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Associations between Family Communication Patterns, Sibling Closeness, and Adoptive Status

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Abstract

Previous research has demonstrated the protective effect of family and sibling closeness on child adjustment, but fewer studies have investigated how closeness is promoted within families. Guided by Family Communication Patterns Theory, we tested the association between family communication and sibling emotional and behavioral closeness, and whether adoptive status moderated this relationship. Participating families included 616 adoptive and non-adoptive families with two adolescent children. Hypotheses were tested using structural equation modeling. Sibling closeness was highest in families that emphasized both conversation and conformity and lowest in families that emphasized only conversation or neither conversation nor conformity. Emotional and behavioral closeness were differentially associated with adoption status, sibling age, and sibling gender. Few moderating effects of adoption status were found. Post hoc analyses showed moderating effects of sibling gender composition.

Keywords

adolescence; adoption; communication; family interaction

Substantial evidence demonstrates that family and sibling closeness are negatively associated with adolescent externalizing (Branje, van Lieshout, & van Aken, Haselager, 2004; Criss & Shaw, 2005; Hamilton, 2005; Meadows, 2007) and internalizing problems (Hamilton, 2005; Meadows, 2007; Pilowsky, Wickramaratne, Nomur, & Weissman, 2006). Yet little research demonstrates family characteristics that promote perceptions of family and sibling closeness. In order to further the understanding of how to promote sibling closeness as a protection against adolescent adjustment problems, we examined the association between observed family communication patterns and two forms of sibling closeness.

An important consideration when examining sibling closeness in today's families is family member genetic relatedness. Adoptive families, stepfamilies, and families formed using assisted reproductive technology are all increasing in number (CDC, 2007, Nicman et al., 2005; Krieder, 2003). Siblings in these families are often not genetically related, and genetic relatedness is associated with perceived closeness (Jankowiak & Diderich, 2000; Pollet, 2007). Thus, this study examined associations among family communication, sibling closeness, and sibling genetic relatedness in adoptive and non-adoptive families. We also examined sibling genetic relatedness as a moderator of the association between communication and closeness.

Family Communication Patterns Theory

This study was guided by Family Communication Patterns Theory (FCPT) (Koerner & Fitzpatrick, 2006). FCPT proposes that to function optimally, families create a family shared social reality (FSSR), broadly defined as shared understanding of one another. Fully establishing a shared reality requires that family members perceive a topic similarly, believe others share their attitudes and perceptions, and finally, be accurate in their beliefs.

The topics family members agree on appear to matter; for example parents and adolescents are more likely to agree on topics regarding values and moral issues, but not as much on more mundane topics (Laursen & Collins, 2004) such as daily hassles (Adams & Laursen, 2001). On the other hand, parents are more intensely affected by disagreement over daily hassles compared to adolescents (Steinberg, 2001), perhaps due to incongruent perceptions and expectations affecting parents more than children (Laursen & Collins, 2004).

Achieving a shared reality (agreement, accuracy, and congruence in beliefs and attitudes) increases the chance that family members will understand and be understood by one another, leading to more efficient interactions and fewer disagreements and conflicts. It may be that achieving FSSR is particularly challenging in families with adolescent children because of their increasing need for autonomy (Fuligni, 1998) and desire for peer rather than family interaction (Larson & Richards, 1991; Steinberg & Silverberg, 1986). There is some evidence that links these developmental changes to increased family conflict (Youniss & Smollar, 1985), particularly in families where adolescents feel like their autonomy is restricted (Fuligni & Eccles, 1993; Smetana, 1995). Still, there is evidence of a negative association between parent-adolescent disagreement and warm, supportive family interactions (Rueter & Conger, 1995). Altogether, this suggests that a sense of shared social reality appears to contribute to healthy family functioning, even if it is somewhat more challenging to achieve with adolescents.

Families create a shared reality using a combination of two orientations, conversation and conformity (Koerner & Fitzpatrick, 2006). Those emphasizing the conversation orientation encourage members to share thoughts, feelings and opinions in an attempt to understand one another's view of a topic. Families emphasizing conformity expect that all family members will view a topic similarly. This shared view is often determined by a dominating and influential family member, such as an authority figure.

Combining the conversation and conformity orientations produces four communication patterns (see Figure 1). *Consensual* families achieve shared reality by balancing high levels of both conversation and conformity. In these families, members talk often about their views and opinions, but typically an authority figure makes the final decision with the expectation that everyone's behavior will then conform to the decision. *Protective* families rely heavily upon conformity to achieve shared reality, emphasizing deferral to a dominating family member's view over conversation. *Pluralistic* families emphasize conversation, putting little emphasis on conforming to a single view. *Laissez-Faire* families are less interested in sharing reality and thus emphasize neither orientation. Family members are highly individualistic and may appear disengaged.

The FCPT family communication patterns share similarities with other typologies, including Baumrind's (1971) parenting styles. *Consensual* families often have *Authoritative* parents. Parents in *Protective* families are typically *Authoritarian*, and *Pluralistic* families tend to have *Permissive* parents (Isaacs & Koerner, 2008). Also, *Laissez-Faire* families show the disengagement of Baumrind's *Neglectful* parents. Associations between FCPT communication patterns and adolescent adjustment (Rueter & Koerner, 2008) are also

consistent with research showing a strong link between warm, firm parenting and healthy child adjustment (Steinberg, 2001).

There are two distinct differences between the FCPT classes and parenting styles. Utilizing a systems perspective, the FCPT proposes that every family member contributes to a family's communication pattern, rather than focusing on parental behavior alone. Also, FCPT goes beyond descriptive typologies to explain why conversation and conformity are theoretically relevant to sibling closeness. According to FCPT, whether through conversation about a topic (e.g., curfew) or by conforming to a single view of the topic, achieving a shared reality means all family members agree on the topic and understand and accept each other's perspective (McLeod & Chaffee, 1972, 1973). Having this shared reality reduces family conflict, leading to improved family relationships, including sibling relationships. In other words, FSSR is theoretically proposed to mediate the association between FCP classes and healthy functioning.

