

## **Peer Relationships and Social and Recreational Activities Among Adolescents and Adults with Autism**

**Gael I. Orsmond,<sup>1,4</sup> Marty Wyngaarden Krauss,<sup>2</sup> and Marsha Mailick Seltzer<sup>3</sup>**

---

In this study, we investigate peer relationships and participation in social and recreational activities among 235 adolescents and adults with autism who live at home. The prevalence of having friendships, peer relationships, and participating in social and recreational activities were all low and comparable to previous research. Both individual and environmental factors were investigated as predictors of having peer relationships and participation in social and recreational activities. Having peer relationships was predicted by individual characteristics (younger age, and less impairment in social interaction skills), but not by characteristics of the environment. Greater participation in social and recreational activities was predicted by characteristics of the individual with autism (greater functional independence, less impairment in social interaction skills, higher levels of internalizing behaviors) and characteristics of the environment (greater maternal participation in social and recreational activities, greater number of services received, and inclusion in integrated settings while in school).

---

**KEY WORDS:** Autism; social activities; adolescence; adulthood.

### **PEER RELATIONSHIPS AND SOCIAL AND RECREATIONAL ACTIVITIES AMONG ADOLESCENTS AND ADULTS WITH AUTISM**

Whereas there has been a considerable effort to delineate the specific social impairments associated with autism (Travis & Sigman, 1998; Volkmar, Carter, Grossman, & Klin, 1997; Volkmar, Carter, Sparrow, & Cicchetti, 1993; Volkmar & Klin, 1995), we know little about the manner by which these impairments affect individuals' daily social lives, especially beyond the childhood years. In this study,

we investigate the social lives of 235 adolescents and adults with autism who live at home. We first provide descriptive data on their friendships and peer relationships. We then examine the frequency of their participation in a variety of social and recreational activities. Finally, we examine individual and environmental factors that may be predictive of having peer relationships and participating in social and recreational activities.

The social deficit of autism is marked by impairment in the use of non-verbal behaviors to regulate social interaction (e.g., gestures, eye contact), difficulty establishing and maintaining peer relationships, a lack of shared enjoyment of interests and accomplishments with others, and a general lack of social or emotional reciprocity (APA, 2000). The research on peer interactions of young children and adolescents with autism indicates that they make fewer initiations than their typically developing age peers as well as peers with other developmental

---

<sup>1</sup> Sargent College of Health and Rehabilitation Sciences, Boston University.

<sup>2</sup> Heller School for Social Policy and Management, Brandeis University.

<sup>3</sup> Waisman Center, University of Wisconsin-Madison.

<sup>4</sup> Correspondence should be addressed to: Gael I. Orsmond, Tel.: 617-353-2703; e-mail: gorsmond@bu.edu

disabilities (Attwood, Frith, & Hermelin, 1988; Hauck, Fein, Waterhouse, & Feinstein, 1995; Lord, 1990; Lord & Magill, 1989; Lord & Magill-Evans, 1995; Sigman & Ruskin, 1999), although they initiate interactions with adults at rates comparable to chronological and mental age peers (Hauck *et al.*, 1995). Engagement with peers and success in initiating interactions reportedly increase with age (Lord & Magill-Evans, 1995). Nonetheless, how these difficulties in approaching and engaging peers translate into fewer friendships and lower levels of engagement in everyday social activities has not been addressed directly in past research, but is a primary focus of the present analysis.

### Peer Relationships and Social Activities Among Individuals with Autism

There is a growing body of literature on friendships in children and adolescents with autism, with research indicating that such children and adolescents rarely develop typical peer relationships (Koning & Magill-Evans, 2001; Le Couteur *et al.*, 1989; Marks, Schrader, Longaker, & Levine, 2000). Other research showed that even among those who have developed friendships, there often is great difficulty defining what a friend is and report greater feelings of loneliness compared to typically developing children (Bauminger & Kasari, 2000). Although higher functioning children and adolescents with autism are more likely to report having friendships than children who have less developed skills, their friendships are often focused on common and circumscribed interests with little social interaction involved (Bauminger & Kasari, 2000; Church, Alinsanski, & Amanullah, 2000).

