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Siblings of individuals with an autism spectrum disorder: Sibling relationships and wellbeing in adolescence and adulthood

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The sibling relationship is unique in that it lasts the longest of all human relationships. Closeness in the sibling relationship, however, changes over time. In the general population, siblings show decreased satisfaction with their sibling relationship in adolescence, particularly as peer relationships become more important, which is followed by decreased contact in early adulthood as siblings establish their independent lives. During the middle and later adult years, siblings share increased satisfaction and contact (Cicirelli, 1994).

We know relatively little about the trajectory of sibling relationships when one sibling has an autism spectrum disorder (ASD). Studies of siblings of individuals with an ASD have focused on the sibling relationship during childhood (e.g., McHale, Sloan, & Simeonsson, 1986; Rivers & Stoneman, 2003; Roeyers & Mycke, 1995) or have included siblings in varied life stages (e.g., childhood through young adulthood; Bågenholm & Gillberg, 1991). Thus, we have limited knowledge about the sibling relationship at specific points during the life course and how the sibling relationship changes over time in this population. Understanding developmental differences in the sibling relationship in adolescence and adulthood in this population is important because siblings are often responsible for the well-being of their brother or sister with an ASD when their parents are no longer able to provide or oversee care.

Past research on the childhood sibling relationship when one sibling has an ASD has yielded inconsistent findings. In some studies, siblings who have a brother or sister with an ASD reported admiration of their brother or sister and were satisfied with their relationship (Kaminsky & Dewey, 2001; Rivers & Stoneman, 2003; Roeyers & Mycke, 1995). In other studies, siblings experienced less closeness, had a decreased number of interactions, and viewed the brother or sister with an ASD as a burden (Bågenholm & Gillberg, 1991; Knott, Lewis, & Williams, 1995). Siblings of children with an ASD have reported limited family interactions (Opperman & Alant, 2003) and feeling more isolated and lonely than siblings of children with other disabilities (Bågenholm & Gillberg, 1991).

Some of the inconsistent findings across studies may be due to different sample characteristics and methods of data collection. Many studies use a wide age range of siblings (e.g., ages 5–20; e.g., Bågenholm & Gillberg, 1991) which may obscure some age-related changes in the sibling relationship and sibling well-being. Moreover, the variability in findings suggests that there may be unmeasured factors that are associated with the sibling relationship and well-being. The current study extends previous research by examining siblings in two specific age groups (adolescence and adulthood) and by examining factors that may explain variability in the sibling relationship at each life stage.

In addition, recent research shows that the symptoms of ASDs change over time (Seltzer et al., 2003; Shattuck et al., 2007). As a result, the effects on the sibling relationship may differ according to the life stage of both the sibling and the brother or sister with an ASD. The ASD impairments of social interaction, communication, and behavior tend to become less severe over time, although they remain problematic for most individuals with an ASD across the life

course (Seltzer et al., 2003; Shattuck et al., 2007). Thus, although such impairments may continue to impact the sibling relationship throughout adolescence and adulthood, the lessening of severity may lead to improved sibling relationships over time.

In this paper, we investigated how the sibling relationship and sibling well-being is different during adolescence versus adulthood when one sibling has an ASD, and asked whether there are different predictors of these sibling outcomes for the two age groups. To our knowledge, there has been no published research prior to our ongoing study on the sibling relationship during adulthood when one sibling has an ASD. Therefore, we looked to the research literature on siblings of adolescents and adults with developmental disabilities other than autism, to inform our predictions regarding sibling relationships over the life course when one sibling has an ASD.

Wilson, McGillivray, and Zetlin (1992) compared adolescent and adult siblings of individuals with developmental disabilities, and found that adolescent siblings experienced more embarrassment, were more concerned about social stigma, and were more worried about being isolated by their peers than were adult siblings. Similarly, Begun (1989) reported that during adolescence, siblings who had a brother or sister with a developmental disability expressed more conflict and less satisfaction with their sibling relationships than in adulthood. These researchers also found that the acceptance of brothers or sisters with disabilities was greater during adulthood.

In this study we also examined differences in sibling psychological well-being, coping skills, and social support. In the general population, adolescents report higher levels of depressive symptoms than adults (Radloff, 1991). Coping skills refer to the person's active or passive strategies and behaviors to deal with stressful events (Carver, Scheier, & Weintraub, 1989). Problem-focused coping strategies actively aim to solve problems and reduce the effects of stressful events, whereas emotion-focused coping strategies aim to regulate or eliminate undesirable emotions that are associated with stressful events (Carver et al., 1989). In our previous research, using a subset of the participants used in the current analyses, adult siblings who used more problem-focused coping strategies reported a closer sibling relationship with their brother or sister with an ASD (Orsmond & Seltzer, 2007). With respect to social support, adolescents, in general, report that the greatest sources of support come from friends and parents (Lempers & Lempers-Clark, 1992; Smetena, Campione-Barr, & Metzger, 2006). During later adolescence and throughout adulthood, support gained from committed romantic relationships tends to replace the support previously provided through parents and friends (Doherty & Feeney, 2004).

