

## Articles

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# Closeness in Young Adult Sibling Relationships: Affective and Physiological Processes

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### Abstract

*What aspects of the relationships of young adult siblings are related to closeness or distance? This study takes a process approach to answering this question, contrasting it with the status approach of family structure variables. Close and distant sibling pairs were compared on physiological variables and specific aspects of warmth, conflict, and power during two conversations – one on enjoyable topics and one on topics of disagreement. While there was no evidence that sibling closeness was related to family structure variables, differences in closeness were found in affective patterns and physiological responses during sibling interaction. Interaction between close siblings was characterized not only by higher positive affect but also by fewer power struggles and lower heart rate reactivity. Close siblings also had higher scores on emotional empathy and cognitive aspects of empathy such as perspective-taking than distant siblings. The developmental importance of considering power struggles in young adult sibling relationships was also discussed.*

**Keywords:** *Sibling relationships; closeness; affect; physiology*

Whereas our knowledge of sibling relationships in the beginning and the end of the lifespan has increased greatly in the past decade, we still know very little about sibling relationships in the middle stages of the lifespan, particularly in early adulthood (Cicirelli, 1996). As the least studied relationship in the family, it is important to continue sibling research beyond childhood for two reasons: (a) the growing body of research linking children's behavior with siblings to developing

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abilities in affective perspective-taking (Howe, 1991; Howe & Ross, 1990), conflict resolution (Shantz & Hobart, 1989), social competence (Stormshak, Bellanti, Bierman, & the Conduct Problems Prevention Research Group, 1996), social understanding (Slomkowski & Dunn, 1992), theory of mind (Brown, Donelan-McCall, & Dunn, 1996; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Youngblade & Dunn, 1995); and (b) the fact that sibling relationships are one of the longest-lasting relationships in people's lives. Although the precise nature of sibling influences on development is not well understood at the present time, the above research suggests that it is important to include sibling relationships as a context in which to study development. To pursue this end, we must also determine what influences individual differences in sibling relationships across the life span. The purpose of this report is to describe the affective and physiological processes that are associated with differences in closeness in young adult sibling relationships.

### *Young Adult Sibling Relationships*

The development of interpersonal relationships has been considered a primary task for young adults with the core issue of intimacy versus isolation (Erikson, 1963). This issue is reflected in young adult sibling relationships in that the siblings now have a choice about whether to be involved in each other's lives or become distant (Avioli, 1989; Bank, 1992). Young adult siblings are establishing independence from parents and often are living apart from one another for the first time in their lives. From the limited sibling research available on young adults, these developmental changes appear to be reflected in the sibling relationship. A decreased intensity in the sibling relationship has been reported (Bank & Kahn, 1982; Ross & Milgram, 1982), with sibling contact voluntary and mediated through geographical distance, career endeavours, time, transportation, competing activities and responsibilities, age, health, and other interpersonal relationships including families of their own (Goetting, 1986). Despite these barriers, the sibling relationship remains intact and has been reported to be very positive with few negative feelings (Cicirelli, 1982). Siblings are highly interested in one another's lives, offer mutual support to each other, and exchange help as situations require in terms of lending money, sharing clothes, and baby-sitting (Goetting, 1986). College women perceived as much emotional support from their closest sibling as they did from their mothers and felt emotionally more positive toward their siblings than towards their fathers (Cicirelli, 1980).

Thus far, the existing research on young adult sibling relationships is characterized by self-report questionnaires, surveys, and interviews. There have been no published studies to our knowledge that examine sibling *interaction* between young adult siblings. Self-report methodology can be problematic since there is often modest correspondence among different family members' reports (e.g., Furman, Jones, Buhrmester, & Adler, 1989) and little correspondence between self-reported behavior and actual behavior as found both in the parent-child (e.g., Patterson, 1982) and the marital literature (e.g., Gottman, 1994). To move toward understanding the relationship between individual differences in sibling relationships and developmental functioning in early adulthood, it is necessary to identify the social processes that may be associated with the quality of sibling relationships. Observing actual sibling interaction can help describe these relationship processes.

This study focuses on differences between close siblings and distant siblings to learn not only about sibling relationships in early adulthood but also about what is associated with positive sibling relationships.

### *Closeness in Sibling Relationships*

Why some siblings are close and get along very well while other siblings are more distant and experience negativity in their relationships remains a burning question in sibling research. Across the lifespan, sibling researchers have commented on the marked individual differences they have found among sibling pairs in their relationship and their interaction with each other (e.g., Boer & Dunn, 1992; Brody, Stoneman, & McCoy, 1994a; Cicirelli, 1996; Dunn & Kendrick, 1981; Gold, 1989a). Differences in sibling relationships are important to parents who find conflicts between their children distressing and a common family problem (Baskett & Johnson, 1982) and of interest to psychologists who have found links between children's sibling relationships and children's long-term adjustment (e.g., Bank, Patterson, & Reid, 1996; Patterson, 1986). The presence of positive qualities in sibling relationships (e.g., Connidis, 1989; Dunn & Munn, 1986; Pepler, Corter, & Abramovitch, 1982; Pelletier-Stiefel, Pepler, Crozier, Stanhope, Corter, Abramovitch, 1986; Stoneman & Brody, 1992) suggests that the traditional emphasis on conflict and rivalry may not adequately reflect the nature of the relationship between siblings.

In childhood and in adulthood, closeness in sibling relationships has important benefits for the well-being of those involved in such relationships. School-aged children with a very close sibling relationship living in homes with marital discord were protected from the emotional and behavioral problems that are associated with stressful home environments (Jenkins, 1992). At the other end of the life span, elderly adults with a close sibling relationship were less lonely (Gold, 1987) and elderly siblings with close relationships with sisters were less depressed (Cicirelli, 1989).

Similar to the benefits of a positive parent-child relationship that can buffer children from adjustment problems associated with adverse circumstances (e.g., Rutter, 1971), sibling relationships can function as a kind of social support available to children. Children in middle childhood have found support from siblings during stressful events such as family death, illnesses or accidents, and difficulties at school or with other children, and this support has been associated with increases in warmth in their sibling relationships (Dunn, Slomkowski, & Beardsall, 1994; Lanthier, 1991). High support from a favorite sibling has further been associated with fewer adjustment problems and socioemotional difficulties for isolated elementary school children (East & Rook, 1992).