Longitudinal research indicates that during adolescence, many individuals with autism show increased interest in social relationships, accompanied by continued development of social skills (Mesibov, 1983; Mesibov & Handlan, 1997; Rutter, 1970; Volkmar & Klin, 1995). Further, there is evidence that the ability to relate to adults, such as teachers and parents, improves during adolescence (Travis & Sigman, 1998; Volkmar, 1987). Yet, the majority of individuals continue to have great difficulty in the social realm into adolescence and adulthood (Church *et al.*, 2000; DeMyer, Hingtgen, & Jackson, 1981; Seltzer, Krauss, Shattuck, Orsmond, Swe, & Lord, 2003). Specific data are provided by Howlin, Mawhood, and Rutter (2000) who conducted a follow-up

study of 19 individuals with autism when they were young adults (mean age 23 years). Only three (16%) of these individuals were described to have one or more friends of roughly their own age with which they shared a variety of interests and social activities. One-third (32%) of the individuals had acquaintances with whom they talked or shared activities in arranged social groups, but with whom they did not have contact otherwise. Almost half of the individuals (47%) were reported to have no particular friends with whom they shared activities.

Another recent study on social development in adults with autism focused on the quality of life and independence of residents in a group home (Persson, 2000). A small number of men who were participating in a TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children) model program were followed over a two-year period. They showed improvements over time in interpersonal behavior, independent functioning, and vocational skills, but not in leisure skills or functional communication in the work setting (Persson, 2000). Thus, we know very little about the context of social activities among adults with autism, and about the factors that may influence their participation in social activities.

### Characteristics Associated with Peer Relationships and Social Activities

Much of the research on the social interactions and friendships of individuals with autism has focused on the extent to which the defining characteristics of autism, such as language skills and stereotyped behavior, are associated with social relationships. For example, research has shown that individuals with autism who have less developed verbal abilities make fewer initiations to peers (Hauck *et al.*, 1995; Sigman & Ruskin, 1999; Stone & Caro-Martinez, 1990), which may diminish the potential for friendships. Similarly, prior research has indicated a negative relation between stereotypical behaviors and engagement in social activities for individuals with autism (Duncan, Matson, Bamburg, Cherry, & Buckley, 1999; Lee & Odom, 1996; Lord & Hopkins, 1986).

Few studies have investigated age-related changes in social relationships, particularly through adulthood. An age-related abatement of symptoms of autism in adulthood has been reported by several investigators (Piven, Harper, Palmer, & Arndt,

1996; Seltzer *et al.*, 2003; Venter, Lord, & Schopler, 1992). This research does not address, however, whether a change in symptom presentation affects the social functioning of the person in everyday life. Additional individual factors, such as being female (Krauss, Seltzer, & Goodman, 1992) and having better daily living skills (Krauss *et al.*, 1992; Ruble & Dalrymple, 1996) have been shown to positively influence social relationships in adults with disabilities.

Whereas studies have examined individual level factors affecting the social lives of individuals with autism, few researchers have examined the impact of environmental factors. One major environmental influence is the family. Research on families of adults with mental retardation has shown that the mother plays a central orchestrating role in the social lives of her son or daughter (Krauss *et al.*, 1992; Seltzer & Krauss, 1999; Seltzer, Krauss, Orsmond, & Vestal, 2002). All of the sample members in the present analysis co-reside with their mother (and in many cases, with their father), and thus, the social lives of their mothers may well have a spillover effect on the social lives of the adolescents and adults with autism.

In addition to the potential influence of the social lives of their mothers, the service context may influence the social lives of adolescents and adults with autism. Many individuals with autism participate in community-based services (e.g., educational, therapeutic, vocational programs, etc.), which may provide opportunities for peer relationships and social activities. Further, the current emphasis on inclusive educational programs, where children with autism are educated with other children without disabilities, also may provide an important environmental context for the development of social skills, the formation of peer relationships, and engagement in varied social activities.