There is some evidence that FCPT communication patterns are associated with interpersonal closeness (Ledbetter, 2009). We use FCPT to anticipate sibling closeness. According to FCPT, because *Consensual* families avail themselves of both conversation and conformity to create shared reality, they are most likely to achieve it. Therefore, (H1a) siblings in *Consensual* families are expected to report greater closeness than all other family types. *Protective* and *Pluralistic* families emphasize a single orientation. They are moderately likely to achieve shared reality, leading us to expect that (H1b) siblings in *Protective* or *Pluralistic* families will report less closeness than *Consensual* families, but greater closeness than siblings in *Laissez-Faire* families. Finally, *Laissez-Faire* families are least likely to achieve shared reality and (H1c) *Laissez-Faire* siblings are expected to report the lowest closeness levels.

Sibling Genetic Relatedness

Aside from kin and sibling group adoptions and stepparent adoptions, adopted children are not genetically related to their parents or siblings. Children who are not genetically related to their family members tend to report lower family closeness than those who are (Jankowiak & Diderich, 2000; Pollet, 2007). In FCPT, this finding is explained by lower levels of shared reality in adoptive families. Indeed, others have proposed that achieving shared reality is more challenging among adoptive families relative to families with genetically related members (Brodzinsky, Lang, & Smith, 1992; Deater-Deckard & Petrill, 2004; Grotevant, Wrobel, van Dulman & McRoy, 2001).

One of the possible explanations for the added challenge to achieving shared reality among adoptive families comes from behavior genetics research. Many cognitive processes, attitudes, and physical characteristics underlying perceptions are, to some extent, a function of genetic inheritance (e.g., Jang, McCrae, Angleitner, Reimann & Livesley, 1998; Lykken, Bouchard, McGue, & Tellegen, 1993; Olson, Vernon, Harries & Jang, 2001; Scourfield, Martin, Lewis & McGuffin, 1999; Tesser, 1993). The possible presence of inherited similarities allows genetically related family members to sometimes view a topic similarly, even without discussing the topic. We and others propose that genetically unrelated family members, who do not have this advantage, must rely more heavily on conversation to fully achieve shared reality (Brodzinsky et al., 1992; Grotevant et al., 2001; Rueter & Koerner, 2008; Stein & Hoopes, 1985). Thus, we expected conversation to play a stronger role in promoting adopted sibling closeness than non-adopted sibling closeness.

Our second set of hypotheses focused on how adoptive status may moderate the relationship between FCP classes and sibling closeness. Specifically, we expected the pattern of closeness levels proposed in H1a-H1c to be the same for non-adopted siblings but reordered

for adopted siblings. Thus, for non-adopted siblings, we proposed that (H2a) *Consensual* families would have the closest siblings; *Protective* and *Pluralistic* families would have similarly moderate levels of sibling closeness; and *Laissez-Faire* siblings would be the least close. Among adopted siblings (H2b) we also expected the highest sibling closeness levels in *Consensual* families and the lowest levels in *Laissez-Faire* families. Due to their greater emphasis on conversation, however, we expected adopted siblings in *Pluralistic* families to report greater closeness than adopted siblings in *Protective* families.

Covariates

There is clear evidence that sibling age difference and gender composition also influence sibling closeness. For example, closeness tends to increase as siblings age (Feinberg, McHale, Crouter & Cumsille, 2003). Also, siblings close in age report greater closeness than siblings with a larger age gap (Furman & Burhmester, 1985). Finally, nearly every study of sibling relationship qualities has found sister-sister sibling pairs report greater closeness compared to mixed gender or brother-brother pairs (Furman & Burhmester, 1992; Noller, 2005; Stoneman & Brody, 1993). In fact, there is some evidence that all girls and women report greater sibling closeness, regardless of the gender of their sibling (Burhmester & Furman, 1987; Furman & Burhmester, 1992; Kim, McHale, Osgood, & Crouter, 2006). Finally, birth order and adolescent age were also explored as covariates of sibling closeness because they have been associated with other characteristics of sibling relationship quality such as conflict (Campione-Barr, & Smetana, 2010). Based on this evidence, sibling age, sibling age difference, birth order, gender, and gender composition were all included in the present study as covariates of sibling closeness.

Methodological Advances

In addition to advancing our knowledge of how genetic relatedness moderates the relationship between communication and closeness, we further explore this relationship using observation. As mentioned, existing research established an association between communication and family closeness (Schrodt, 2006; Vazsonyi, Hibbert & Snider, 2003). Even so, the majority of studies that examine communication use self-reported surveys that assess global aspects of family communication (e.g., “how satisfied are you with the communication you have with your family,” “how open is the communication between you and your family members.” These findings point to a connection between communication and closeness; nevertheless, it is still unclear what specific aspects of family communication are influencing adolescents’ perceptions of closeness. Therefore we sought to extend our knowledge on what communication practices, as systematically rated by an outside observer, are related to closeness perceptions. Additionally, we coded multiple family members communication behavior (father, mother, elder sibling, and younger sibling), rather than focusing on the communication practices of one family member alone.

We also examined two dimensions of sibling closeness. Family closeness is defined as emotional bonding (Olson et al., 1983; Olson & Goral, 2003; White, 2000) or emotional joining (Anderson & Henry, 1994; McCubbin, Thompson, Pirner, & McCubbin, 1988) and also behavioral interdependence (Berscheid, Snyder, & Omoto, 1989) among family members. Empirical evidence supports the presence of two distinct closeness factors, feeling close and behaving close (Aron, Aron & Smollan, 1992). Previous research has found that siblings are more similar in a variety of adjustment outcomes when they have greater emotional closeness (Rowe & Gulley, 1992) and the more they participate in shared activities (Tucker, McHale & Crouter, 2008). The presence of two closeness factors, led us to assess sibling closeness as two separate constructs, emotional closeness and behavioral closeness to further examine their potential similarities and differences in relation to family communication. Emotional closeness was defined as perceived love, trust, and care between

siblings. Behavioral closeness was defined as perceived amount and quality of time spent together.

In sum, the following hypotheses were tested:

Hypothesis 1: FCP classes will be associated with sibling closeness.

Hypothesis 1a: Siblings in consensual families will report greater closeness than all other family types.

Hypothesis 1b: Siblings in protective or pluralistic families will report less closeness than siblings in consensual families, but greater closeness than siblings in laissez-faire families.

