggests that, for children who experienced a warm relationship, regardless of the types of exchanges that predominated in their daily interactions (e.g., companionship, teaching), they tended to report being happy with their sibling. Research has shown that sibling relationships are a fruitful environment to develop emotional competence and emotional understanding (e.g., Kramer, 2014) and because of the children's intimate history with one another and their shared experiences, they may be able to interact with one another in a way that is enjoyable for both children. In this sense, it may be more important to help children to experience positive emotions with and feelings for their sibling, rather than fostering particular types of positive interactions. Further, it may be the affective features of interactions, such as how siblings talk to and support one another, that particularly support the development of positive feelings and emotions between the siblings, although future work is needed to confirm this hypothesis (see Kramer, 2010, for list of potential skills involved in developing a positive sibling relationship).

Warmth and Daily Fluctuations in Positive and Negative Features

Past research addressing sibling relationships has mainly focused on between-subjects associations, as discussed in the previous section. In this respect, one unique contribution of the current study was to also examine variations within individuals (i.e., daily fluctuations in reports of sibling relationships).

On days when children reported more negative interactions with their siblings, such as fighting or negative emotions, they also reported fewer positive interactions; in other words, negative interactions were inversely linked to positive ones. However, warmth did not significantly moderate this association. This finding is inconsistent with the notion that more time spent together on a given day is simultaneously linked to both more positive and negative interactions. It may have been assumed that, for example, when children spend more time together, they may be having fun and fighting more. However, the result of this analysis suggest that a certain tenor of interactions tends to predominate on a given day (e.g., on days when children report more negative behaviors such as fighting, they also report fewer positive behaviors, such as companionship).

In general, our findings suggest that having fluctuations in positive and negative interactions between siblings is potentially normative. It may be that, regardless of the levels of warmth in a relationship, all relationships fluctuate in their levels of positivity and negativity, with some negative days and some positive days. Previous research based on between-subjects analyses have shown that middle childhood and early adolescence are periods of strong affect between siblings, both positive and negative, which could lead to the typology of affect-intense (i.e., high conflict, high warmth; McGuire et al., 1996). Future work should consider different types of both positive and negative daily behaviors and their possible connections to different

types of relationship typologies (e.g., affect-intense, harmonious). Moreover, different fluctuation patterns in varied aspects of sibling interactions should be considered, as well as whether sibling relationship quality is associated with these daily features.

Warmth and Reciprocity in Sibling Daily Interactions

Positive reciprocity was evident in our sample. Specifically, overall reciprocity was shown between the siblings; when the focal child engaged in positive behaviors towards their sibling on a given day, they were more likely to report that their sibling engaged in similar types of positive behaviors with them on the same day. However, warmth did not significantly moderate the degree of daily positive reciprocity that we observed; in other words, warmer relationships did not show significantly higher levels of reciprocity between the siblings. Additionally, variations across the specific types of reciprocity were not significant; children reported reciprocating disclosing, teaching, comforting, and helping to a similar extent. This reciprocal dimension of the sibling relationship is similar to that highlighted by Abramovitch et al. (1986), wherein reciprocal behaviors in both positive and negative dimensions were evident during childhood. However, the current study assessed daily reciprocity using a within-dyad approach whereas Abramovitch and colleagues (1986) relied on a between-dyad method. Additionally, this study only assessed positive features; future work should also consider negative dimensions of daily reciprocity (e.g., teasing) similar to the Abramovitch study as well.

The manner in which the daily diaries were analyzed in this study allowed for exploration in reciprocity over time within the same family rather than across participants overall. Since children reported their own behaviors towards their sibling as well as their sibling's behaviors towards them across multiple days, we were able to show that children do report reciprocity day-to-day. Typical one-time questionnaires may indicate that siblings report reciprocal interactions,

but without the use of daily diaries, it is difficult to untangle the daily patterning of these behaviors.

Limitations and Future Directions

This study was the first of its kind, in that no previous work has explored how siblings' positive relationship quality is linked to fluctuations in daily diary reports of interactions. As with all research, this study is not without its limitations. To begin, the sample size of the study was small, with only 33 participants with available data. Additionally, two sets of twins were included in the study, and thus two additional children were removed when conducting birth order and age gap analyses, which further reduced the sample size for those tests. The sample was also fairly homogenous, with a majority of the sample White and English-speaking from a rural, Eastern Canadian town. This does not allow for generalization of the findings to other demographic groups. Future studies on this topic should include families and children from a variety of backgrounds, cultures, and cities.