Based on the research reviewed above, we posed four research questions: (1) Do adolescent siblings of individuals with an ASD differ from adult siblings with respect to engagement in shared activities and reported positive affect in the sibling relationship?; (2) Do adolescent siblings of individuals with an ASD differ from adult siblings in psychological well-being, coping, and social support?; (3) How does gender influence the relationship and well-being of adolescent and adult siblings?; and (4) How do the characteristics of the brother or sister with an ASD (e.g., age, behavior problems), family characteristics (e.g., family size), and sibling resources (e.g., coping, support, and psychological well-being) predict engagement in shared activities and positive affect in the sibling relationship?

We predicted that, similar to typically developing sibling dyads and siblings of adults with other types of developmental disabilities, adult siblings would have more positive relationships than adolescent siblings with their brother or sister with an ASD (Begun, 1989; Cicirelli, 1994; Wilson et al., 1992). Also similar to the general population, we expected sibling

engagement in shared activities to be greater in adolescent siblings because they are more likely to live together with the brother or sister with an ASD than adult siblings.

We also expected that adult siblings of an individual with an ASD would report more favorable psychological well-being than adolescent siblings, in part not only because this is the pattern seen in the general population, but also because we anticipated that the stress associated with living with a brother or sister with an ASD would likely lessen when siblings are no longer living together in adulthood. We expected that adult siblings would use more problem-focused coping strategies and fewer emotion-focused coping strategies than adolescent siblings, and that adult siblings would rely less on social support from their parents and friends than would adolescent siblings. These predictions were informed by the developmental shifts observed in the general population (Skinner & Zimmer-Gember, 2007)

We hypothesized that engagement in shared activities and positive affect in the sibling relationship would differ according to the gender composition of the sibling dyad for both age groups. In prior research, we found that adult brothers with a sister with a developmental disability were the least involved and reported the lowest levels of positive affect in the sibling relationship, but that the gender of the sibling with the developmental disability did not condition the relationship for sisters (Greenberg, Seltzer, Orsmond, & Krauss, 1999; Orsmond & Seltzer, 2000). We predicted a similar pattern in the current sample, that is, that sisters would have an equally close relationship with their brother or sister with an ASD, but that the sibling relationship would be conditioned by the gender of the sibling with an ASD for brothers.

Finally, we predicted that behavior problems in the brother or sister with ASD would negatively impact sibling relationships (Greenberg et al., 1999; Seltzer, Greenberg, Krauss, Gordon, & Judge, 1997; Seltzer et al., 2003), but that siblings from larger families would have more positive relationships (Howlin, 1988; McHale, Sloan, & Simeonsson, 1986). With respect to sibling resources, we hypothesized that for both adolescent and adult siblings, sibling engagement in shared activities and positive affect in the sibling relationship would be higher when the sibling had more favorable psychological well-being, used more problem-focused coping skills, and reported greater social support (Kaminsky & Dewey, 2002; McHale et al., 1986; Orsmond & Seltzer, 2007; Seltzer et al., 1997). We also explored whether sibling resources (psychological well-being, coping skills, and social support) buffered the negative impact of behavior problems in the brother or sister with an ASD on the sibling relationship. By posing these questions, we hoped this study would provide important information regarding the level of sibling engagement at a time in life when siblings may need to take a more active role in the relationship as parents begin to relinquish their active caregiving role.

Method

Participants

Siblings were recruited from families of 406 adolescents and adults with an ASD participating in an ongoing longitudinal study (Lounds, Seltzer, Greenberg, & Shattuck, 2007; Seltzer et al., 2003). Data are collected every 18 months, on average. Families were recruited via state-supported agencies, schools, and diagnostic clinics, which provided services to individuals with intellectual and developmental disabilities. We also recruited participants through newspaper advertisements and television news interviews about the study. Half of the individuals with an ASD lived in Wisconsin and half lived in Massachusetts. Data for the present analyses were taken from the second and fourth time points in the study.

The families met three criteria when initially recruited: (a) the family member with an ASD was age 10 or older; (b) he or she had received a diagnosis on the autism spectrum from medical, psychological, or educational professional, as reported by the parents; and (c) administration

of the Autism Diagnostic Interview – Revised (ADI-R; Lord, Rutter, & LeCouteur, 1994) confirmed the parental report of an autism spectrum disorder. Nearly all (94.6%) met all ADI-R lifetime criteria with onset of symptoms prior to 36 months, confirming a diagnosis of autism. Case-by-case review by the research team, including members trained in the diagnosis of autism spectrum disorders, determined that of the other 5.4% of the sample members included in the study their ADI-R profile was consistent with an autism spectrum disorder. Two situations accounted for most of these cases: (1) individuals with a diagnosis of Asperger disorder who met the ADI-R criteria in all three domains (communication, social, restricted or repetitive behaviors), but whose parents did not recall that they had atypical development prior to age 3; and (2) individuals diagnosed with pervasive developmental disorder – not otherwise specified (PDD-NOS) who met criteria on the communication and social domains, but did not meet criteria on the restricted or repetitive behaviors domain.