Hypothesis 1c: Siblings in laissez-faire families will report the lowest closeness levels.

Hypothesis 2: Adoptive status will moderate the association between FCP classes and sibling closeness.

Hypothesis 2a: Among biologically related children, results will mirror Hypotheses 1a–1c.

Hypothesis 2b: Among adopted children, results will also mirror Hypothesis 1a and Hypothesis 1c. The moderating effect of adoptive status is expected to be due to different associations between pluralistic and protective families and sibling closeness. Specifically, we expect that adopted siblings in pluralistic families will report greater closeness than adopted siblings in protective families.

Methods

Data were obtained from the Sibling Interaction and Behavior Study (SIBS) (McGue, Keyes, Sharma, Elkins, Legrand & Johnson, 2007), a study designed to examine the effect of gene x environment interactions on adolescent substance use (data collected in 1998). Families ($N = 617$) included parents with two children who were (a) both adopted and not genetically related to their parents or each other ($n = 285$, one family from this group was excluded from all study analyses because the adopted children were genetically related to each other), (b) both biological offspring of their parents ($n = 208$), or (c) genetically unrelated with one child the biological offspring of his/her parent, and one adopted child ($n = 123$). Therefore the final sample included 616 families. Families with two biological children were identified through state birth certificates. Adoptive families were identified through three adoption agencies' records.

Researchers located 90% of the identified adoptive and 85% of the non-adoptive families. In a pre-screened phone interview, one parent (usually the mother) reported on each child's adoption status, and each family member's ethnicity and birth date. Additionally, this parent reported on each parent's income and education, amongst other key demographic variables. Study eligibility was limited to families who lived within driving distance of the research lab. Participating children were required to have no physical or mental handicap and be no more than five years apart in age. Adopted children were all placed with their families before the age of two years ($M = 4.7$ months, $SD = 3.4$ months).

Fifty-seven percent of the eligible nonadoptive and 63% of the eligible adoptive families agreed to participate. Three quarters of the eligible nonparticipating parents were interviewed by phone to determine sample representativeness. Comparisons of parents' education, occupation, and marital status, as well as behavioral disorders in children,

showed that the study sample is generally representative of the metropolitan region where the university is located (McGue et al., 2007). Family members who participated in the laboratory were paid \$50.

Study Participants

The final sample included 616 families with 1,232 adolescents (692 adopted adolescents, 540 non-adopted, 54.8% female, 53.7% Caucasian, 37.5% Asian, 8.8% adolescents reported another ethnicity; one adolescent was deemed ineligible due to IQ performance). Adolescent mean age was 14.9 years, $SD = 1.9$ (elder siblings M age = 16.1, $SD = 1.5$; younger siblings $M = 13.8$, $SD = 1.6$). One quarter (25.3%) of the sibling pairs were brothers, 34.9% were sisters, 23.7% were younger sister with elder brother sibling pairs, and 16.1% were younger brother with elder sister sibling pairs. The average age difference in sibling pairs was 2.34 years ($SD = .89$). Among adoptees, 514 were internationally adopted (female: 60.3%, Asian: 89.2%), and 178 were domestic adoptions (female: 41%, Caucasian: 78.7%). On average, 56% of participating parents were college-educated (61% adoptive parents, 44% non-adoptive parents). The majority of parents (91.1%) were married. Consistent with the demographics of the area, 96% of parents were Caucasian. Additional sample demographics are available in McGue et al., 2007.

Procedures

Participating family members came to the research lab to complete informed consent, diagnostic interviews, self-report surveys, and two 5-minute videotaped family interactions. Family interactions were recorded in rooms decorated like a living/dining room, with family members seated around a table. The video camera was inconspicuously placed in a bookcase, although family members were aware they were being recorded. A trained lab technician explained the family interaction tasks to the family members, answered any questions about the tasks, and left the room for the video recording. For the first task, families were asked to come to an agreement about what a Rorschach inkblot represented. For the second task, families read a story about a man whose spouse had been diagnosed with a disease that was incurable unless she took one drug; this drug, however, was unaffordable. Family members were asked to decide whether the man should steal this drug for his spouse, as well as whether he should steal the drug for someone in the same circumstances but whom he did not know (Kohlberg, 1981).

Measures

Family communication patterns (FCP)—The FCP variable was assessed as a latent class variable using four observational scales adapted from the Iowa Family Interaction Scales (Melby, Conger, Book, Rueter, Lucy & Repinski, 1998). Trained observers globally rated each family member's behavior towards each other family member using a scale ranging from 1 (*not at all characteristic of the person*) to 9 (*mainly characteristic of the person*). All observers received approximately 100 hours of training and were required to pass written tests before independent coding. Observers also attended bi-monthly meetings for continued training. Reliability was assessed by double coding 25% of tapes. Double coded ratings were compared using intraclass correlations (ICC) (Shrout & Fleiss, 1979; Suen & Ary, 1989).

Following the measurement strategy of Rueter and Koerner (2008), the Communication, Listening Responsiveness, and Warmth scales were used to assess the conversation orientation (which emphasizes open and frequent communication in the co-creation of FSSR), and the Control scale was used to assess the conformity orientation (which emphasizes conforming to the views of an dominating family member in the creation of FSSR). Each family member received one code per scale that was aggregated across both

family tasks. Family members were rated for their behavior towards every other family member (3 ratings for each of the 4 scales).

Communication (ICC range: .60 – .75, *M* (*SD*) range: 3.11 (1.14) – 4.99 (1.44)) was defined as the extent the family member explained his/her reasoning in a clear, neutral to positive manner. *Listening Responsiveness* (ICC range: .34 – .63, *M* (*SD*) range: 1.82 (0.99) – 3.21 (1.28)) measured the degree to which the family member listened to, showed interest in and validated another family member. *Warmth* (ICC range: .44 – .72, *M* (*SD*) range: 1.57 (1.00) – 2.73 (1.64)) measured the degree to which the family member expressed support, appreciation or care for another family member. *Control* (ICC range: .56 – .76, *M* (*SD*) range: 3.79 (1.54) – 5.38 (1.41)) measured the extent that the family member successfully influenced others to conform to the behaviors, opinions, and points of view desired by the family member. For example, if a family member's answer to the question of whether the man should steal the drug for his wife was accepted by other family members without question, that person would receive a high rating for control.