The importance of understanding differences in sibling closeness is further highlighted by the stability of this sibling dimension. In a longitudinal study of sibling relations from early childhood to early adolescence, Dunn and colleagues found an impressive amount of continuity, particularly in the positive aspects of warmth and intimacy (Dunn et al., 1994). Differences in warmth and intimacy toward siblings when the older siblings were, on average, age 12 had significant links with sibling interaction seven years earlier. Also in middle childhood, 69% of siblings identified with harmonious siblings relationships were reclassified as harmonious four years later (Brody et al., 1994a).

Closeness to siblings appears to increase through adulthood and into late adulthood even though siblings may have infrequent contact (Cicirelli, 1982; Ross & Milgram, 1982). In late adulthood, closeness was one of only two dimensions along with contact in elderly sibling relationships that did not change over a two year period (Gold, 1989b). At this time, there is a gap in our knowledge of sibling closeness in early adulthood. The next section will highlight relevant research on affect and physiology that will be used to identify processes of sibling interaction.

### *Affect and Physiology*

Affective and physiological dimensions during sibling interaction are proposed as important in gaining an understanding of the ways in which siblings interact with one another and of their resulting relationship. Sibling relationships have been characterized as having a distinct emotional intensity with a lack of inhibition in sibling interaction. They display the full range of emotions, and these emotions can quickly change from warmth to hostility and back again (e.g., Dunn & Kendrick, 1982). The sibling relationship is an emotional relationship. One of the reasons for this may be because the sibling relationship is ascribed rather than earned and exists simply because these children have the same biological parents. During childhood, conflict was perceived as occurring more often in sibling relationships than in all other kinds of relationships (Furman & Buhrmester, 1985a). In early adolescence, sibling conflict was found to be brief but affectively intense (Raffaelli, 1992).

Gottman's work on friendships during adolescence found it necessary to include affect when describing adolescents. In his theory of affective development through adolescence and young adulthood (Gottman & Mettetal, 1986; Ginsberg & Gottman, 1986), each developmental period was associated with social processes that are particularly salient for that age group. For example, for adolescents the primary goal was self-exploration – exploring the self, defining the self, and understanding the self with self-disclosure being the main process during conversations with friends.

Different patterns of affective exchange during discussions between friends and marital couples have been helpful in distinguishing between friendships of varying degrees of closeness (e.g., Gottman & Parker, 1986) and distressed and nondistressed marital couples (Levenson & Gottman, 1983; 1985). Marital couples were studied during naturalistic interactions to determine whether marital satisfaction could be predicted by physiological and affective patterns. Mean physiological levels were found to account for over 80% of the variance in change in marital satisfaction over a three year period: The more couples were aroused physiologically during their marital interactions, the more their marital satisfaction declined. It should also be noted that there is a sizeable literature linking high heart rate reactivity to risk for cardiovascular disease (e.g., Matthews, Weiss, Detre, Dembroski, Falkner, Manuck, & Williams, 1986) and, more recently, to hostility (Brown and Smith, 1992; Smith and Brown, 1991).

Different affective patterns were found to predict concurrent marital satisfaction and long-term marital satisfaction (Gottman & Krokoff, 1989). Although exchanges of disagreement and anger were associated with concurrent marital dissatisfaction, they were found to be adaptive and predictive of improvement in

marital satisfaction over three years. Affective patterns that did predict future marital dissatisfaction were defensiveness and whining, stubbornness, and withdrawal from the interaction, particularly if they occurred in husbands. Relationship satisfaction appears to be encoded in patterns of affective patterns and physiological activity. The value of physiological measures in studying interpersonal processes is suggested by the studies of Levenson and Gottman. Their findings indicate that physiological measures may tap a different dimension of social interaction than behavioral indices or other traditional methods.

### *Power*

Based on interviews with fifth and sixth grade students on their sibling relationships, Furman and Buhrmester (1985b) identified relative power and status as an important dimension of the sibling relationship. Relative status and power refer to the degree and direction of asymmetry in the sibling relationship. Children consistently report that older siblings have greater status and power than younger siblings. During childhood, older siblings show more positive power (teaching, helping, and nurturing) and more negative power (domineering/managing) toward younger siblings than vice-versa (Buhrmester & Furman, 1985b; Hetherington, 1988; Vandell, Minnett, & Santrock, 1987). Although there is agreement that sibling relationships become less asymmetrical during middle childhood (Vandell et al., 1987) and by adolescence (Buhrmester & Furman, 1990), there is some disagreement as to whether this equality in power is a result of: (a) decreases in power behaviors by older and younger siblings (Buhrmester & Furman, 1990) or (b) decreases in the amount of power exerted by older siblings toward younger siblings with parallel increases in power exerted by younger siblings toward older siblings (Vandell et al., 1987). This study examines power in young adult sibling relationships by looking at the power struggle behaviors that occur between interacting siblings as a function of sibling status (older sibling vs. younger sibling) and closeness.

### *Present Study*

We used a multimethod approach and a multivariate design that involved direct observation of sibling interaction, continuous recordings of physiology, and self-report measures to paint a descriptive picture of sibling interaction and of the processes that are associated with sibling closeness. Two approaches were taken: (1) a status approach focusing on family structure variables (e.g., gender composition of dyad); and (2) a process approach focusing on affective and physiological dimensions during sibling interaction. The status approach suggests that the quality of sibling relationships is directly affected by family structure variables that contain the individual characteristics of the siblings and their family. The most common family structure variables include gender composition of the dyad (brother vs. sister and same-sex vs. cross-sex), relative age or sibling status (older sibling vs. younger sibling), age interval or age difference between the siblings, and family size or number of siblings in the family (e.g., Cicirelli, 1996; Teti, 1992). Despite the fact that family structure variables are widely researched as sources of differences in sibling relationships, results from these studies have been largely inconsistent (e.g., Brody & Stoneman, 1990; Dunn, 1992). The most consistent

finding in regard to family structure variables is that same-sex siblings report closer relationships than cross-sex siblings (e.g., Buhrmester, 1992).