Additionally, only one of the siblings from each family took part in the study. It is unknown whether the other sibling's daily reports would be similar to or different from those of the target sibling in this study. Future work should include both or all siblings in the family in order to be able to compare the findings. It may be that the two (or more) siblings report vastly different information, which could help shed light on how sibling relationships function and how different siblings view their relationship.

Furthermore, it is not known when the children completed these diaries. The children may have completed them when instructed (i.e., every night right before bed). This being said, it is also possible that some children completed them at the end of the week all at once before returning them. This may have implications for the results because we cannot be sure that each

day was accurately reported. In order to overcome this limitation, future studies can use daily phone calls or online surveys that notify the participant when to fill out the survey as well as have a time stamp when submitted.

The varying number of items that were used to assess various dimensions of daily interactions was another limitation of this study. The different dimensions had different numbers of items within them, which complicated the comparison between types of interactions. For example, positive emotionality was measured by only one item (i.e., Were you happy when you were with your [sibling] today?) , whereas negative emotionality had two items (i.e., “Were you sad when you were with your [sibling] today?” and “Were you mad at your [sibling] today?”). It would be preferable for future work to include a uniform number of items across the different types of interactions assessed.

Finally, this study only assessed one dimension of overall relationship quality (i.e., warmth). Future work should analyze various relationship quality dimensions (e.g., conflict, power) and evaluate how these different dimensions are related to different daily features of sibling interactions. For example, might associations between positive and negative behaviors in the sibling relationship be moderated by the dimension of conflict rather than warmth? Further, in considering juxtapositions between dimensions, would the various typologies of the sibling relationship (e.g., harmonious) show different patterns of daily fluctuations? Future work in these areas is warranted.

Implications and Conclusions

The results of this study have the potential to inform future interventions aimed at supporting positive sibling relationships. Findings could ultimately help guide parents, teachers, and professionals by documenting the aspects of siblings’ daily interactions that are most

diagnostic of variations in sibling relationship quality. For example, Kramer and Baron (1995) showed that parents view conflict as the most problematic yet easiest aspect to be improved upon, however the largest discrepancy between parents' standards and their actual observation of their children's relationship was with the warmth of the relationship. This underscores that sibling relationship warmth may be overlooked inasmuch as negative features of interactions tend to be the focus, even though positive features of the relationship are also crucial. Those closest to the children should help support and build upon positive features of the sibling relationship and interventions should not focus solely on decreasing conflict but also on improving warmth and positivity in the relationship. In relation to the results of the current study, our findings indicated that positive emotionality is highly related to the warmth of the sibling relationship, as is helping. As such, although we cannot establish the causal mechanisms involved in these associations, these correlations suggest that approaches that foster positive emotions and prosociality may be useful to consider.

This study began to explore the fluctuations in the sibling relationship, with the understanding that charting variations in emotions and interactions is paramount to understanding sibling relationships. Our findings suggested that there are indeed days on which negative interactions predominate the sibling relationship, and these moments may be particularly salient to parents. However, there are also days in which positive interactions tend to predominate, and thus it may be useful to help parents attend to and harness these opportunities to support and reinforce warm sibling interactions. Relatedly, positive reciprocity between siblings should also be acknowledged and supported, inasmuch as it may also help improve or maintain a positive relationship.

Finally, this study underlines the value of daily diary methodologies in research on sibling relationships to not only assess between-dyad variations, but also within-person variations at the daily level. While larger, more memorable interactions between siblings may be impactful on the development of children and relationships, mundane interactions, such as helping your sibling or playing games, are also worthy of investigation, in that these may form building blocks of relationships. The results of this study have begun to chart these within-dyads features of daily interactions, and further research examining this unique relationship and its fluctuations is warranted.

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Appendix A Daily Diary

1. How was your day?
 - a. Great!
 - b. Pretty good
 - c. So – so
 - d. Not so good
 - e. Awful!

Yes/No Questions:

2. Did you tell your brother about something good that happened with a friend today?
3. Did you tell your brother about something good that happened with a friend today?
4. Did you tell your brother about a problem that you had with someone in your family today?
5. Did you tell your brother about something good that happened when you were with your family today?
6. Did you tell your brother about a problem that you had at school today?
7. Did you tell your brother about something good that happened when you were at school today?
8. Did your brother tell you something about his friend today?
9. Did your brother tell you something about the family today?
10. Did your brother tell you something about what happened at school today?
11. Did you teach something new to your brother today?
12. Did you learn something new from your brother today?
13. Did your brother learn something new from you today?
14. Did you help your brother today?
15. Did your brother help you today?
16. Did you cheer up your brother today?
17. Did your brother cheer you up today?
18. Were you happy when you were with your brother today?
19. Were you sad when you were with your brother today?
20. Were you mad at your brother today?
21. If you were mad who made up?
22. What did you do with your brother today?
 - a. Played at home
 - b. Played at school
 - c. Watched t.v.
 - d. Did housework
 - e. Had a fight
 - f. Did homework together
 - g. Played sports
 - h. Talked together
 - i. Other

Short Answer:

23. Is there anything really GOOD that happened with your brother today?
24. Is there anything really BAD that happened with your brother today?
25. What did you talk about with your brother today? Try to name at least 3 things.

26. When you talked about the first thing, what kind of conversation was this? (Check off as many words as you need or add others.)

- | | |
|--------------------------|------------------------|
| a. Caring | g. Interesting |
| b. Loving | h. Mean |
| c. Nice | i. Getting advice |
| d. Sharing secrets | j. Giving advice |
| e. A fight | k. Other words such as |
| f. Helping with problems | |

27. When you talked about the second thing, what kind of conversation was this? (Check off as many words as you need or add others.)

- | | |
|--------------------------|------------------------|
| a. Caring | g. Interesting |
| b. Loving | h. Mean |
| c. Nice | i. Getting advice |
| d. Sharing secrets | j. Giving advice |
| e. A fight | k. Other words such as |
| f. Helping with problems | |

28. When you talked about the third thing, what kind of conversation was this? (Check off as many words as you need or add others.)

- | | |
|--------------------------|------------------------|
| a. Caring | g. Interesting |
| b. Loving | h. Mean |
| c. Nice | i. Getting advice |
| d. Sharing Secrets | j. Giving advice |
| e. A fight | k. Other words such as |
| f. Helping with problems | |

29. Is there anything else you want to say about your brother?

Appendix B

Variables

Table B

Variable	Question Numbers	Example
Disclosure	2 – 10	Did [your sibling] tell you something about his friend today?
Teaching	11 – 13	Did you teach something new to [your sibling] today?
Helping	14 – 15	Did you help [your sibling] today?
Comforting	16 – 17	Did [your sibling] comfort you today?
Positive Emotionality	18	Were you happy when you were with [your sibling] today?
Companionship	22a, b, c, g, h	Played at school; talked together
Negative Emotionality	19 – 20	Were you sad when you were with [your sibling] today?
Fighting	22e	Had a fight

Appendix C

Reciprocal Variables

Table C1

Disclosure Reciprocal Items

Disclosure	
Self Disclosure	Sibling Disclosure
<ul style="list-style-type: none"> • Did you tell your brother about a problem that happened with a <u>friend</u> today? • Did you tell your brother about something good that happened with a <u>friend</u> today? 	<ul style="list-style-type: none"> • Did your brother tell you something about his <u>friend</u> today?
<ul style="list-style-type: none"> • Did you tell your brother about a problem that you had with someone in your <u>family</u> today? • Did you tell your brother about something good that happened when you were with your <u>family</u> today? 	<ul style="list-style-type: none"> • Did your brother tell you something about the <u>family</u> today?
<ul style="list-style-type: none"> • Did you tell your brother about a problem that you had at <u>school</u> today? • Did you tell your brother about something good that happened when you were at <u>school</u> today? 	<ul style="list-style-type: none"> • Did your brother tell you something about what happened at <u>school</u> today?

Note. In order to ensure comparability between the self and sibling scores in the between-subjects analysis (research question 1), the disclosure items for self were collapsed within category per day (friend, family, school). That is, if the focal child marked either option “yes” (1), then they received a score of 1 for that category of disclosure. Furthermore, for the within-subjects analyses (research questions 2 and 3), both the self disclosure and sibling disclosure items were reduced further, meaning if the child or their sibling disclosed to one another at all, it was marked as “yes” (1) for a given day.

Table C2*Teaching Reciprocal Items*

Teaching	
Self Teach	Sibling Teach
Did your brother learn something new from you today?	Did you learn something new from your brother today?

Table C3*Helping Reciprocal Items*

Helping	
Self Help	Sibling Help
Did you help your brother today?	Did your brother help you today?

Table C4*Comforting Reciprocal Items*

Comforting	
Self Comfort	Sibling Comfort
Did you cheer up your brother today?	Did your brother cheer you up today?