Sibling closeness perceptions—Sibling emotional closeness and sibling behavioral closeness were measured by the adolescents' responses to the Sibling Relationship Questionnaire (SRQ) (Furman & Buhrmester, 1985). The SRQ asks adolescents to rate interactions with the other sibling on a scale of 1 (*Hardly at all*) to 5 (*EXTREMELY much*). Emotional closeness was assessed as a latent factor indicated by three items: (a) "How much is there a strong feeling of affection (love) between you and this sibling?"; (b) "Some siblings care about each other a lot while other siblings don't care about each other that much. How much do you and this sibling care about each other?"; and (c) "How much do you and this sibling love each other?" ($\alpha = .89$).

Behavioral closeness was also assessed as a latent factor indicated by three items: (a) "Some siblings play around and have fun with each other a lot, while other siblings play around and have fun with each other a little, how much do you and this sibling play around and have fun with each other?"; (b) "How much do you and this sibling go places and do things together?"; and (c) "Some kids spend lots of time with their siblings, while others don't spend so much. How much free time do you and this sibling spend together?" ($\alpha = .86$).

Data Analysis Plan

Findings are reported based on staged tests of the study hypotheses using mixture modeling performed in Mplus 5.1 (Muthén & Muthén, 1998–2007).

Family communications patterns (FCP) latent classes—The Family Communication Patterns (FCP) variable was operationalized as a 4-class latent factor. This latent factor was created using Latent Class Analysis (LCA) following procedures described in Rueter and Koerner (2008). That study used the same sample and measures as were used in the present study. The LCA included 16 first-order latent factors (4 family members: mother, father, elder adolescent, younger adolescent x 4 observed measures: communication, listener responsiveness, warmth, control) as indicators of the second-order FCP variable. Each first-order factor (e.g., "mother's communication") had 3 indicators, one for the family member's behavior toward each of the other 3 family members. Rueter and Koerner (2008) compared 1-, 2-, 3-, 4- and 5-class models and found that the 4-class solution produced the best fitting model. For the present study, the first-order factor means were set to the 4-class values reported by Rueter and Koerner (See Table 1).

Sibling emotional closeness and behavioral closeness latent factors—Emotional closeness and behavioral closeness were operationalized as latent factors

(emotional closeness $M = .00$, $SD = .71$; behavioral closeness: $M = .00$, $SD = .74$). Standardized factor loadings ranged from .83 to .89 (emotional closeness), and .78 to .84 (behavioral closeness). The two factors were strongly correlated ($r = .69$, $t = 15.26$, $p < .001$). Therefore, all emotional and behavioral closeness models were tested separately and simultaneously. The same patterns of effects were found in both cases. Results are reported for the simultaneous analyses.

Hypothesis testing—Testing this study's hypotheses required that we compare mean levels of sibling closeness latent factors across FCP latent classes. We accomplished this by regressing the sibling emotional and behavior closeness latent factors on the 4-class FCP latent variable. Emotional and behavior closeness were correlated, and adolescent age, age difference, gender, and sibling gender composition were entered as covariates of emotional and behavior closeness. To control shared family variance amongst adolescents, the model included the COMPLEX specification, thereby increasing standard errors and reducing the potential for unrealistically inflated effects. With this regression model, we were interested in the means (intercepts) of the two closeness latent factors.

To test H1a-H1c, emotional and behavioral closeness means were compared across FCP pairs. Each of the 6 resulting analyses constrained the emotional and behavioral closeness factor means to be equal for specified FCP pairs. For example, to compare sibling emotional closeness across *Consensual* and *Laissez-Faire* families, *Consensual* and *Laissez-Faire* emotional closeness means were constrained to be equal, whereas the emotional closeness means for the *Pluralistic* and *Protective* classes were allowed to vary.

Each constrained model was compared to the unconstrained model, which allowed all closeness means to vary. Comparisons were made possible because multiplying Loglikelihood values by -2 results in an approximate chi-square distribution. The chi-square difference test was used to identify statistically significant differences between closeness means. A model that fit significantly better indicated a statistically significant difference in the examined means. A chi-square difference of 3.84 with 1 df change was needed to reach statistical significance at $p < .05$.

To test H2a and H2b, the paired comparisons described above were repeated twice, once for the sample of adopted adolescents and the second time for the non-adopted adolescents. Again, the change in $-2 \times$ Loglikelihood was analyzed to determine if unconstrained models fit significantly better than constrained models.

Results

Preliminary Analyses

Of the 616 sample families, 6.82 % ($n = 84$ adolescents) were classified as *Consensual* families, 22.15% ($n = 272$ adolescents), as *Protective*, 30.44% ($n = 375$ adolescents) as *Pluralistic*, and 40.58% ($n = 501$ adolescents) as *Laissez-Faire* families. Among the covariates tested (age, gender, sibling age difference, and sibling gender composition) only age produced a marginally significant association with the FCP variable ($t = -1.78$, $p = .074$).

Table 1 presents mean factor scores for each family communication pattern. The expected four FCPT patterns were generally supported. *Protective* family members typically scored low on communication and one parent, mothers, typically scored high on control (however elder siblings were moderately high on control as well). *Consensual* family members typically scored high on all measures. *Pluralistic* family members were lower on control compared to the other FCPs, but were about average compared to the sample as a whole, and

tended to engage in a lot of conversation characterized by high levels of communication and listening. Finally, *Laissez-Faire* families tended to score low on all measures.

Covariates of Sibling Closeness Perceptions

Demographic correlates examined included adoptive status, birth order, adolescent age, age difference, gender, and sibling gender composition. We first estimated the direct association between adoption status (1 = adopted, 2 = non-adopted) and sibling closeness by simultaneously regressing emotional and behavioral closeness on adoption status. Adoption status only related to behavioral closeness, $\beta = .12$, $t = 3.39$, $p < .001$. A follow-up independent t -test showed that adopted adolescents reported significantly less behavioral closeness ($M = -.08$) than non-adopted adolescents ($M = .11$), $t(1190) = -4.19$, $p < .001$. Birth order was marginally associated with sibling emotional closeness ($t(1190) = -1.81$, $p = .07$), and significantly associated with sibling behavioral closeness such that younger siblings ($M = .05$) reported greater behavioral closeness than elder siblings ($M = -.05$), $t(1190) = -2.43$, $p < .03$. Age was not significantly associated with sibling emotional closeness, but was associated with behavioral closeness, such that older adolescents reported less behavioral closeness, $\beta = -.10$, $t = -3.08$, $p < .01$. Sibling age difference was not significantly associated with either emotional or behavioral closeness.