With this study, we sought to move sibling research particularly in this age group from status research to process research. Although it is important to determine whether these sibling and family characteristics influence the quality of sibling relationships, this research does not suggest hypotheses about the processes that are associated with close sibling interaction. In our process approach, a framework of warmth, conflict, and power during sibling interaction was used to gain insight into closeness in young adult sibling relationships. Sibling dyads were observed in two types of interactions: (1) potentially positive interactions that could reveal sibling functioning with positive affect, and (2) interactions that would be potentially stressful and could reveal problem areas and negative affect. Unlike the previous work on closeness and sibling interaction, specific affects of warmth, conflict, and power were examined, and a close relationship was defined using both siblings' perceptions. This study also includes the first application of psychophysiological measures during sibling interaction. Given the emotional nature of sibling relationships, the relationship between empathy capacities and sibling closeness was also explored.

## Method

### *Recruitment*

Students and their siblings were recruited from the University of Washington Psychology Subject Pool. Students from the Subject Pool received extra class credit for their participation. Although siblings of the students received no compensation for their participation, the students typically took their sibling out to lunch or dinner following the lab session.

### *Sample*

Eighty-four sibling pairs (21 sister/sister, 21 brother/brother, 21 older brother/younger sister, 21 older sister/younger brother) participated in the Conversations of Twins and Siblings Study. The ages of the siblings ranged from 18 to 30 years of age ( $M = 23$ ,  $SD = 2.49$  for the older siblings;  $M = 19$ ,  $SD = 1.78$  for the younger siblings). The family income of the siblings ranged from \$13,500 to \$350,000 ( $M = 75,672$ ,  $SD = 63,523$ ). The range for maternal education in years was from none to 20 ( $M = 14$ ,  $SD = 3.89$ ), and the range for paternal education in years was from 3.5 to 20 ( $M = 15$ ,  $SD = 3.34$ ). Absence of education and low levels of education were found in families that had immigrated to the United States from Southeast Asia. Parents were divorced in 25% of the families. The ethnic breakdown of the siblings reflect the University of Washington student population at large with 60% Caucasian, 23% Asian-American, 6% Hispanic, 4% African-American, 2% Native American, and 6% Other (including siblings from mixed ethnic backgrounds).

### *Procedures*

Sibling pairs were seen in a two- to three-hour lab session. The siblings were seated in two chairs directly facing each other with two visible video cameras

attached to the wall directly behind each chair. Physiological sensors were placed on the siblings, and the siblings completed the Closeness measure and other self-report questionnaires not included in this report. A two-minute physiological baseline was collected. Siblings generally spent 45–60 minutes in the lab completing questionnaires before this first baseline. Two 10-minute conversations were then videotaped – the first on two enjoyable topics and the second on two topics of disagreement or differences. The first conversation was designed to generate positive affect in the siblings and the second conversation to stress the sibling relationship, produce negative affect, and the resolution of negative affect. The order of the conversations was not counterbalanced given previous work with marital couples (Levenson & Gottman, 1983) that indicated that the negative affect from the problem area discussion persists and contaminates following conversations.

*Conversation on enjoyable topics.* Each sibling completed an Enjoyable Topics Form individually. This form consisted of general topics that siblings of this age group most enjoy talking about (e.g., family affairs; activities – social life, sports, music, TV/movies). The topics were derived from the responses of about 250 students in University of Washington Introductory Psychology classes. Based on each sibling's responses and through confirmation in a short interview, two top topics were selected for the first conversation. The siblings were left on their own for their conversation.

*Conversation on topics of disagreement or differences.* A second 2-minute physiological baseline was collected. Directly following the second baseline, each sibling completed a Topics of Disagreement Form. This questionnaire consisted of general areas that cause siblings to disagree, argue, or have different opinions (e.g., possessions; how their parents treat them differently). The topics were derived from the responses of about 250 students in University of Washington Introductory Psychology classes. Based on each sibling's responses and through a short interview in which each sibling articulated the problem to a facilitator, two top problems were selected for their next conversation. Problems were selected for discussion if they were areas in which the siblings had differing perspectives, rather than areas in which both siblings shared similar viewpoints on the problem. Following this conversation, the siblings completed general family information and empathy questionnaires.

### *Measures*

*Physiology.* Physiological recordings were made with use of a system consisting of a Coulbourn eight-channel polygraph and a Digital Equipment Corporation (DEC) LSI 11/23 microcomputer. Data were sampled 30 times per second and averaged over one-second intervals. The following physiological variables were of focus for this report: Heart rate (HR), measured as the cardiac interbeat interval (determined by measuring the time interval between successive R-wave spikes of the electrocardiogram) and converted into HR ( $HR = 60,000/\text{interbeat interval in msec}$ ), was detected by two Beckman miniature electrodes filled with Redux paste attached to the sides of the sibling's chest; and general somatic activity (ACT), measured by an electromechanical transducer attached to a platform under the sibling's chair. As suggested by Obrist (1981), ACT was collected to interpret HR deceleration and acceleration. The physiological data were available on a second-



by-second basis. To obtain a measure of physiological reactivity during the conversations, the difference between the mean HR during the conversation and the mean HR for the corresponding baseline was computed for each conversation.

Two remotely controlled high-resolution video cameras were situated on the walls and each sibling wore a laveliere microphone. Each camera focused on one sibling and the two camera signals were merged onto one videotape using a split-screen special effects generator. The DEC computer was programmed to synchronize the video and physiological recordings so that the time code on the videotape corresponded to the second-by-second data in the physiological files.

### *Self-Report Questionnaires*

*Closeness questionnaire.* This questionnaire (Ginsberg & Gottman, 1986) was developed for measuring closeness among friends and has primarily been used with college roommates and friends. It was used in this study to assess the different levels of closeness between siblings. The items in this questionnaire were constructed to correlate with Schutz's (1958) three dimensions of interpersonal relationships – needs for affection, inclusion, and control. In addition, Gottman added a shared fantasy dimension because fantasy was found to play a significant role in the friendships of young children (Gottman & Parkhurst, 1980). Closeness is measured by the degree of agreement (1 = strongly disagree to 5 = strongly agree) with such statements as 'I would say that my brother is someone who sees my faults but likes me anyhow,' and 'I would say that my sister is someone who brings out my deepest emotions.' A closeness score was computed by taking the average of all 72 items: the higher the score, the closer the relationship. Two studies establishing the construct validity of this scale have been conducted (Ginsberg & Gottman, 1986). The Cronbach's  $\alpha$  was .97 for older siblings and .96 for younger siblings.