This paper examines the social lives of adolescents and adults with autism who live at home by addressing three research questions. First, what types of peer relationships do adolescents and adults with autism have? Second, how frequently do adolescents and adults with autism participate in various social and recreational activities? And third, what individual and environmental factors are predictive of having peer relationships and of participation in social and recreational activities? We hypothesized that both individual and environmental factors would be predictive of having peer relationships and greater participation in social and

recreational activities. Specifically, we hypothesized that having peer relationships and greater participation in social and recreational activities would be predicted by being an adolescent (vs. an adult), and by having more developed verbal skills, fewer social impairments, and fewer disruptive behaviors. Furthermore, we expected the environmental factors of receiving a greater number of community-based services, and being in inclusive (as opposed to segregated) educational settings would be predictive of both outcomes. Finally, we predicted that having a socially engaged mother would be predictive of the adolescent or adult's participation in social and recreational activities.

## METHOD

### Participants

Participants included a subsample of the families of 407 adolescents and adults with an autism spectrum disorder who are participating in an ongoing (four-wave) longitudinal study. Data for this analysis are from the first wave of data collection. The 407 individuals reside in two states (203 in Wisconsin and 204 in Massachusetts). Families who volunteered to participate in the ongoing study were recruited via agencies, schools, diagnostic clinics, and the media. Identical recruitment procedures were used in the two states.

The families in the longitudinal study met the following three initial criteria: (1) the son or daughter was age 10 or older; (2) he or she had received a diagnosis on the autism spectrum from a medical, psychological, or educational professional, as reported by their parents; and (3) administration of the Autism Diagnostic Interview—Revised (ADI-R; Lord, Rutter, & Le Couteur, 1994) confirmed the parental report of an autism spectrum disorder.

The sample for the present analysis included a subsample ( $n = 235$ ) of the 407 adolescents and adults and their families who met the following three additional criteria: (1) the adolescent or adult met the criteria for autism (excluding those with profiles of other autism spectrum disorders such as Asperger's disorder and PDD-NOS) according to administration of the ADI-R (Lord *et al.*, 1994), (2) the adolescent or adult with autism was living in the parental home, and (3) the mother was the primary respondent in the interview. Twenty-two individuals were eliminated from the analyses

because they did not meet the full criteria for Autistic Disorder on the ADI-R based on the "lifetime" algorithm score. We restricted the sample to those living with their parent(s) because that is the group for whom data on social and recreational activities were collected. Accordingly, an additional 134 families were eliminated from the analyses because the adolescent or adult was living outside the parental home. Finally, we included only those families in which the mother was the primary respondent in our study because previous research (Krauss *et al.*, 1992) suggested the importance of the mother's role in her son or daughter's social life. Eight additional families were eliminated from the analyses because the father was the primary respondent for the interview.

Selecting only one child from families with multiple siblings with autism resulted in the loss of an additional eight sample members. In three of these families with siblings participating in our study, we chose the older of the two children for the present analysis. In four cases of twins and one case of triplets, one individual was randomly chosen. In two additional cases of twins, one child was living at home, while the other had moved out of the parental home; for this analysis we retained the data on the child living at home.

These 235 adolescents (ages 10–21,  $n = 185$ ) and adults (ages 22–47,  $n = 50$ ) with autism in the sample ranged in age from 10 to 47 years, with a mean age of 19 years. The majority of the sample members were male (73%), reflective of the higher prevalence of autism in males compared with females (APA, 2000). The mothers ranged in age from 32 to 79 years, with a mean age of 48 years. Sample characteristics are shown in Table I for the two age groups (i.e., adolescents and adults). Chi-square or *t*-test analyses indicated that adolescents and adults differed significantly on each of these variables, with the exception of gender and competitive employment. Adolescents were typically at school during the day, while about one-third of the adults were in supported employment, another third attended a day activity program, and one-quarter worked in sheltered workshops. Adolescents and adults were equally likely to have a competitive job (about 10% of the sample). Not unexpectedly, a greater number of adolescents (85%) were partially or fully included with their peers during school, while a smaller number of adults (52%) had been included with peers while they were in school. The mothers of the adults with autism were older, less likely to be married, and less likely to be employed than the mothers of adolescents.