Adolescent gender was associated with sibling closeness such that girls reported higher closeness than boys (emotional closeness: $\beta = .21$, $t = 6.53$, $p < .001$; behavioral closeness: $\beta = .13$, $t = 4.08$, $p < .001$). Sibling gender composition was not associated with emotional closeness but was associated with behavioral closeness ($\beta = -.16$, $t = -4.64$, $p < .001$). Post-hoc Fisher LSD tests showed that adolescents in sister sibling pairs reported greater behavioral closeness than all other sibling pairs, and adolescents in sibling pairs of younger sisters with elder brothers pairs reported significantly lower behavioral closeness than all other sibling pairs, all p 's $< .001$ (sister-sister: $M = .16$, $SD = .74$; brother-brother: $M = .05$, $SD = .73$; younger brother – elder sister $M = -.03$, $SD = .69$; younger sister – elder brother $M = -.26$, $SD = .71$).

Hypothesis Testing: H1a-H1c

Emotional closeness—The first column in Table 2 presents sibling emotional closeness means across FCPs for the full sample. Unless otherwise stated, the reference class for mean comparisons was *Laissez-Faire*. As expected (H1a), adolescents in *Consensual* families reported greater emotional closeness than all other FCP classes (*Consensual* compared to *Protective*: $\chi^2(1) = 7.52$; *Consensual* compared to *Pluralistic*: $\chi^2(1) = 23.02$; *Consensual* compared to *Laissez-Faire* (reference class: *Pluralistic*, i.e., *Pluralistic* $M = 0$), $\chi^2(1) = 25.66$; all p 's $< .01$). Adolescents in *Protective* families reported more emotional closeness than adolescents in *Laissez-Faire* families (reference: *Pluralistic*; $\chi^2(1) = 9.74$, $p < .01$). Contrary to H1b expectations, adolescents in *Pluralistic* and *Laissez-Faire* families reported equivalent emotional closeness (reference: *Consensual*). Adolescents in *Protective* families reported significantly greater emotional closeness than adolescents in *Pluralistic* families, $\chi^2(1) = 7.38$, $p < .01$. Finally, in support of H1c, adolescents in *Laissez-Faire* families reported lower emotional closeness than those in *Consensual* and *Protective* families (statistics reported above), however, as reported above, emotional closeness was similar in *Pluralistic* and *Laissez-Faire* families.

Behavioral closeness—As shown in the second column in Table 2, sibling behavioral closeness means generally followed the expected pattern. For example, as expected (H1a), adolescents in *Consensual* families reported greater behavioral closeness than adolescents in *Pluralistic* families ($\chi^2(1) = 12.98$, $p < .001$) and *Laissez-Faire* families (reference: *Pluralistic*; $\chi^2(1) = 7.16$), $p < .01$). On the other hand, statistical tests showed that

adolescents in *Consensual* families ($M = .28$) and *Protective* families ($M = .14$) reported similar behavioral closeness. Statistical tests provided some support for H1b. As reported above, sibling behavioral closeness was lower in *Pluralistic* families than in *Consensual* families, but behavioral closeness in *Protective* families was not less than in *Consensual*. Indeed, adolescents in *Protective* families reported significantly greater behavioral closeness than *Pluralistic* ($\chi^2(1) = 10.04, p < .01$). Also unexpectedly, behavioral closeness among adolescents in *Laissez-Faire* families was similar to that reported by adolescents in *Protective* and in *Pluralistic* families. According to H1c, we expected adolescents in *Laissez-Faire* families to report the lowest behavioral closeness levels. This expectation was supported for the comparison of *Consensual* and *Laissez-Faire* families, but not for comparisons of *Laissez-Faire* to *Protective* or to *Pluralistic* families (statistics reported above).

Hypothesis Testing: H2a-H2b

Emotional closeness—Columns three and five in Table 2 present sibling emotional closeness means for the adopted and non-adopted subsamples. We had expected that among non-adopted adolescents, the pattern of emotional closeness means would remain similar to those found when testing H1a-H1c. This expectation was supported. Non-adopted adolescents reported greater emotional closeness in *Consensual* families than in *Laissez-Faire* ($\chi^2(1) = 11.14, p < .001$) and in *Pluralistic* families ($\chi^2(1) = 11.07, p < .001$). For the full sample, we found higher levels of emotional closeness in *Protective* families than in *Pluralistic* families, and this same result was found in the non-adopted subsample ($\chi^2(1) = 5.28, p < .05$). Finally, as in the full sample, sibling emotional closeness was lower in *Laissez-Faire* than in *Consensual* (statistics reported above) and *Protective* families ($\chi^2(1) = 5.62, p < .05$) but similar in *Laissez-Faire* and *Pluralistic* families.

Among the adopted adolescents, we expected a re-ordering of the emotional closeness levels such that adopted adolescents in *Pluralistic* families were expected to report greater emotional closeness than in *Protective* families (H2b). This expectation was not supported. Rather, adopted adolescents in *Consensual* families reported greater emotional closeness compared to all other FCPs (*Protective*: $\chi^2(1) = 5.46$; *Pluralistic*: $\chi^2(1) = 11.87$; *Laissez-Faire*: $\chi^2(1) = 14.25$; all p 's $< .05$), and there were no statistically significant differences between emotional closeness levels across *Protective*, *Pluralistic* and *Laissez-Faire* families.

Behavioral closeness—Among the non-adopted adolescents, we had expected a pattern of behavioral closeness means similar to that found in the full sample. This expectation was generally supported (see Table 2, 6th column), although possibly due to a reduction in sample size, fewer comparisons were statistically significant. As with the full sample, non-adopted adolescents in *Consensual* and *Protective* families reported similar levels of behavioral closeness and behavioral closeness was lower in *Pluralistic* families than in *Consensual* families ($\chi^2(1) = 5.29, p < .05$). All other non-adopted adolescent comparisons were not statistically significant.