We also characterized the individuals with an ASD as to whether or not they had an intellectual disability, using a variety of sources of information. When possible, we administered the Wide Range Intelligence Test (WRIT; Glutting, Adams & Sheslow, 2000) to the individual with an ASD. In addition, mothers reported on adaptive behavior via the Vineland Screener (Sparrow, Carter & Cicchetti, 1987). Individuals with a standard scores of 70 or below on each instrument were classified as having an intellectual disability, whereas those with scores above 75 on either measure were deemed not to have an intellectual disability. For the remaining cases, independent review of records (including psychological testing records when available, adaptive behavior information, parental report of a prior diagnosis of intellectual disability) by three psychologists, combined with a clinical consensus procedure, was used to determine whether or not an individual had an intellectual disability. In all, 305 participants (70.6%) were classified as having an intellectual disability.

Data were collected from adult siblings (ages 19 and older) during the second time point of the study and from the adolescent siblings (ages 12 to 18) during the fourth time point. At the second time point of data collection, there were 351 available adult siblings in the 406 families. Data were collected from 244 siblings, for a response rate of 69.5%. In the present analysis, we included only one sibling per family, resulting in 142 adult siblings, ranging in age from 19 to 55 years of age. The selection criteria for adult siblings included in the present analysis were as follows: (1) if only a single sibling was available, he or she was the participant ($n = 45$); (2) if more than one sibling in a family participated, the one closest in age to the brother or sister with the ASD was included in this analysis ($n = 71$); (3) in 26 families the sibling closest in age did not participate, but another sibling did and his or her data were used.

Data from 56 adolescent siblings were obtained during the fourth time point of data collection in the ongoing study, from families that included siblings between the age of 12 and 18 years at that time. Eighty-five siblings in the appropriate age range were contacted and 57 adolescent siblings participated, for a response rate of 67.0%. Eleven mothers did not want their non-disabled child to participate in the study, and 17 siblings who were contacted declined to participate in the study. Data from one adolescent sibling were not included in this analysis because an adult sibling was closer in age to the brother or sister with the ASD. Thus, no family contributed both an adolescent and an adult sibling to the study. Twenty-six adolescent siblings were the only other sibling in the family, 21 were closest in age to their brother or sister with the ASD, and in 9 families the sibling closest in age did not participate, but another adolescent sibling did and his or her data were used. Siblings who had significant developmental disabilities were not included in this study.

As shown in Table 1, adolescent siblings averaged 16 years of age and adult siblings averaged 32 years of age. Regarding birth order, adolescents were significantly more likely to be younger than their brother or sister with an ASD than were the adult siblings, and came from

significantly smaller families (less than 3 children on average) compared with adults (over 4 children on average). Almost two-thirds of the sibling respondents in both age groups were sisters, and most of them had a brother with an ASD. Three-quarters of the adolescents lived with their brother or sister with an ASD, while only 6% of the adults lived with their brother or sister with an ASD. The brothers and sisters with an ASD averaged 19 years of age in the adolescent sibling group and 29 years of age in adult sibling group. Over 70% of the brothers and sisters with an ASD in both groups were male. Almost three-fourths of the brothers and sister with an ASD were able to spontaneously use at least three-word phrases (70.2%).

Procedures

Adult siblings completed a mailed packet of questionnaires, while adolescent siblings participated in a 45-minute phone interview followed by a brief mailed packet of questionnaires. Seven adolescent siblings did not return the mailed questionnaires but participated in the phone interview. If data were available for at least 80% of a scale, that person's mean score on the scale was substituted for the missing values.

Measures

Sibling Relationship Quality—Two aspects of sibling relationship quality were measured: engagement in shared sibling activities and positive affect in the sibling relationship. For engagement in shared sibling activities, we administered a scale used in our previous research on siblings of adults with developmental disabilities (Krauss, Seltzer, Gordon, & Friedman, 1996; Orsmond & Seltzer, 2000). Siblings were asked whether they had participated in the following six activities together with their brother or sister with an ASD in the past year: (1) going out for a meal in a restaurant, (2) going shopping or running errands, (3) going to a movie, bowling, or other recreational activity; (4) visiting a friend or relative; (5) accompanying their brother or sister for a doctor's or clinic appointment; (6) taking or going with the brother or sister on vacation. The total score for engagement in shared sibling activities indicated the number of different types of activities done together in the past year (ranging from 0 to 6), with higher scores indicating greater variety of shared activities.