*Emotional empathy.* The Epstein Feeling Inventory (Mehrabian & Epstein, 1972) is a 33-item scale using a 9-point Likert format (-4 = very strongly disagree to +4 = very strongly agree). This scale measures dispositional emotional empathy, and all items can be summed to produce a single score of emotional empathy. The Cronbach's  $\alpha$  was .85 for older siblings and .83 for younger siblings.

*Cognitive empathy.* Two scales from the Davis Multidimensional Individual Measure of Empathy (Davis, 1980) was used. These two scales used a 5-point Likert format (A = does not describe me well; E = describes me well). Each scale is 7 items long. The Perspective-Taking Scale (PT) measures a person's dispositional tendency to adopt the point of view of others, and the Fantasy Scale (FS) measures the dispositional tendency to imagine oneself as a character in fictitious settings such as books or movies. The Cronbach's  $\alpha$  for PT was .81 for older siblings and .73 for younger siblings; the Cronbach's  $\alpha$  for FS was .80 for older siblings and .83 for younger siblings.

*Behavioral coding of conversations.* Both conversations were event-coded for affect using the Specific Affect Coding System (SPAFF; Gottman, McCoy, Coan, & Collier, 1996). The affects in SPAFF were placed in the framework of warmth, conflict, and power (see Table 1). The positive affects such as humor and affection made up the warmth dimension. Negative affects were broken down into the



**Table 1. Affects in the Specific Affect Coding System (SPAFF; Gottman, McCoy, Coan, & Collier, 1996)**


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<i>Warmth: Positive affect</i>	
Humor	Smiles; amusement; jokes, laughter; silliness
Affection	Compliments; supportive and caring statements
Interest	Engaged listening; seeks elaborations from sibling
Validation	Back channeling; agreement; apology; respect
<i>Conflict: Negative affect</i>	
Anger	Irritation; annoyance; frustration; impatience; raising voice
Sadness	Hurt; sighing; crying; helpless/hopeless behavior
Contempt	Insults; put downs; lack of respect; sarcasm; eye roll
Tension	Anxiety; fidgeting; worry; speech disturbances
<i>Power: Power struggles</i>	
Domineering	Lecturing; invalidating; interruptions; commands; threats
Belligerence	Challenging, taunting questions; daring other to respond
Defensiveness	Making excuses; 'yes, but' statements; cross-complaining

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conflict dimension, e.g., anger and contempt, and the power dimension, e.g., domineering and belligerence.

SPAFF was designed to describe the affective nature of interacting dyads and to dismantle the global concept of negative and positive affect. SPAFF is both a physically- and socially-based coding scheme. Detection of affects is made by integrating verbal content, voice tone, context, facial expression, gestures, and body movements. The codes in SPAFF are mutually exclusive and exhaustive (descriptors of the codes can be found in Table 1). The affects for each sibling were converted into proportions by dividing the frequency of onsets/events for each affect by the total number of observed onsets/events for each conversation.

Four observers, who were also certified with the Ekman & Friesen (1978) Facial Coding System as part of their SPAFF training, coded the conversations. Pairs of observers SPAFF coded each sibling pair simultaneously with each observer focusing on one sibling. Observers used an event-coding checklist to record sequences of codes as they occur in the interaction. Only affects addressed towards the sibling (not self or other) were coded. Because proportions were the unit of analysis, interobserver and intraobserver reliability statistics were computed using correlation coefficients and alpha coefficients based on concepts of generalizability theory (e.g., Bakeman, in press; Cronbach, Gleser, Nanda, & Rajaratnam, 1972). The following interobserver reliability coefficients were obtained for the conversations of 15 sibling pairs: for humor, the average  $r = .94$  and the  $\alpha = .98$ ; for interest, the average  $r = .62$  and the  $\alpha = .87$ ; for validation, the average  $r = .77$  and the  $\alpha = .93$ ; for affection, the average  $r = .69$  and the  $\alpha = .89$ ; for anger, the average  $r = .65$  and the  $\alpha = .85$ ; for contempt, the average  $r = .66$  and the  $\alpha = .87$ ; for sadness, the average  $r = .86$  and the  $\alpha = .94$ ; for tension, the average  $r = .60$  and the  $\alpha = .82$ ; for domineering, the average  $r = .76$  and the  $\alpha = .90$ ; for belligerence, the average  $r = .87$  and the  $\alpha = .87$ ; for defensiveness, the average  $r = .78$  and the

$\alpha = .92$ . Interobserver and intraobserver reliability was rechecked twice during the course of coding.

### Closeness Groups

Using the sample mean across sibling status as the cut-off, ( $M = 4.01$ ,  $SD = .50$ ), each sibling's report of closeness was used to divide the sibling pairs into closeness groups (see Table 2): (1) sibling pairs with both older and younger siblings reporting the relationship as close, (2) sibling pairs with both siblings reporting the relationship as distant, and (3) a mixed closeness group that emerged from the data and was serendipitously found. This mixed closeness group was composed of sibling pairs where one sibling reported the relationship as close and the other as distant. Although the mixed group is quite intriguing, the focus in this study will be on the differences between the close and the distant groups, with the mixed group included for descriptive purposes.

**Table 2. Closeness Groups Based on Each Sibling's Report of Closeness (in Cell Counts)**

	Younger sibling		
	Distant	Close	
Distant Older sibling	26	9	35
Close Older sibling	12	37	49
	38	46	84

Close:  $n = 37$  pairs (44%)

Mixed:  $n = 21$  pairs (25%)

Distant:  $n = 26$  pairs (31%)

*Note:* Closeness was measured by a self-report questionnaire (Ginsberg & Gottman, 1986).

To answer the question of whether the siblings that participated in the lab sessions were closer to each other than siblings that elected not to participate, closeness was examined in a comparison sample of 128 young adult siblings from the University of Washington Subject Pool. The sample mean of the comparison sample was significantly lower than the lab sample, ( $M = 3.75$ ,  $SD = .71$ ;  $F(1, 211) = 9.13$ ,  $p = .003$ ), and there was more variability. When the comparison sample was divided into groups of close siblings and distant siblings using the same cut-off closeness score as the lab sample, 40% of the comparison sample consisted of close sibling relationships.