Table I. Sample Characteristics

	Adolescents ( $n = 185$ )	Adults ( $n = 50$ )	$\chi^2$ or <i>t</i> -test
Chronological age			
<i>M</i> ( <i>SD</i> )	15.48 (2.82)	30.74 (7.56)	14.02*
Range	10–21	22–47	
Gender	75.7% male	62.0% male	3.72
Current day activity (not mutually exclusive categories)			
School	93.4%	4.3%	158.80*
Competitive job	7.7%	10.6%	0.43
Supported employment	11.0%	38.3%	20.13*
Sheltered workshop	1.6%	25.5%	34.81*
Day activity program	3.3%	34.0%	40.66*
No work or school	0.5%	6.0%	6.92**
Inclusion in school (% partial or full)	85.1%	52.1%	24.21*
Mother's age			
<i>M</i> ( <i>SD</i> )	44.43 (5.75)	59.64 (9.45)	10.85*
Range	32–66	44–79	
Mother's marital status	87.0% married	68.0% married	10.09**
Mother's employment status (full or parttime)	73.5% employed	50.0% employed	10.09**

\* $p < .001$ , \*\* $p < .01$ .

## Measures and Procedure

### *Friendships and Peer Relationships*

The mother provided all data during home interviews or during completion of self-administered questionnaires. Mothers of individuals with autism reported on their son or daughter's friendships and peer relationships as part of the ADI-R. The ADI-R is a standardized investigator-based interview conducted with a primary caregiver that is based on the International Classification of Diseases criteria for autism (ICD-10; World Health Organization, 1992), and closely parallels the DSM-IV criteria (APA, 1994). The interviewer codes behavioral descriptions given by the caregiver as: 0 (no abnormality), 1 (possible abnormality), 2 (definite autistic type abnormality), and 3 (severe autistic type abnormality). For the peer relationship item, the following four qualities have to be met for a relationship to qualify as a "friendship": the relationship has to be with someone in approximately the same age group, the activities that they do together have to be varied, the activities that they do together have to take place outside of prearranged groups, and there has to be reciprocity and mutual responsiveness in the relationship. A code of '0' is given when all four criteria are met. A code of '1' is given when the individual has a relationship that involves some shared activities outside a prearranged setting, but not all four criteria are met; a code of '2' indicates peer relationships but only in group settings; and a code of '3' indicates the absence of peer relationships.

### *Social and Recreation Activities*

Mothers reported on their son's or daughter's social and recreational activities on a modified version of a measure developed for the National Survey of Families and Households (Bumpass & Sweet, 1987). Mothers rated the frequency of participation of her son or daughter in social and recreational activities on a scale from 0 (less than yearly or never) to 3 (at least once a week). Nine activities were examined: (1) socializing with school or work friends, (2) socializing with friends or neighbors, (3) socializing with relatives, (4) participating in group recreational activities, (5) attending religious services, (6) attending social events at religious settings, (7) working on a hobby, (8) taking a walk or other exercise, and (9) taking overnight trips or traveling.

### *Individual Characteristics*

Two demographic characteristics of the individuals with autism were included in the analysis: age group (adolescent or adult) and gender. Four measures of individual functioning were also included. Independence in activities of daily living was measured using the Revised ADL Index (Seltzer & Krauss, 1989). For each of 20 items covering the domains of personal care, housekeeping, meal preparation, and mobility and community interaction, mothers rated their son's or daughter's level of independence, on a scale of 2 (does task independently), 1 (does task with help), or 0 (does not do task at all). For this analysis, the score represented the sum of the ratings on the 20 items (ranging from 3 to 40).