Siblings also completed the Positive Affect Index (PAI; Bengtson & Black, 1973a), which includes 10 items measuring positive affect in the relationship. Five questions addressed the adolescent and adult siblings' feelings toward their brother or sister with an ASD (e.g., "How much affection do you have toward your brother/sister?"), and five assessed the siblings' perception of the affect from their brother or sister with an ASD (e.g., "How much affection do you feel that your brother/sister has for you?"). The questions reflect the dimensions of affection, understanding, trust, fairness, and respect in the relationship. Each item is rated on a scale from 1 (not at all) to 6 (extremely), with higher scores indicating more positive affect. The test-retest reliability, internal consistency and construct validity of PAI were high as reported by the test authors (Bengtson & Black, 1973b). Alpha reliabilities for our samples of adolescent and adult siblings were .89 and .91, respectively.

Psychological Well-Being—The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to assess psychological well-being. The CES-D aims to evaluate depressive symptoms in the general population and is a well-validated and reliable measure of depressive affect (Radloff, 1991) that frequently has been used with adolescents (Dierker et al., 2001) as well as adults (Andresen, Malmgren, Carter, & Patrick, 1994). This 4-point self-report scale contains 20 items assessing the frequency of depressive symptoms during the preceding week. The score of each item ranges from 0 (rarely) to 3 (most of the time). A higher total score indicates more depressive symptoms. Test-retest reliability, internal consistency and concurrent validity are good (Radloff, 1977). Alpha reliabilities for our samples of adolescent and adult siblings were .91 and .92, respectively.

Coping Skills—We utilized eight scales from the COPE (Carver et al., 1989) to assess which types of coping strategies the siblings used when they faced distress. These eight scales are divided into two categories: four scales are related to problem-focused coping (active coping, planning, positive reinterpretation and growth, and suppression of competing activities), and four scales are related to emotion-focused coping (denial, focus on/venting emotions, mental disengagement, and behavioral disengagement). Each scale includes four items and each item response ranges from 1 (not at all) to 4 (a lot). For each area, the four scales are summed so that greater use of problem-focused coping and emotion-focused coping are indicated by higher scores. Satisfactory internal consistency, convergent and discriminant validity were reported by Carver et al. (1989). For problem-focused coping, alpha reliabilities for our samples of adolescent and adult siblings were .91 and .92, respectively. For emotion-focused coping, alpha reliability was .77 for our samples of adolescent and adult siblings.

Social Support—We used the Perceived Social Support Scales (Procidano & Heller, 1983) to measure siblings' perceived social support from parents and from friends. Siblings responded to this 20-item measure three times -- for the support that they receive from their mother, father, and friends. Siblings responded whether each statement was true or false. Scores on each scale range from 0 to 20, with higher scores indicating that siblings perceived greater support. Test-retest reliability, internal consistency and construct validity of the measure are reported to be high (Procidano & Heller, 1983). Alpha reliabilities for our samples of adolescent and adult siblings were .86 and .91, respectively, for support from mother; .87 and .90, respectively, for support from father; and .87 and .77, respectively, for support from friends.

Behavior Problems in Brother/Sister with an ASD—Behavior problems were measured with the Scales of Independent Behavior-Revised (SIB-R; Bruininks, Woodcock, Weatherman, & Hill, 1996). The problem behavior scale of the SIB-R consists of eight behavior problems: behavior that is hurtful to self, unusual or repetitive behavior, withdrawn or inattentive behavior, socially offensive behavior, uncooperative behavior, behavior that is hurtful to others, destructive to property, and disruptive behavior. The mother was asked whether her child with an ASD exhibited each of these eight behavior problems within the last 6 months, and if so, to rate the frequency and severity of the behaviors. Ratings of behavior problems were obtained at each point of data collection. Measures of behavior problems from the second time-point of data collection were used for the adult sibling analysis and data from the fourth time-point of data collection were used for the adolescent sibling analysis. Standardized algorithms (Bruininks et al., 1996) were used to translate frequency and severity ratings into a general summary score where higher scores indicated more severe maladaptive behaviors. The reliability and the validity of the SIB-R have been documented previously (Bruininks et al., 1996). In our samples, the SIB-R scores of individuals with ASD in adolescent and adult groups ranged from 100.0 to 149.0 and from 100.0 to 148.0, respectively. There was no difference in behavior problems in these two groups, $t(180) = -0.36, ns$.

Background characteristics reported by siblings included age (in years), age difference between the sibling and the brother or sister with an ASD (in years), the total number of children in the family, gender (0 = male, 1 = female), birth order (0 = older, 1 = twins or younger), and living arrangement (0 = do not live together, 1 = live together) (see Table 1).

Results

Adolescent siblings engaged in significantly more shared activities in the past year than did adult siblings (see Table 2). Effect sizes (ES) were calculated as Cohen's *D* (Cohen, 1988) for all mean comparisons and are listed in Table 2. The effect size for the group difference in shared activities was large (ES = 1.4) (Cohen, 1988). However, positive affect in the relationship did not differ significantly between the two age groups.