### Analyses

Due to the specific planned comparison between close and distant siblings and the unequal number of sibling pairs in each closeness group, repeated-measures

analyses for affect and physiology were conducted through multiple regressions (e.g., Hertzog & Rovine, 1985; Pedhazur, 1977; Poor, 1973; Sackett & Shortt, 1995). A multiple regression approach to repeated-measures analyses has several advantages: (a) specific hypothesis testing (e.g., close siblings vs. distant siblings) can be conducted instead of omnibus hypothesis testing (e.g., the overall main effect for closeness group across close, mixed, and distant); (b) in the multiple regression, shared variance and redundant information are partialled out, and therefore the between-subjects variance is partialled out before the within-subjects factors are considered; and (c) the multiple regression is appropriate for data that are correlated naturally (e.g., correlation between multiple observations or as the result of unequal number of cases in the cells).

Although Obrist (1981) has suggested that physiological responses can be influenced by activity, mean heart rate during the conversations was not significantly correlated with mean activity during the conversations (enjoyable conversation: for older siblings,  $r(84) = -.01$ ; for younger siblings,  $r(84) = .07$ ; conversation on topics of disagreement: for older siblings,  $r(84) = -.10$ ; for younger siblings,  $r(84) = -.02$ ). As a result, activity level was not included as a covariate in the physiological reactivity repeated-measures analyses.

## Results

### *Status Approach: Family Structure Variables*

To determine the influence of family structure variables on sibling closeness, the family status variables of gender composition of the sibling dyad (sisters vs. brothers vs. older brothers/younger sisters vs. older sisters/younger brothers; same-sex siblings vs. cross-sex siblings), age interval between older and younger siblings, and number of siblings in the family were examined as a function of closeness group. None of the family status variables were related to differences in closeness. Chi-square analyses revealed that closeness was not associated with the gender composition of the dyad in both types of comparisons: (1) the four gender combinations comparison (sister/sister vs. brother/brother vs. older brother/younger sister vs. older sister/young brother),  $\chi^2(6, n = 84) = 7.57, p = .27$ , and (2) the same-sex vs. cross-sex sibling comparison,  $\chi^2(2, n = 84) = .23, p = .89$ . One-way analyses of variances with a planned comparison between closeness group (close vs. distant) further revealed that close siblings were not significantly different from distant siblings in age interval between older and younger sibling,  $t(81) = .71, p = .48$  or number of siblings in the family,  $t(81) = -.61, p = .54$ . Additionally, closeness was not related to the geographical distance between the siblings (living in the same city vs. living in different cities),  $\chi^2(2, n = 84) = .98, p = .62$ , and close siblings were not significantly different from distant siblings in contact as measured by days since siblings last saw each other,  $t(78) = -.23, p = .82$ .

### *Process Approach: Affect and Physiology*

To answer the question of how are close siblings different from siblings that are distant in the affective qualities during sibling interaction, we conducted repeated-measures analyses through multiple regressions with the repeated-measure on

sibling status (older sibling or younger sibling) and the specific planned comparison between close siblings and distant siblings. Similar analyses were conducted for physiological reactivity. In these analyses, main effects for the closeness group comparison (close vs. distant), sibling status main effects (older sibling vs. younger sibling), or closeness group comparison by sibling status interactions were considered.

*Specific affective qualities as a function of closeness in the conversation on enjoyable topics.* Close siblings were differentiated from distant siblings in their interaction during the conversation on enjoyable topics. In the warmth dimension, main effects for the closeness group comparison were found for affection,  $F(1, 81) = 4.17, p < .05$ , and validation,  $F(1, 81) = 4.57, p < .05$ . Close siblings showed more positive affect than distant siblings. Specifically, close siblings displayed more affection and validation during their conversations than distant siblings. Close siblings and distant siblings showed similar amounts of interest and humor. In the conflict dimension, there was only a closeness (close vs. distant) by sibling status interaction for anger,  $F(1, 81) = 5.43, p < .05$ . Older siblings but not younger siblings in close sibling relationships displayed more anger than their counterparts. No differences between close and distant siblings were found for the negative affects of sadness, contempt, and tension. In the power dimension, older and younger siblings in close relationships were less belligerent toward each other than siblings in distant relationships,  $F(1, 81) = 7.10, p < .01$ . Older siblings in general were found to be more domineering when talking about enjoyable topics than younger siblings,  $F(1, 81) = 8.71, p < .01$ . No differences between close siblings and distant siblings were found for domineering behavior or defensiveness. There were no clear affective patterns for the siblings in the mixed group. Means and standard deviations can be found in Table 3.

*Specific affective qualities as a function of closeness in the conversation on topics of disagreement.* Differences between the closeness groups were more pronounced in the conversation on topics of disagreement. In the warmth dimension, close siblings displayed significantly more affection,  $F(1, 81) = 7.71, p < .01$ , interest,  $F(1, 81) = 6.99, p < .01$ , and validation,  $F(1, 81) = 10.85, p < .01$  than distant siblings. There was a closeness (close vs. distant) by sibling status interaction for validation,  $F(1, 81) = 9.48, p < .01$ . Older siblings but not younger siblings in the close group validated more than older siblings in the distant group. As indicated by a sibling status main effect, older siblings in general were more affectionate than younger siblings,  $F(1, 81) = 7.02, p < .01$ .

There were no significant differences for the negative affects in the conflict dimension. However, in the power dimension, older siblings were more domineering and belligerent than younger siblings,  $F(1, 81) = 21.38, p < .01$  and  $F(1, 81) = 13.26, p < .01$ , respectively, and younger siblings were more defensive,  $F(1, 81) = 9.50, p < .01$ , than older siblings. Close older and younger siblings were less domineering and belligerent than distant siblings,  $F(1, 81) = 6.84, p < .05$  and  $F(1, 81) = 12.10, p < .01$ , respectively. Close older and younger siblings were also less defensive than distant siblings,  $F(1, 81) = 5.64, p < .05$ . As shown in Figure 1, close siblings engaged in fewer power struggles than distant siblings. In general, the siblings in the mixed group showed intermediate affective patterns that were in between the close group and the distant group. Means and standard deviations can be found in Table 4.