Behavior problems were assessed with the Inventory for Client and Agency Planning (ICAP; Bruininks, Hill, Weatherman, & Woodcock, 1986). On this measure, mothers reported the presence or absence of eight behavior problems in three domains (internalizing, asocial, and externalizing behaviors). Internalizing behaviors consisted of three behaviors: behavior that was hurtful to self, unusual, and withdrawn. Asocial behaviors included socially offensive behaviors and uncooperative behaviors. Finally, externalizing behaviors included behavior that was hurtful to others, destructive to property, and disruptive. The count of the number of behavior problems present within each of these domains was used for the analysis.

Impairments in language skills were represented by a summary item from the ADI-R describing the overall current level of language, with a score of '0' indicating daily use of phrases or full sentences to communicate, a score of '1' indicating primarily single words or two-word phrases, and a score of '2' for individuals who are essentially non-verbal. Thus, higher scores indicated greater impairment in language skills.

A measure of impairment in reciprocal social interaction was also derived from the ADI-R using the sum of the ratings for the 14 items measuring qualitative impairment in reciprocal social interaction (direct gaze, social smiling, range of facial expression, interest in people, response to others' approaches, friendships, directing attention, offering to share, sharing enjoyment with others, use of other's body, offering comfort, quality of social overtures, inappropriate facial expressions, and appropriateness of social response). Alpha reliability for this measure in our sample was .82.

### *Environmental Factors*

We included three environmental factors that potentially could influence peer relationships and the level of participation in social and recreational activities: the mother's engagement in social and recreational activities, the number of services received by the son or daughter, and whether or not the son or daughter was included with non-disabled peers while in school. Mothers reported on their participation in the nine social and recreational activities described above (Bumpass & Sweet, 1987). To create a summary variable, we calculated the number of activities the mother engaged in at least several times a year. The services variable was calculated by summing the number of services received by the son or daughter and included: physical therapy, occupational therapy, speech and language therapy, psychological or psychiatric services, crisis intervention program, agency sponsored recreational or social activities, transportation services, income support, and respite services (range was 0–9 with an average of 3.7 services). The inclusion variable was a dichotomous variable representing whether the son or daughter has or had either full or partial inclusion (coded as 1) while in school or whether they had no inclusion (coded as 0).

### **Data Analysis**

The first two research questions included descriptive analyses of the frequencies of the different types of peer relationships and of participation in the nine different social and recreational activities in our sample members. The third research question was analyzed by two multiple regression analyses. We conducted a logistic regression analysis to examine the individual and environmental factors predictive of whether or not the person with autism had peer relationships (where '0' indicated having no peer relationships and '1' indicated any level of peer relationship). We conducted an OLS regression analysis to examine the individual and environmental factors predictive of the frequency of participation in social and recreational activities. For this analysis, we summed the number of social and recreational activities in which the individual participated at least several times a year.

The individual factors analyzed in these regression models included age group, gender, independence in ADL's, internalizing behaviors, a social

behaviors, externalizing behaviors, impairments in language skills, and impairments in social interaction skills. The environmental factors analyses included the mother's participation in social and recreational activities, number of services received, and inclusion with peers while in school.

## **RESULTS**

### **Peer Relationships of Individuals with Autism**

As noted earlier, four different levels of peer relationships were measured. The stringent ADI-R criteria for defining a friendship included having a same aged friend with whom varied, mutually responsive, and reciprocal activities were engaged in outside of organized settings. We found that only 19 individuals (8.1%) of the sample had at least one friendship that met these criteria. About a fifth (20.9%) were reported to have at least one peer relationship that involved some activities outside of a prearranged setting, while a quarter (24.3%) were reported to have peer relationships only in prearranged settings. Importantly, almost half (46.4%) of the sample was reported to have no peer relationships that met any of these criteria—i.e., these individuals had no same aged friends with whom they had a reciprocal relationship either within or outside of prearranged settings.