Contrary to expectations, the pattern of adopted adolescent behavioral closeness means was similar to that found in the full sample. Behavioral closeness was higher in adoptive *Consensual* families than in *Pluralistic* families ($\chi^2(1) = 6.46, p < .05$) and higher in *Protective* families than in *Pluralistic* families ($\chi^2(1) = 4.81, p < .05$). Behavioral closeness in adoptive *Consensual* compared to *Laissez-Faire* families was marginally higher ($\chi^2(1) = 2.82, p = .09$).

Post-Hoc Analyses

Due to the differential gender composition effects for sibling behavioral versus emotional closeness, post-hoc analyses were conducted. We sought to determine if the association between FCPs and sibling closeness was moderated by sibling gender composition. The same analysis plan used to test H2 was used to test these analyses; the FCP model was examined for each subgroup of sibling gender composition in terms of both a free and fully constrained model.

Sibling emotional closeness—Sibling gender composition moderated the relationship between FCPs and emotional closeness. Sister sibling showed a significant difference between free and fully constrained models, $\chi^2(2) = 12.21, p < .01$, but there was no difference for brother sibling pairs, $\chi^2(2) = 5.04, p = .08$ across FCPs. Follow-up tests revealed that for sisters, adolescents in *Pluralistic* families ($M = -.15$) reported significantly less emotional closeness compared to those in *Consensual* ($M = .34, \chi^2(1) = 10.82, p < .001$) and *Protective* families ($M = .12, \chi^2(1) = 4.96, p < .03$). For younger sister – elder brother sibling pairs, follow-up tests showed significantly greater emotional closeness ($M = .70$) in *Consensual* families compared to all other FCP classes (*Protective* $M = .05, \chi^2(1) = 7.52, p < .01$; *Pluralistic* $M = -.15, \chi^2(1) = 13.53, p < .001$; *Laissez-Faire* $M = 0, \chi^2(1) = 10.10, p < .003$). Younger brother – elder sister sibling pairs in *Protective* ($M = .45$), *Consensual* ($M = .63$), and *Pluralistic* families ($M = .21$) reported significantly more emotional closeness than siblings in *Laissez-Faire* families ($M = 0$), $\chi^2(2) = 12.72, p < .003$. No other significant differences were found.

Sibling behavioral closeness—Behavioral closeness did not vary by FCP for brothers ($\chi^2(2) = 3.42, p = .18$), or sister sibling pairs ($\chi^2(2) = 3.84, p = .15$). Gender composition did moderate the association between FCP and behavioral closeness for younger sister – elder brother, $\chi^2(2) = 17.13, p < .001$, and younger brother – elder sister sibling pairs: $\chi^2(2) = 11.26, p < .005$. Follow-up tests revealed that younger sister – elder brother pairs in *Consensual* families reported significantly greater behavioral closeness ($M = .58$) than other FCPs (*Protective* $M = -.14, \chi^2(1) = 10.47, p < .003$; *Pluralistic* $M = -.27, \chi^2(1) = 15.52, p < .0001$; *Laissez-Faire* $M = 0, \chi^2(1) = 5.45, p < .03$). Younger brother – elder sister sibling pairs reported greater behavior closeness in *Protective* ($M = .31$) families compared to *Pluralistic* ($M = -.21, \chi^2(1) = 10.81, p < .01$) and *Laissez-Faire* families ($M = 0, \chi^2(1) = 3.74, p = .05$). No other significant differences were found.

Discussion

This study builds on earlier research showing a link between family communication and family closeness (Dickerson & Crase, 2005; Schrodt, 2006; Shearer et al., 2005; Vazsonyi et al., 2003) to demonstrate an association between family communication and sibling closeness. This research is needed because other studies show that siblings who feel close to one another have fewer adjustment problems (Branje et al., 2004; Criss & Shaw, 2005), but scant research has identified family characteristics that promote sibling closeness. In performing this study, we examined two forms of sibling closeness, tested theoretically guided hypotheses, and took children's adoption status into consideration.

Sibling Emotional versus Behavioral Closeness

Based on evidence supporting the possible existence of more than one closeness dimension (Aron et al., 1992; Tucker, McHale & Crouter, 2008), we tested associations between family communication and two sibling closeness dimensions, emotional closeness (perceived love, trust, and care between siblings) and behavioral closeness (amount and quality of time spent

together). Following existing research (Tucker et al., 2008), our findings show significant overlap between the dimensions and also giving indications of differences.

Evidence of overlap includes a strong correlation between the two factors, suggesting that siblings who see themselves as emotionally close tend to also report behavioral closeness. Also, certain covariates showed similar associations across closeness dimensions. For example, sibling gender and sibling age difference were similarly associated with closeness. Sibling gender produced significant associations with both closeness dimensions indicating that girls typically report greater emotional and behavioral closeness than boys. Sibling age difference was not associated with either closeness dimension. Several earlier studies report similar findings for sibling gender (Kim et al., 2006; Stoneman & Brody, 1993) and sibling age difference (Bellin & Rice, 2009; Furman & Burhmester, 1985; Kim et al., 2006) when utilizing measures on the emotional aspects of sibling closeness (warmth or intimacy).

Further support for the presence of two separate sibling closeness factors comes from findings of differential associations with emotional and behavioral closeness among certain sibling characteristics. For example, sibling emotional closeness did not vary by sibling genetic relatedness, but behavior closeness did. This finding indicates that genetically related siblings were more likely to report going places and spending free time together than genetically unrelated siblings.

In the absence of studies comparing closeness across adopted and non-adopted siblings, we compare these findings to studies of step-, (Sturgess, Dunn, & Davies, 2001) half-, and full-siblings (Jankowiak & Diderich, 2000; Pollet, 2007). These studies produced mixed results: Step and full siblings reported similar closeness levels (Sturgess et al., 2001), and half siblings reported less closeness than did full siblings (Jankowiak & Diderich, 2000; Pollet, 2007). Age differences in these studies' samples could account for the mixed findings. Sturgess et al. (2001) assessed young children, the Jankowiak and Diderich (2000) sample included young children to adults, and Pollet (2007) assessed young adults. Possibly more telling, however, is the type of closeness measured. The study finding no difference in closeness (Sturgess et al., 2001) assessed emotional closeness (e.g., feelings of love). Differences in closeness based on sibling genetic relatedness were found in studies that measured behavioral closeness (e.g., reciprocal exchanges, doing things together, frequency of contact). Also, using an adoption design, Rende, Slomkowski, Stocker, Fulkner and Plomin (1992) have documented important genetic influences on positive and negative unstructured behavior amongst siblings in early childhood. Altogether, this research suggests that sibling genetic relatedness may not affect feelings of emotional closeness, but, possibly due to inherited behavioral tendencies, genetic relatedness does affect how much siblings share similar activities, reciprocate behaviors, and do things together.