**Table 3. Means and Standard Deviations for the Specific Affects During the Conversation on Enjoyable Topics by Closeness Group**

Affects (in proportions)	Closeness group		
	Distant	Mixed	Close
<i>OLDER SIBLINGS</i>			
<i>Warmth dimension: Positive affect</i>			
Interest	.156 (.089)	.167 (.087)	.157 (.075)
Validation	.154 (.072)	.172 (.076)	.190 (.077)
Humor	.199 (.101)	.176 (.085)	.220 (.093)
Affection	.016 (.022)	.011 (.020)	.028 (.033)
<i>Conflict dimension: Negative affect</i>			
Anger	.001 (.007)	.001 (.007)	.008 (.016)
Sadness	.006 (.016)	.001 (.005)	.006 (.012)
Contempt	.018 (.031)	.021 (.032)	.015 (.031)
Tension	.002 (.007)	.010 (.028)	.004 (.013)
<i>Power dimension: Power struggles</i>			
Domineering	.035 (.043)	.039 (.064)	.023 (.039)
Belligerence	.019 (.029)	.011 (.024)	.004 (.017)
Defensiveness	.022 (.028)	.022 (.037)	.023 (.035)
<i>YOUNGER SIBLINGS</i>			
<i>Warmth dimension: Positive affect</i>			
Interest	.139 (.088)	.145 (.087)	.157 (.075)
Validation	.161 (.074)	.158 (.071)	.190 (.082)
Humor	.207 (.089)	.213 (.127)	.219 (.112)
Affection	.013 (.022)	.010 (.021)	.022 (.028)
<i>Conflict dimension: Negative affect</i>			
Anger	.011 (.031)	.004 (.010)	.005 (.015)
Sadness	.005 (.013)	.003 (.008)	.006 (.013)
Contempt	.027 (.039)	.029 (.046)	.013 (.025)
Tension	.013 (.026)	.011 (.029)	.006 (.016)
<i>Power dimension: Power struggles</i>			
Domineering	.022 (.025)	.025 (.047)	.008 (.020)
Belligerence	.016 (.030)	.006 (.013)	.005 (.018)
Defensiveness	.027 (.035)	.029 (.041)	.029 (.036)

*Heart rate reactivity.* Heart rate reactivity discriminated between close and distant sibling interaction in the conversation on topics of disagreement,  $F(1, 81) = 6.58$ ,  $p < .05$ . As depicted in Figure 2, interaction between distant siblings involved higher HR reactivity for both siblings. This suggests that interaction between distant siblings involved more physiological arousal and may be more

**Table 4. Means and Standard Deviations for the Specific Affects During the Conversation on Topics of Disagreement by Closeness Group**

Affects (in proportions)	Closeness groups		
	Distant	Mixed	Close
<i>OLDER SIBLINGS</i>			
<i>Warmth dimension: Positive affect</i>			
Interest	.047 (.056)	.055 (.049)	.088 (.076)
Validation	.100 (.065)	.121 (.013)	.197 (.084)
Humor	.127 (.091)	.122 (.085)	.144 (.083)
Affection	.021 (.032)	.033 (.053)	.039 (.037)
<i>Conflict dimension: Negative affect</i>			
Anger	.033 (.049)	.030 (.036)	.028 (.049)
Sadness	.009 (.018)	.021 (.034)	.022 (.047)
Contempt	.032 (.043)	.041 (.036)	.031 (.027)
Tension	.025 (.035)	.013 (.021)	.012 (.032)
<i>Power dimension: Power struggles</i>			
Domineering	.127 (.096)	.113 (.094)	.073 (.077)
Belligerence	.078 (.068)	.059 (.054)	.027 (.052)
Defensiveness	.084 (.061)	.100 (.072)	.057 (.056)
<i>YOUNGER SIBLINGS</i>			
<i>Warmth dimension: Positive affect</i>			
Interest	.060 (.050)	.065 (.048)	.083 (.066)
Validation	.146 (.106)	.142 (.091)	.178 (.091)
Humor	.139 (.093)	.135 (.096)	.140 (.100)
Affection	.009 (.015)	.018 (.024)	.031 (.034)
<i>Conflict dimension: Negative affect</i>			
Anger	.029 (.047)	.042 (.048)	.030 (.054)
Sadness	.017 (.054)	.008 (.016)	.021 (.036)
Contempt	.038 (.044)	.045 (.051)	.019 (.037)
Tension	.032 (.038)	.016 (.028)	.019 (.033)
<i>Power: Power struggles</i>			
Domineering	.070 (.083)	.065 (.057)	.041 (.056)
Belligerence	.045 (.055)	.049 (.049)	.015 (.035)
Defensiveness	.117 (.077)	.117 (.068)	.087 (.059)

stressful than interaction between close siblings. HR reactivity was also lower for the siblings in the mixed group compared to the siblings in the distant group. No differences in heart rate reactivity between close and distant sibling interaction were found for the conversation on enjoyable topics.