### **Frequency of Social and Recreational Activities**

Next, we examined the pattern of participation in each of the social and recreational activities (see Table II). In contrast to the measure of peer relationships, which included specific criteria regarding the nature or context of the relationship, this measure of social or recreational activity focused solely on frequency of participation—regardless of the context or intensity of the participation level. The most common activity (at least once a week) was walking or getting exercise, for which almost three quarters of the sample (74.5%) were active. Almost half (41.3%) engaged in a hobby on a weekly basis. Importantly, both of these recreational activities can be pursued independently, without companions or friends.

About a third of the sample participated in group recreational activities (38.5%) or attended religious services (30.6%) on a weekly basis. Both of

Table II. Frequencies of Social and Recreational Activities

	At least once a week (%)	Once or twice a month (%)	Several times a year (%)	Less than yearly (%)
Walk or get exercise	74.5	9.8	8.1	6.0
Work on a hobby	41.3	3.0	6.8	47.2
Participating in group recreational activities	35.3	23.4	27.7	11.9
Attend religious services	30.6	8.9	14.9	44.3
Socializing with relatives	22.6	21.7	40.4	14.5
Socializing with friends or neighbors	20.9	17.9	24.7	35.3
Socializing with school or work friends	13.2	12.8	24.7	47.7
Attend social events at religious settings	4.3	6.4	31.1	57.4
Take overnight trips or travel	0	7.7	62.6	28.1

these activities are typically scheduled in advance or on a predictable basis and participation in both may be facilitated by others, such as professionals or parents.

Fewer sample members participated at least weekly in varied, informal socializing activities—with relatives (22.6% at least weekly), friends (20.9%), or with people from school or work (13.2%). Attending social events at religious services and taking overnight trips were relatively rare events (both of which presumably are aided by family members rather than peer relationships). These findings regarding participation in social and recreational events are consistent with the low frequency of friendships reported earlier and reflect the significant correlation ( $r = .395$ ,  $p < .001$ ) between these two measures of the social world of individuals with autism.

#### Individual and Environmental Factors Predictive of Peer Relationships and Participation in Social and Recreational Activities

Logistic regression analysis was used to investigate the individual and environmental variables predictive of having a peer relationship (i.e., having a same aged friend with whom some activities are shared in at least a group setting). To create the dependent variable, the ADI-R peer relationship variable was re-coded such that a '0' indicated a lack of peer relationships ( $n = 109$ ) and a '1' indicated peer relationships at least in group settings ( $n = 125$ ).

Intercorrelations among these independent variables and the dependent variables used in the

regression analyses are presented in Table III. The results of the logistic regression predicting peer relationships are presented in Table IV. Note that this dependent variable measuring the likelihood of having a peer relationship is distinct in operational definition from having a friend, as the latter requires varied, mutually responsive and reciprocal activities outside of an arranged setting.

With respect to individual characteristics, age group, and impairment in social interaction skills predicted having peer relationships. Adolescents (vs. adults) and individuals with less impairment in social interaction skills were more likely to have peer relationships. None of the environmental factors examined was a significant predictor of having peer relationships. We also examined whether age group interacted with any of the other independent variables to predict peer relationships. No interaction terms were significant.

Next, OLS multiple regression analysis was used to investigate individual and environmental factors predictive of participation in social and recreational activities. The results are presented in Table V. Both individual and environmental factors were significant predictors. Greater participation in social and recreational activities was predicted by greater independence in activities of daily living, a greater number of internalizing behavior problems, less impairment in reciprocal social interaction skills, a greater number of services received, greater maternal participation in social and recreational activities, and inclusion while in school. We also examined whether age group interacted with any of the other independent variables to predict participation in social and recreational activities. No interaction terms were significant.