The two age groups did not differ in depressive symptoms. MANOVA indicated a significant overall group effect for coping strategies, $F(2, 186) = 6.51, p < .01$. Univariate analyses showed that adult siblings used significantly more problem-focused coping strategies and fewer emotion-focused coping strategies than did adolescent siblings (see Table 2). MANOVA also indicated a significant overall group effect for social support, $F(3, 101) = 12.16, p < .001$. Follow-up univariate analyses indicated that adolescent siblings perceived significantly greater support from their mother, father, and friends than did adult siblings. Medium to large effect sizes were observed for the group differences on coping strategies and social support.

Controlling for group differences in demographic variables (family size and birth order) using ANCOVA did not alter these findings substantially. All group differences remained significant, with the exception of the group difference in emotion-focused coping, which was no longer significant after controlling for these factors, $F(1, 185) = 2.36, p > .05$.

We also tested whether the sibling relationship, well-being, coping strategies, and support from parents and friends varied according to whether the sibling was the only other sibling, the closest in age of multiple siblings, or not the closest in age among several other siblings. One-way ANOVAs were conducted examining three types of siblings (only, closest in age, and other). There was only one significant main effect for type of sibling, namely for depressive symptoms, $F(2, 183) = 3.07, p < .05$. The sibling closest in age in both groups had the highest average CES-D scores ($M = 15.91, SD = 11.84$), followed by only siblings ($M = 11.86, SD = 9.23$), and other siblings ($M = 10.94, SD = 8.95$). However, post-hoc Tukey HSD tests did not indicate significant differences between the three types of sibling pairs.

To test gender effects we conducted one-way ANOVAs (with four sibling gender dyad combinations) separately for adolescents and adults. Sibling engagement in shared activities during adulthood varied according to the gender composition of the sibling dyad, $F(3, 137) = 3.91, p < .01$. Post-hoc Tukey HSD tests indicated that women with a sister with an ASD engaged in significantly more shared activities ($M = 3.52, SD = 0.35$) than adult brothers with a sister with an ASD ($M = 1.60, SD = 0.45$). The number of shared activities between adult sisters and their brother with an ASD ($M = 2.61, SD = 1.92$) and adult brothers and their brother with an ASD ($M = 2.52, SD = 1.64$) fell between these extremes. Sibling engagement in shared activities did not differ significantly according to the gender dyad for adolescents, $F(3, 52) = 0.08, p > .05$. Positive affect did not differ by the gender dyad for either adult siblings, $F(3, 133) = 1.42, p > .05$, or adolescent siblings, $F(3, 45) = 0.59, p > .05$.

We computed bivariate correlations to examine the associations between characteristics of the non-disabled sibling, the individual with an ASD, and the quality of sibling relationships, followed by ordinary least squares regression models (separately for adolescents and adults) to examine predictors of engagement in shared activities and positive affect in the sibling relationship. An initial set of predictors were chosen if they were significantly correlated with sibling engagement or positive affect for either adolescent or adult siblings. We also initially included living arrangement because of theoretical interest. We averaged maternal and paternal support scores to create a parental support score. Correlations among variables are presented in Table 3, with data for adolescent siblings above the diagonal and for adults below.

Table 4 reports the results from ordinary least squares multiple regression model that examined which variables independently predicted the quality of sibling relationships. Initially, living arrangement, support from friends, and emotion-focused coping were included in the regression models, but they were never significant predictors. Due to sample size constraints, we did not include these variables in our final regression models. Thus, our final set of independent variables examined included background characteristics (family size, age of the brother or sister with an ASD, and behavior problems), and sibling resources (problem-focused

coping, support from parents, depressive symptoms). In addition, to test if problem-focused coping moderated the effect of behavior problems on the sibling relationship, we created an interaction term by multiplying behavior problems in the brother or sister with an ASD (mean centered) and non-disabled siblings' problem-focused coping (mean centered) (Aiken & West, 1991), and then we entered this interaction variable into our regression equations.

The results are shown in Table 4, separately for adolescent and adult siblings. For engagement in shared sibling activities, the overall model was not significant for adolescents, $F(7, 37) = 1.96, p > .05$. Fewer behavior problems of the brother or sister with an ASD and the interaction between the behavior problems and adolescent siblings' problem-focused coping were significant predictors. When the brother or sister had low levels of behavior problems, sibling engagement in shared activities was equally high regardless of the level of problem-focused coping used by the sibling. However, when the brother or sister had high levels of behavior problems, higher use of problem-focused coping moderated the negative impact of behavior problems on sibling engagement.

The regression model for sibling engagement in shared activities for adults was significant, $F(7, 115) = 4.19, p < .01$. For adults, having a brother or sister with an ASD who was younger in age or who had fewer behavior problems was associated with greater engagement in shared activities.