Domineering

Belligerence

Defensiveness

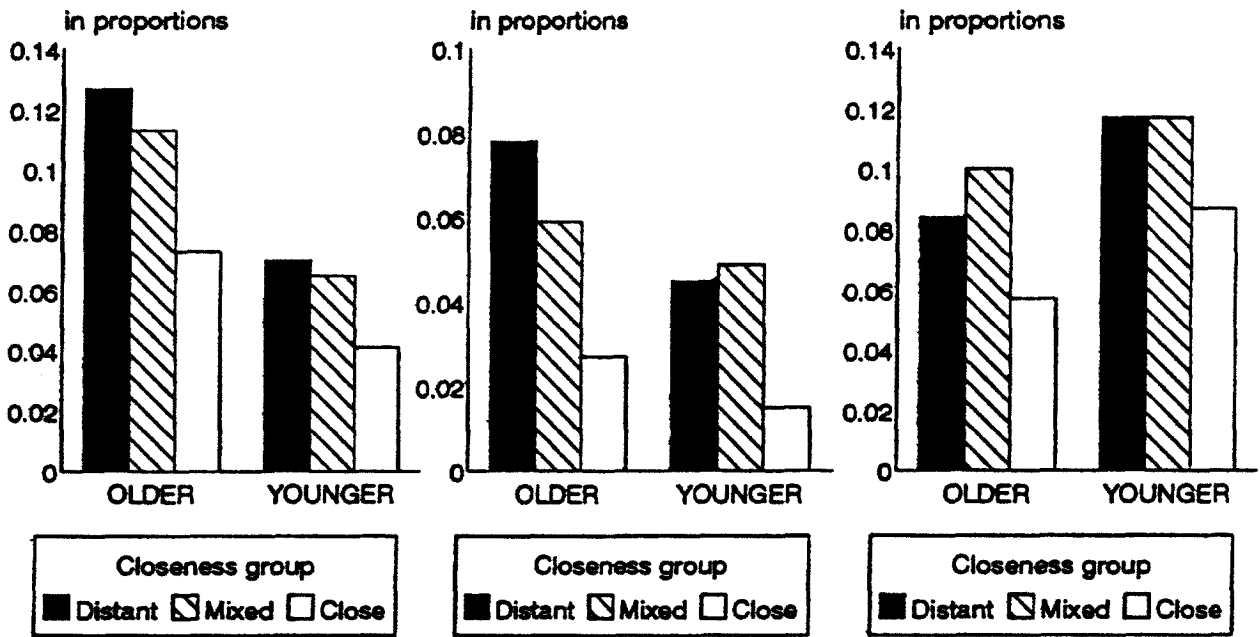


Figure 1. Power struggles during the conversation on topics of disagreement by closeness group.

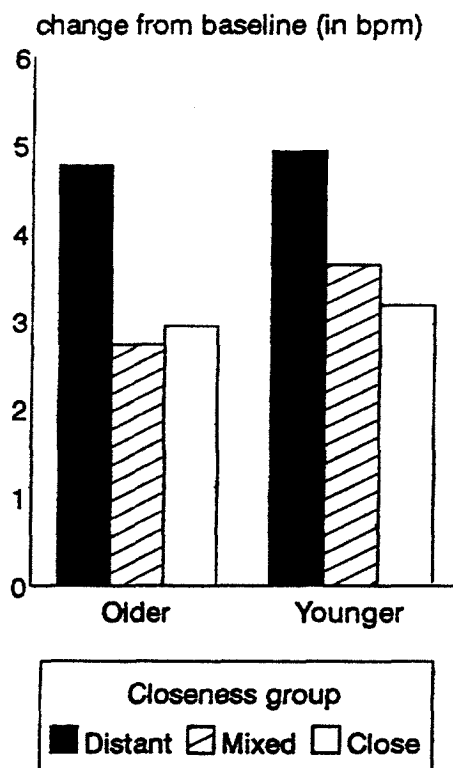


Figure 2. Heart rate reactivity during the conversation on topics of disagreement by closeness group.

Empathy Capacities

To determine the relationship between sibling closeness and dispositional empathy capacities, we conducted repeated-measures analyses through multiple regressions with the repeated-measure on sibling status (older sibling or younger sibling) and the specific planned comparison between close siblings and distant siblings. Close siblings were found to be higher in emotional empathy,  $F(1, 81) = 17.71, p < .01$ , perspective-taking,  $F(1, 81) = 11.54, p < .01$ , and identification with fictional characters,  $F(1, 81) = 30.40, p < .01$  than distant siblings. In general, siblings in



**Table 5. Means and Standard Deviations for Dispositional Empathy Capacities by Closeness Group**

Empathy capacities	Closeness groups		
	Distant	Mixed	Close
<i>OLDER SIBLINGS</i>			
Emotional empathy	25 (26.92)	30 (27.77)	45 (24.38)
Cognitive empathy			
Perspective-taking	24 (5.46)	24 (3.61)	26 (5.68)
Fantasy	21 (5.37)	24 (5.20)	26 (4.61)
<i>YOUNGER SIBLINGS</i>			
Emotional empathy	30 (29.33)	30 (19.66)	48 (23.15)
Cognitive empathy			
Perspective-taking	22 (4.00)	24 (4.37)	26 (4.43)
Fantasy	22 (6.20)	24 (4.23)	26 (4.86)

*Note:* Emotional empathy was measured by the Epstein Feeling Inventory (Mehrabian & Epstein, 1972) and cognitive empathy was measured by two scales from the Davis Multidimensional Individual Measure of Empathy (Davis, 1980).

the mixed group had intermediate empathy scores in relation to the close group and the distant group. Means and standard deviations can be found in Table 5.

## Discussion

This study suggests that the answer to how young adult siblings come to be close or distant to each other may lie in the affective and physiological quality of their interactions. We found no evidence that sibling closeness could be explained by family status variables (cf., Buhrmester, 1992; Buhrmester & Furman, 1990; Pulakos, 1987; Stocker, Lanthier, & Furman, 1996) or geographical distance and contact (cf., Goetting, 1986). Closeness in young adult sibling relationships was characterized not only by greater warmth but fewer power struggles. Sibling interaction between close and distant siblings was discriminated both in conversations on enjoyable topics and topics of disagreement. Across the two contexts, close sibling interaction involved more affection and older sibling validation in the warmth dimension and less belligerence in the power dimension than distant sibling interaction. The conversation on topics of disagreement elicited additional differences with close siblings showing more interest on the warmth dimension and less domineering and defensiveness on the power dimension than distant siblings.

This study highlights the importance of power in the quality of young adult sibling relationships. In the most recent classification systems of sibling dimensions developed for young adults (Stocker et al., 1996), adult siblings (Bedford, 1989) and elderly siblings (Gold, 1989a), as well as typologies of sibling relationships in childhood and adolescence (Brody et al., 1994a; Hetherington, 1988; McGuire, McHale, & Updegraff, 1996; Stormshak et al. 1996), power was not included. This

neglect is surprising in light of the fact that in early adolescence power issues were found to be the most frequent cause of sibling conflict (Raffaelli, 1992). Although sibling relationships become more egalitarian across the life span (e.g., Buhrmester & Furman, 1990), young adult siblings who are not close to each other appear to be struggling to resolve their power inequality.

We think that power struggles (i.e., domineering, belligerence, and defensiveness exhibited during the sibling conversations) is the social process that is particularly salient for this age group of siblings and that this developmental period of early adulthood is associated with the sibling task of resolving power imbalances. This transition from asymmetrical sibling relationships in childhood to more symmetrical and egalitarian sibling relationships found in adolescence has been characterized as a developmental milestone for siblings to accomplish (Buhrmester & Furman, 1990). This transition typically occurs when the younger siblings reach preadolescence and differences in developmental abilities and competence between older and younger siblings narrow.