Table III. Pearson Product-Moment Correlations of Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age group (0 = adolescents, 1 = adults)	—													
2. Gender (0 = male, 1 = female)	.126	—												
3. Independence in ADLs	-.018	-.059	—											
4. Number of internalizing behaviors	-.027	.142*	-.101	—										
5. Number of asocial behaviors	-.146*	.067	-.168*	.198**	—									
6. Number of externalizing behaviors	-.210**	.118	-.142*	.317**	.556**	—								
7. Impairment in language skills	.147*	-.027	-.429**	-.016	-.019	-.043	—							
8. Impairment in social interaction skills <sup>a</sup>	.185**	.020	-.414**	.200**	.136*	.008	.412**	—						
9. Impairment in social interaction skills <sup>b</sup>	.175**	.015	-.405**	.210**	.152*	.020	.394**	.994**	—					
10. Mother's total social activities	.047	.022	.124	-.066	-.013	-.039	-.009	-.106	-.114	—				
11. Number of services received	-.107	.116	-.381**	.140*	.180**	.156*	.247**	.149*	.144**	-.088	—			
12. Inclusion in school (0 = none, 1 = full or partial)	-.325**	-.142*	.134*	-.034	.046	-.005	-.228**	-.306**	-.304**	.118	-.114	—		
13. Peer relationships (0 = none, 1 = some)	-.224**	-.004	.233**	-.011	.046	.027	-.303**	-.458**	-.414**	.076	.014	.170*	—	
14. Son or daughter's total social activities	-.079	.059	.306**	.072	.005	-.013	-.259**	-.358**	-.343**	.509***	-.012	.293**	.395**	—

<sup>a</sup>Impairment in social interaction skills includes all 14 items from ADI-R domain.

<sup>b</sup>Impairment in social interaction skills includes 13 items from ADI-R domain (excludes the friendship item).

\* $p < .05$ , \*\* $p < .001$ , \*\*\* $p < .01$ .

Table IV. Logistic Regression for Prediction of the Presence of Peer Relationships (0 = no peer relationships; 1 = peer relationships)

	B (unstandardized)	SE
<i>Individual Factors</i>		
Age group <sup>a</sup>	-.941*	.425
Child gender <sup>a</sup>	.111	.365
Independence in ADLs	.025	.027
Internalizing behaviors	.254	.224
Asocial behaviors	.289	.260
Externalizing behaviors	-.165	.181
Impairment in language skills	-.426	.255
Impairment in social interaction	-.175**	.039
<i>Environmental Factors</i>		
Number of services received	.156	.093
Mother's social and recreational activities	.074	.099
Inclusion in school	-.016	.419
$\chi^2$ (df = 11)	61.90**	

<sup>a</sup>Age group (0 = adolescent; 1 = adult); gender (0 = male; 1 = female).

\* $p < .05$ , \*\* $p < .001$ .

Table V. Regression Coefficients for Variables Predicting Social and Recreational

	B
<i>Individual Factors</i>	
Age group <sup>a</sup>	.003
Child gender <sup>a</sup>	.043
Independence in ADLs	.166*
Internalizing behaviors	.162*
Asocial behaviors	.034
Externalizing behaviors	-.074
Impairment in language skills	-.083
Impairment in social interaction	-.219*
<i>Environmental Factors</i>	
Number of services received	.152*
Mother's participation in social and recreational activities	.465**
Inclusion in school	.156*
R <sup>2</sup>	.445**

<sup>a</sup>Age group (0 = adolescent; 1 = adult); gender (0 = male; 1 = female)

\* $p < .01$ , \*\* $p < .001$ .

DISCUSSION

This study provides new insights into the social lives of adolescents and adults with autism. First, very few adolescents and adults with autism were reported to have friendships with same-aged peers

that included a variety of activities, were reciprocal in nature, and occurred outside of prearranged settings (8%). The low rate of friendships in our sample is consistent with other reports of the rates of friendship in this population (Howlin *et al.*, 2000). Indeed, in almost 50% of our sample, the individual with autism was reported to have no peer relationships outside of pre-arranged settings (such as school, work, or other arranged social groups). These findings underscore the primacy of social deficits observed in autism and as outlined in diagnostic criteria (APA, 2000), and their continuity in adolescence and adulthood.