For positive affect in the sibling relationship, the overall regression model was significant for adolescents, $F(7, 37) = 3.11, p < .05$. Larger family size and fewer behavior problems were associated with greater positive affect in the sibling relationship. For adult siblings, the overall model was also significant, $F(7, 113) = 5.89, p < .01$. Adult siblings who had greater support from their parents reported more positive affect in the sibling relationship. The interaction term for behavior problem and problem-focused coping did not significantly predict positive affect for either sibling group. We also tested whether emotion-focused coping served as a moderator of behavior problems on sibling engagement in shared activities and positive affect in the sibling relationship for adolescent and adult siblings. The interaction term was never significant.

Discussion

The findings of this study reflect several unique qualities of sibling relationships in adolescence and adulthood when a brother or sister has an ASD. Despite decreased contact with their siblings, adult siblings reported the same degree of positive affect in the relationship as did adolescent siblings. Although confirmation through longitudinal studies is needed, these data suggest that there may be stability over time in the closeness of the sibling relationship when one sibling has an ASD. This pattern differs from sibling relationships when neither sibling has a disability, wherein closeness in the sibling relationship tends to decrease in adolescence and young adulthood, and then increases again in middle and later adulthood (e.g., Cicirelli, 1994; Scharf, Shulman, & Avigad-Spitz, 2005). Indeed, our prior research has indicated that a strong predictor of the adult sibling relationship when one sibling has a disability is the quality of the sibling relationship during adolescence (Greenberg et al., 1999). Moreover, it is possible that the social impairments in the brother or sister with an ASD may remain stable over time, and thus the sibling relationship would appear more similar over time; however, evidence from our research and others suggests an abatement of social impairments over time (Seltzer et al., 2003; Shattuck et al., 2007).

We found no group difference in depressive symptoms. We had expected adolescent siblings to report more depressive symptoms, but the mean for both groups was considerably lower than the cut-off point for clinical depression (a score of 16 or higher), suggesting the absence

of clinical depressive symptoms (Radloff, 1991). We did find developmental trends in coping strategies consistent with the general literature. Adolescents used more emotion-focused and fewer problem-focused coping strategies than adults. These differences in coping styles reflect typical age patterns (Skinner & Zimmer-Gembeck, 2007). When the adolescents in our sample did use higher levels of problem-focused coping, however, it was protective against the negative effects of behavior problems in their brother or sister. Thus, even though they may use lower levels of problem-focused coping than adults, when they cope this way, it is effective in buffering the potential negative impact of behavior problems in their brother or sister with an ASD.

Social support also differed by group, with adolescent siblings reporting greater support from both parents and friends than adult siblings. We did not have the data to make group comparisons regarding spousal support, and we expect that this might be an important source of support for adult siblings. Even though adolescents reported greater support from their parents than did the adults, it was in adults that we observed a positive association between parental support and positive affect in the sibling relationship. The importance of parental support for adults, however, illustrates that parents provide support to children throughout their lives, and that this support may be particularly important when a member has a disability.

The importance of social support for adolescent siblings was also observed in terms of family size. Adolescents from larger families reported greater positive affect in their sibling relationship. As previous research has found, in larger families, the caregiving responsibility can be more easily shared, and therefore siblings may feel less pressure and greater satisfaction in the sibling relationship (Howlin, 1988). In addition, it was interesting to note that support from friends was not associated with closer sibling relationships for adolescents, as we had hypothesized.

We found gender effects in the sibling relationship for adult siblings but not for adolescents. Adult brothers of sisters with an ASD showed the least engagement in shared activities and sisters of sisters the most. This finding is similar to the findings in our previous research on adult siblings of brother or sister with a developmental disability other than autism, wherein brothers who had a sister with a developmental disability were the least engaged in the sibling relationship (Orsmond & Seltzer, 2000). The findings in the current analysis support our previous assertion that women with developmental disabilities, including autism, may be at risk for social isolation later in life if their only sibling is a brother.

The sibling relationship was also associated with characteristics of the brother or sister with an ASD, most notably age and behavior problems. Adult siblings engaged in more shared activities when the brother or sister with an ASD was younger in age. Rivers and Stoneman (2003) suggested that as children with autism grow older, their atypical behaviors become more difficult for typically developing siblings. This may be one explanation, in addition to the end of coresidence, regarding why adult siblings shared fewer activities with their brother or sister with an ASD if their brother or sister was older in age.

Consistent with our previous studies (Greenberg et al., 1999; Seltzer et al., 1997; Seltzer et al., 2003), our current findings showed that the brother or sister's behavior problems negatively impacted the sibling relationship. Behavior problems may make siblings less willing to engage in activities with their brother or sister with an ASD, especially activities in public contexts. Difficult behaviors may also indirectly influence sibling activities, as parents may be less willing to engage in family activities such as going out for a meal and therefore limiting the opportunity for siblings to engage in shared activities.

There are several limitations to the current set of analyses. First, our cross-sectional study design also did not allow us to examine developmental changes that might occur over time.