Behavior genetics research shows that genetic influences on behavior increase with age whereas environmental influences decrease (e.g., Bergen, Gardner, & Kendler, 2007). Thus, even genetically related siblings who are not identical twins will likely become less behaviorally close as they age, but possibly still remain emotionally close. This may help to explain our finding of a negative association between age and behavioral closeness but no association between age and emotional closeness.

Family Communication and Sibling Closeness

To our knowledge, this study was the first to demonstrate a link between family communication and adolescent sibling closeness. Moreover, by using Family Communication Patterns Theory (FCPT) (Koerner & Fitzpatrick, 2006) to guide this study, our results indicate the types of family communication that foster sibling closeness. According to FCPT, whether through an orientation toward conversation or by expecting

conformity among family members, achieving a shared reality reduces family conflict and improves family relationships. Based on FCPT, we expected siblings in families most able to create a shared reality to have the highest closeness levels, consistent with Hypotheses 1. FCPT proposes that consensual families are most likely to achieve shared reality because they avail themselves of both conversation and conformity orientations. We proposed that sibling closeness would be highest in consensual families (Hypothesis 1a). This expectation was consistently upheld for both emotional and behavioral closeness, and follows previous parenting research showing the importance of combining warmth with control (Steinberg, 2001).

Protective families were second to *Consensual* on sibling emotional closeness and similar to *Consensual* families on sibling behavioral closeness. The strength of *Protective* families in nurturing sibling closeness, especially behavioral closeness, was a surprise. Because *Protective* families emphasize a single orientation, we had expected them to tie with *Pluralistic* families and be consistently lower than *Consensual* families on sibling closeness (Hypothesis 1b). The orientation *Protective* families stress is conformity among all family members, and these families often have authoritarian parents (Isaacs & Koerner, 2008). There is some indication that siblings with authoritarian parents develop coalitions or a sense of solidarity resembling behavioral closeness (Johnson, 1982), however, this possibility requires further investigation.

A second possibility requiring additional research is that a *Protective* family's press for conformity leads to time spent together as a family, and time spent together is the more proximal predictor of sibling behavioral closeness. Finally, a large proportion of our sample were Asian, female adoptees, and there is some indication that Asian adolescents are not as negatively affected by the high levels of parental control often seen in *Protective* families as other ethnic groups (Steinberg, 1992, 2001). For now, we can conclude that the combination of a conversation and a conformity orientation appear to promote the highest levels of sibling closeness, and that a conformity orientation appears to facilitate sibling behavioral similarities that help to foster sibling behavioral closeness.

In contrast to the facilitating effect of the single orientation used by protective families, the single orientation of pluralistic families appeared to do little to promote sibling closeness. Pluralistic families emphasize conversation and put little emphasis on conformity. These families allow or even encourage independent actions among family members. In the absence of a press to conform, family members are encouraged to explore individual interests. According our findings, the result is sibling closeness, especially behavioral closeness, is at the lowest levels. Altogether, hypothesis 1b was partially supported and partially contradicted.

Emphasizing neither conformity nor conversation, as is the case for *Laissez-Faire* families, also appeared to do little to promote sibling closeness. Siblings in *Laissez-Faire* families, whose members tend to be highly individualistic to the point of being disengaged, typically scored at the lowest levels of both emotional and behavioral closeness, consistent with Hypothesis 1c. *Laissez-Faire* families were the most frequently occurring FCP, which might be surprising if one compares FCPs to other typologies based only on parenting behaviors (e.g., Baumrind, 1971). FCPs, however, take each family member's behavior into account. When observing communication among families with adolescent children who are likely to be involved in processes of differentiation from parents (Fuligni, 1998; Smetana, 1988), and de-identification from siblings (Whiteman, McHale & Crouter, 2007), the large number of *Laissez-Faire* families would not be unexpected. An alternate explanation for the large proportion of *Laissez-Faire* families is driven by method. Family members engaged in an in-lab discussion of hypothetical, non-salient topics that might not have fully engaged all

family members. Future observational research in this domain should utilize a variety of observational tasks to fully test this possibility.

Altogether, expectations for the full sample based on Family Communication Patterns Theory (Koerner & Fitzpatrick, 2006) were generally supported. Families theorized to most likely achieve shared reality were most likely to have emotionally and behaviorally close siblings. Alternative theoretical, however, explanations do exist. For example, Social Learning Theory (Bandura, 1969) would propose that the modeling of supportive communication behavior by some family members would be spread to other family members, increasing the possibility of sibling emotional closeness. Similarly, siblings would learn behavioral closeness by modeling one another's behavior. Future research that compares social learning versus FCPT explanations would be useful to tease apart the explanatory processes. We now turn to the association between family communication and sibling closeness across genetically related and genetically unrelated siblings.

Family Communication, Sibling Genetic Relatedness, and Sibling Closeness

As described above, we found a direct association between sibling genetic relatedness (adoption status) and behavioral closeness, but no association between genetic relatedness and emotional closeness, in partial support and partial contradiction of Hypothesis 2. Our test of the interaction between a family's FCP and adoption status produced a possible interaction effect for emotional closeness, but no interaction effect for behavioral closeness. Our interaction effect hypotheses were based on suggestions that, in the absence of inherited similarities (e.g., Jang et al., 1998; Lykken et al., 1993; Olson et al., 2001; Scourfield et al., 1999; Tesser, 1993), genetically unrelated family members must rely on conversation to fully achieve shared reality (Brodzinsky et al., 1992; Grotevant et al., 2001; Rueter & Koerner, 2008; Stein & Hoopes, 1985). Thus, we expected genetically unrelated siblings in families emphasizing a conversation orientation (consensual and pluralistic) to report the highest closeness levels (Hypothesis 2b). This expectation was partially supported for sibling emotional closeness only. We found that in *Consensual* families genetically unrelated siblings reported the highest emotional closeness levels. In all other FCP, genetically unrelated siblings reported equally low emotional closeness, contradicting Hypotheses 2b. Thus, it appears that behavioral aspects of sibling closeness directly relate to genetic relatedness and emotional closeness is linked to a combination of FCPs and genetic relatedness. These findings further indicate that a conformity orientation plays a stronger role in sibling closeness than first anticipated. Of course, before placing full confidence in these results, they must be replicated and further explored in future studies.