The critical aspect of this transition seems to be the older siblings' willingness to relinquish the power they hold in their sibling relationships. Although older siblings come into this position of power with the birth of their younger siblings and the power imbalance exists simply because they are chronologically older than their younger siblings, older siblings may be reluctant to give up this power. One reason may be because they are unlikely to have this kind of influence and control in their peer relationships (e.g., Stoneman, Brody, & MacKinnon, 1984). Validation shown by older siblings in close sibling relationships to their younger siblings can be viewed as indicative of their ability to let go of their sibling power, particularly since these older siblings validated in both the positive and stressful conversation. Since younger siblings rarely request the older siblings' power behaviors (e.g., Stoneman et al., 1984) and are given less opportunities to reciprocate the amounts of power shown by their older siblings (e.g., Buhrmester, 1992), the question to answer becomes, Why won't older siblings relinquish this sibling power?

Closeness in sibling relationships appears to help facilitate the transition to less asymmetrical sibling relationships. Young adult siblings, who are likely to be in the final stages of this transition, were found to exert more power in both conversations by being more domineering and belligerent than younger siblings, and younger siblings were more defensive than their older siblings in the conversation on topics of disagreement. Older and younger siblings in close sibling relationships showed lower levels of belligerence toward each other in the enjoyable sibling interaction and lower levels of domineering, belligerence, and defensiveness in the stressful sibling interaction than distant siblings. Although these are correlational data and we can only speculate on directionality, the power struggles may either be acting as a barrier to closeness or the absence of closeness may prevent siblings from being able to negotiate a kind of sibling relationship in which there is more equality.

In this study, negativity in the conflict dimension did not appear to be associated with close sibling interaction, which suggests that conflict may not be as salient for siblings during early adulthood as it is in childhood (cf., Stoneman & Brody, 1993). A close relationship with one's siblings in early adulthood is not necessarily contingent on the absence of conflict or negative affect. This is similar to a finding with marital couples in which marital anger does not appear to have long-term negative consequences for marriages (Gottman & Krokoff, 1989).

Differences in closeness in the sibling relationships were reflected in their physiological reactivity during the conversation of topics of disagreement. Distant siblings evidenced a higher heart rate increase and physiological arousal during this conversation compared to the preconversation baseline than close siblings. This finding fits in well with the affective findings and emphasizes the usefulness of incorporating measures of affect and physiology in the same study. The physiological responses of the siblings during the conversations can provide descriptive information on what happens during the sibling interaction and help explain the behavior observed by suggesting possible mechanisms at work.

This problem-solving conversation was focused on the challenging task of resolving differences of opinion and issues that may have been unresolved for years. Similar to marital interaction (Gottman, 1994), sibling interaction involves regulation of one's emotional and physiological states. During the interaction, one must express the negative emotions that are necessary to facilitate conflict resolution, while still remaining in control of the negative emotions. While indicative of the discomfort and the stress a person experiences, the measure of physiological reactivity can also be viewed as an index of emotional regulation (Gottman & Swanson, 1995). As indicated by their lower levels of physiological reactivity, close siblings were better able to regulate their emotions when presented with a situation that was designed to generate negative emotions.

Physiological arousal also has implications for cognitive processing and subsequent behavior. As suggested by Gottman and Levenson (1988) from their research with marital couples, at high levels of negative affect, physiological arousal during marital interaction may interfere with information processing and higher-order cognitive functioning such as problem solving. As a result, a person may rely on his or her repertoire of overlearned but ineffective interpersonal behaviors to get through the interaction. Distant siblings who became physiologically aroused during the conversation on topics of disagreement may be drawing on domineering, belligerent, and defensive behavioral patterns learned in childhood.

Closeness was also linked to the dispositional empathy capacities of the siblings, underscoring the importance of considering emotional aspects of sibling relationships. Both older and younger siblings in close sibling relationships were found to have higher emotional and cognitive empathy capacities. This finding is consistent with sibling work in early childhood that suggests that children who get along with siblings are more skilled at affective perspective-taking (Youngblade & Dunn, 1995). At this time, it is impossible to know whether siblings who are able to understand the feelings and thoughts of others are easier to get close to or whether the experience of negotiating a close sibling relationship provides opportunities to develop empathic abilities. It is likely that the processes that enable individuals to be empathic are similar to the processes that lead to a close sibling relationship, and that sibling relationships can provide a window on developmental functioning. Furthermore, the finding that close siblings are both able to regulate their emotions during stressful interaction and are empathic is consistent with research linking empathy with regulatory capacities (Eisenberg, Fabes, Murphy, Kabon, Maszk, Smith, O'Boyle, & Suh, 1994).

In general sibling interaction during early adulthood involved more warmth than conflict and power struggles. This pattern may be reassuring to parents in

light of the conflict and power struggles associated with the quality of childhood sibling relationships. Taking a developmental perspective, previous research has shown a decrease in warmth and an increase in conflict in sibling relationships from middle childhood to adolescence (Buhrmester & Furman, 1990; Brody, Stoneman, & McCoy, 1994b; Dunn et al., 1994). While this study indicates that the discrepancy in power and status between older and younger siblings was still present in early adulthood, it also suggests that young adult siblings may be experiencing a warming in their relationship with high levels of warmth and low levels of conflict in their interactions.

At this time, the answer to what influences closeness in young adult sibling pairs remains incomplete. Although this study did not examine the effects of individual characteristics of the siblings such as temperament on sibling interaction, the research on the links between temperament and the quality of children's sibling relationships is promising. For example, siblings similar in temperament (regardless of the quality of the temperament) were found to have warm sibling interactions (Stoneman & Brody, 1993). It is also possible that differential parenting (e.g., Brody & Stoneman, 1994) influences the quality of young adult sibling relationships. Although our sample comprised a range of different ethnic and socio-economic groups, inclusion of at least one college attending young adult in every sibling pair limits the generalizability of the current findings.

It would be interesting to examine more than one sibling relationship in the family and how a close sibling relationship with one sibling is different from a distant relationship with another sibling in the same family. We hope that this study paves the way for process-outcome research to begin in this age group. We strongly encourage further research on the positive benefits of sibling relationships across the lifespan.

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