The siblings in the adolescent and adult groups may have been differentially affected by sociohistorical conditions, such as the quality or style of education of the brother or sister with an ASD, siblings' exposure to information about autism, or public policy. Secondly, some measures chosen for this study posed limitations. For example, our measure of shared activities focused on the different types rather than frequency of engaged in activities. These activities are not solely at the sibling's discretion and may be influenced by parental participation in these activities, particularly for adolescents. Thirdly, for this analysis, we have not examined the presence of more subtle characteristics of the autism spectrum (the broader autism phenotype; BAP) which may be present in siblings and may impact the sibling relationship as well (Bauminger & Yirmiya, 2001). Finally, the overall study was based on a volunteer sample of families, and may be not representative of the larger population, especially with respect to ethnic diversity, as our sample is largely Caucasian.

This study, however, is unique in that it is one of the first to investigate the sibling relationship in adolescent and adult siblings of individuals with an ASD, and to examine related factors that may be associated with the sibling relationship during these stages of life. Another important strength of this analysis is that we measured two interrelated but distinct aspects of the sibling relationship: the variety of their shared activities and their perception of positive affect in the relationship. This enabled us to gain both objective and subjective information about the sibling relationship.

Our findings have several implications for clinical practitioners and for service delivery. First, professionals who work with families of individuals with an ASD might inform family members about the possible developmental trends of the sibling relationship from adolescence into adulthood. Families often do not know what to expect in the future, and parents and siblings may be reassured to know that even if the frequency of their shared activities may decline from adolescence to the adulthood, their relationship with the brother or sister with an ASD is likely not to decline in quality. Secondly, the importance of parental involvement in supporting the sibling relationship well into adulthood should be highlighted in professionals' interactions with parents.

Finally, our findings draw attention to a subset of individuals with an ASD who may be at risk for decreased family involvement in the form of sibling relationships later in life. Siblings may be less involved in their brother or sisters' lives if they lack parental support and if their sibling with an ASD has difficult behavior problems or is of the opposite gender (particularly for brothers who have a sister with an ASD). Providing extra support and monitoring to such families may help with future caregiving transitions.

In conclusion, the present study provides important new understanding regarding relationships between individuals with an ASD and their siblings in adolescence and adulthood. The evidence reveals both similarities and differences in the quality of sibling relationships between typically developing sibling dyads and sibling dyads with a brother or sister with an ASD. Although having a brother or sister with an ASD is often viewed as a primary stressor for siblings, our findings suggest that family characteristics (e.g., family size, gender, age of the brother or sister) can also impact an adolescent and adult sibling's relationship with their brother or sister with an ASD. These family characteristics are unalterable; however, preventive or supportive interventions that focus on sibling coping and parental support may be appropriate. Also, the current study underscores the fact that parents play an important role in siblings' perceived relationship quality with their brother or sister with an ASD not only in adolescence but also in adulthood.

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Table 1
Demographic Characteristics of Siblings by Age Group

Characteristic	Adolescent Siblings (N = 56)	Adult Siblings (N = 142)	Test Statistic
Sibling Respondents			
Age (Mean years) (SD)	15.98 (1.71)	31.92 (9.77)	$t(196) = 18.73, p < .001$
Age difference between siblings (yrs)			
Mean (SD)	3.89 (2.26)	4.64 (3.44)	$t(196) = 1.79, ns$
Range	0.0 – 10.0	0.0 – 17.0	
Relative birth order	8.9%	67.7%	$\chi^2(1) = 53.33, p < .001$
(% older than b/s ^a with an ASD)			
Number of children in family			
Mean (SD)	2.88 (1.04)	4.25 (1.37)	$t(196) = 7.62, p < .001$
Range	2.0 – 6.0	2.0 – 9.0	
Gender (% female)	64.3 %	59.9 %	$\chi^2(1) = 0.33, ns$
Gender composition of sibling dyad			$\chi^2(3) = 0.77, ns$
Brother-brother with an ASD	28.6%	30.3%	
Brother-sister with an ASD	7.1%	10.6%	
Sister-brother with an ASD	42.9%	40.8%	
Sister-sister with an ASD	21.4%	18.3%	
Lives with b/s with an ASD (%)	76.8%	6.3%	$\chi^2(1) = 102.93, p < .001$
Brother/Sister with an ASD			
Age (Mean years) (SD)	19.52 (2.47)	29.06 (10.60)	$t(196) = 10.05, p < .001$
Range	14.0 – 25.0	12.0 – 54.0	
Gender (% female)	28.6%	28.9%	$\chi^2(1) = 0.00, ns$