Family Communication, Sibling Closeness and Sibling Gender Composition

We conducted post-hoc analyses to test whether the association between FCPs and sibling closeness was moderated by sibling gender composition and found some support. These analyses were exploratory with no *a priori* hypotheses. It appears that for younger sisters, the combination of conversation and conformity orientations were particularly important for increased emotional closeness, and to some extent increased behavioral closeness if they have an older brother. In contrast, for younger brothers, an emphasis of either conversation orientation or conformity orientation or the combination of those two orientations were sufficient for increased emotional closeness. Moreover, conformity alone was sufficient for increased behavioral closeness for younger brothers. It is recommended that future research test possible explanations for these differing associations.

Study Limitations and Strengths

Application of these findings must be made within the sample's generalizability. As noted earlier, this study's families are representative of the region from which they were recruited

(McGue et al., 2007). This region, however, was limited to a Midwestern metropolitan area. Also, although there was ethnic diversity among the sample's children, parents were predominately White. Future research must determine if our findings apply to families from other regions or other ethnicities. Adoptive families often have higher SES than other families, and this was the case in this study (McGue et al., 2007). Families were also mostly headed by 2-parents. There is evidence that SES and family structure relate to family (Baer, 1999; Hardway & Fuligni, 2006; Pfliger & Vazsonyi, 2006) and sibling closeness (East & Khoo, 2005). For example, one study indicates that single-parent status is associated with greater levels of sibling closeness (East & Khoo), but another study suggests the opposite (Lansford, Ceballo, Abbey, & Steward, 2001). Studies need to test how well this study's findings apply to families with lower SES and varying family structures.

This study examined a process expected to unfold over time. Methodological strengths of this study build confidence in our findings. For example, our use of observation to assess family communication and self-report to assess sibling closeness, helped to reduce method bias that could artificially inflate associations among variables (Morsbach & Prinz, 2006). Additionally, having an outside observer rate communication patterns allows for an equal understanding of communication across families, rather than relying on the subjective interpretation of communication patterns by individual family members (Kerig, 2001). Even so, we tested our proposed process using cross-sectional data. Thus, although we have strong theoretical reasons for proposing that family communication leads to sibling closeness, this first study to show a connection between family communication and sibling closeness cannot demonstrate the direction of effect. Also, our conformity measure captured the presence and influence of a influential and dominating family figure, but we used only one type of code to capture conformity unlike the three used to capture conversation. Further testing of our theory is needed using longitudinal data and stronger conformity orientation measures.

Taking these limitations, strengths, and weaknesses into account, we can conclude from this study that a more in depth understanding of sibling closeness can be obtained by examining multiple dimensions of closeness, including emotional and behavioral closeness. Also, it appears that certain forms of family communication are related to sibling closeness. Conversation combined with an expectation of solidarity or conformity among family members appears to be associated with the highest levels of sibling closeness, both emotional and behavioral, for both adopted and non-adopted adolescents. On the other hand, it appears there is a unique additive effect of conversation in addition to conformity that relates to greater sibling emotional closeness for adopted adolescents, and perhaps younger siblings that are female. Further research is needed to examine developmental changes in the relationship between family communication and sibling closeness over time.

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Figure 1. Koerner & Fitzpatrick's (2006) Family Communication Patterns Model, based on the crossing of the two dimensions

Table 1

First-order Factor Means for 4-class LCA of Family Communication Patterns (N = 616)

	Protective	Consensual	Pluralistic	Laissez-Faire
Control: Mother	.38	.40	.08	-.34
Control: Father	.13	.54	.07	-.21
Control: Elder sibling	.28	.25	-.03	-.18
Control: Younger sibling	.09	.26	-.05	-.06
Communication: Mother	.00	1.06	.55	-.62
Communication: Father	.01	.82	.33	-.41
Communication: Elder sibling	.27	.99	.14	-.42
Communication: Younger sibling	-.06	.88	.25	-.32
Warmth: Mother	.28	1.54	.05	-.45
Warmth: Father	.28	1.02	-.03	-.30
Warmth: Elder sibling	.74	1.47	-.36	-.37
Warmth: Younger sibling	.38	.99	-.08	-.32
Listening: Mother	-.08	1.35	.50	-.59
Listening: Father	.17	.90	.24	-.44
Listening: Elder sibling	.38	1.19	.06	-.46
Listening: Younger sibling	.17	.80	.19	-.38

Note: Scores above 0 indicate scores above the overall factor mean, scores below 0 indicate scores below the overall mean.

Sibling Emotional and Behavioral Closeness Factor Means Across Family Communication Patterns

Table 2

	Full sample (N = 1,232)		Adopted Adolescents (n = 692)		Non-adopted Adolescents (n = 540)	
	Emotional	Behavioral	Emotional	Behavioral	Emotional	Behavioral
Consensual	.48 ^{bcd}	.28 ^{cd}	.52 ^{bcd}	.24 ^c	.44 ^{cd}	.28 ^c
Protective	.21 ^{acd}	.14 ^c	.11 ^a	.16 ^c	.21 ^{cd}	.10
Pluralistic	.01 ^{db}	-.11 ^{ab}	.04 ^a	-.13 ^{db}	-.01 ^{ab}	-.08 ^d
Laissez-Faire	.00 ^{db}	.00 ^a	.00 ^a	.00	.00 ^{db}	.00

Note: Superscript letter denotes significantly different from

- ^a Consensual,
- ^b Protective,
- ^c Pluralistic,
- ^d Laissez-Faire (p < .05).