^abrother/sister

Table 2

Comparison of Adolescent and Adult Siblings

Variable Mean (SD)	Adolescents	Adults	Test statistic	D
Sibling relationship				
Shared activities ^a	4.73 (1.21)	2.64 (1.81)	$t(195) = 9.41, p < .001$	-1.41
Positive affect ^b	41.29 (8.97)	43.38 (9.33)	$t(184) = 1.36, ns$	0.26
Psychological well-being (CES-D) ^c	14.71 (10.37)	12.34 (10.45)	$t(187) = 1.37, ns$	-0.30
Coping skills (COPE) ^d				
Problem-focused	24.52 (9.20)	29.36 (8.96)	$t(187) = 3.24, p < .001$	-0.57
Emotion-focused	15.69 (5.77)	13.41 (5.90)	$t(187) = 2.35, p < .05$	-0.42
Support (PSSS) ^e				
Mother	14.56 (4.39)	11.09 (4.63)	$t(169) = 4.57, p < .001$	-0.65
Father	12.76 (4.72)	9.04 (5.24)	$t(124) = 4.16, p < .001$	-0.85
Friends	15.65 (4.12)	12.05 (3.25)	$t(181) = 5.54, p < .001$	-0.93

^aSibling engagement in shared activities (Krauss et al., 1996)

^bPositive Affect Index (Bengston & Black, 1973a)

^cCenter for Epidemiological Studies Depression Scale (Radloff, 1977)

^dCOPE (Carver et al., 1989)

^ePerceived Social Support Scales (Procidano & Heller, 1983).

Table 3

Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Age span	--	.11	-.09	.26*	-.22	.73***	-.08	-.09	-.04	-.12	.13	-.03	.14	.01	.06	.06
2 Family size	.19**	--	-.16	.02	.10	.10	-.08	-.15	.21	-.13	.17	.28*	.15	.17	.15	.42**
3 Sibling gender	-.05	-.08	--	.03	.03	.05	.14	.02	-.15	.28*	-.04	-.05	.19	.46**	-.01	.02
4 Birth order	-.38***	-.12	-.05	--	-.17	.50***	.06	-.11	-.10	-.03	-.17	-.05	-.21	-.10	-.07	-.12
5 Live with b/s ^a with an ASD	-.07	-.01	.04	-.12	--	-.25	.07	.08	-.01	.04	.13	-.02	-.17	.17	.16	.03
6 Age b/s with an ASD	-.19	.14	-.13	.36***	-.29**	--	-.05	-.04	.07	.06	.09	-.02	.21	.02	.08	-.03
7 Gender b/s with an ASD	.01	-.04	.05	-.01	-.10	.00	--	.09	-.17	-.01	-.01	-.06	-.06	.02	-.06	-.10
8 Behavior problems	-.04	-.05	.01	-.07	.14	-.36***	-.04	--	.05	.35*	-.01	-.23	.04	.18	-.50***	-.26*
9 Problem-focused coping	.08	-.03	-.11	-.05	-.06	.06	.19*	-.07	--	-.16	.30*	.18	.18	-.17	.03	.32*
10 Emotion-focused coping	-.06	.09	.27**	.13	.07	.06	.04	-.03	-.27**	--	-.13	-.18	-.11	.42**	-.19	-.13
11 Support from mother	.09	.03	-.01	.01	.01	.02	-.01	.02	.07	-.15	--	.39**	.24	-.12	.33*	.24
12 Support from father	.10	-.11	.14	-.12	-.13	-.20	-.25*	.21	-.15	-.08	.02	--	.25	-.20	.12	.49**
13 Support from friends	-.09	.02	.32***	.02	.18*	-.24**	-.13	-.11	.00	.08	.04	.30**	--	-.15	-.10	.00
14 Depressive symptoms	-.06	.06	-.00	.06	.07	.05	.07	.04	-.37***	.42***	-.19*	-.21	-.34***	--	.07	.11
15 Sibling engagement	.06	-.02	.16	-.06	.07	-.32**	.06	-.09	-.05	.00	.06	.08	.18*	-.04	--	.21
16 Positive affect	.03	.04	.02	-.08	-.04	-.09	-.12	-.05	.02	-.19*	.35***	.31**	.21*	-.24**	.43***	--

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Note. Adolescent siblings are above the diagonal, and adult siblings are below.

^abrother/sister

* p<.05

**

p<.01

p<.001

Table 4
Prediction of Sibling Engagement and Positive Affect

Variable	Sibling Engagement		Positive Affect	
	Adolescents	Adults	Adolescents	Adults
Background characteristics				
Family size	.03	.03	.31 [*]	.06
Age of brother/sister with an ASD	.06	-.46 ^{***}	-.11	-.08
Behavior problems	-.33 [*]	-.27 ^{**}	-.28 [*]	-.16
Sibling resources				
Problem-focused coping	.19	.01	.30	-.01
Support from parents	.02	.12	.12	.45 ^{***}
Depressive symptoms	.05	.05	.14	-.16
Behavior problems × problem-focused coping	.46 ^{**}	-.05	.06	-.14
R^2	.271	.203 ^{**}	.371 [*]	.267 ^{***}

Note. Ordinary Least Squares regression models were conducted separately for adolescent and adults. Data presented are standardized coefficients.

* p < .05

** p < .01

*** p < .001