Yet, we do not know whether individuals with autism and related disorders desire or are motivated to form friendships, or rather, whether their lack of friendships reflects lack of interest in the social world. The phenomenological research available on friendships in autism comes from studies of high-functioning children with autism and indicates that they experience greater feelings of loneliness, a poor understanding of their loneliness, and a lower quality of companionship in the friendships that they have (Bauminger & Kasari, 2000). The data from the present study indicate that difficulty developing and maintaining friendships persists well into adulthood for individuals with autism. Our data also indicate that the impairments associated with autism are impediments to the development of peer relationships; the more severe the impairments in social skills, the less likely it is for an individual to form peer relationships.

With respect to social and recreational activities, we found different rates of participation for different types of activities. Interestingly, the two recreational activities that do not necessarily require social interaction were the most commonly engaged in by the members of the present sample. Taking a walk or getting some other form of exercise was the most frequent activity, with three-quarters of the sample (74.5%) engaging in exercise at least weekly. Also, nearly half (41.3%) of the sample worked on a hobby at least weekly, which is not surprising given that many individuals with autism have intense interests and preoccupations that could be viewed as hobbies. However, an equal number (47.2%) were reported almost never to work on hobbies.

Participation in organized events—such as attending religious services or participation in group recreational activities—was fairly common. About a third of the sample participated weekly in group

recreational activities (and over half do so at least once or twice a month), while slightly less than a third attend religious services weekly. Both of these activities may well reflect parental efforts to provide typical social or cultural events for their son or daughter with autism.

More casual social activities—such as socializing with relatives, friends, neighbors, or school and work friends—were less commonly engaged in. These activities may be facilitated by family members (particularly with respect to socializing with neighbors and relatives), by teachers or service providers (particularly with respect to socializing with school or work friends), or by the individuals with autism themselves (particularly with respect to socializing with friends). Our data do not include specific information on how such activities are orchestrated, so the level of individual motivation to engage in these common forms of social interactions remains unknown.

We did examine individual and environmental factors that were predictive of peer relationships and participation in social and recreational activities for our sample of adolescents and adults with autism. Peer relationships were predicted solely by individual characteristics associated with autism (fewer social impairments) and by age group (being an adolescent). While these findings are consistent with the literature, we were surprised that the environmental factors we investigated were not significant predictors of having a peer relationship. This pattern of individual but not environmental predictors points to the durability of the core social deficit of autism throughout the life course. We were particularly intrigued that whether or not the individual is or was educated in an inclusive setting (i.e., with children who did not have disabilities) was unrelated to having peer relationships. This finding warrants additional research to explore the short- and long-range implications of school inclusion on the ability to form peer relationships and the likelihood of having friends beyond the school setting and the school years.

In contrast, we found that participation in social and recreational activities was sensitive to environmental factors, in addition to individual characteristics. Rates of participation in social and recreational activities were a function of not only the individual's social impairments, but also the extent to which their mothers participated in similar activities, and the service context. As expected, adolescents and adults with autism who had greater

functional independence and less social impairment were more likely to participate in social and recreational activities. Yet, counter to our expectations, another characteristic often associated with autism—the presence of internalizing behavior problems—was associated with a *greater* participation in social and recreational activities. It may be that internalizing behavior (such as being withdrawn) may even facilitate participation in social and recreational activities. That is, individuals who are withdrawn may be able to be taken to social activities without active resistance, whereas other individuals with autism may more actively avoid social contexts.

For our sample of individuals with autism, we also observed the central role that the mother played with respect to her son's or daughter's social and recreational activities. Adolescents and adults with autism were more likely to participate in social and recreational activities if their mother reported that she herself participated in similar activities. There are at least two possible explanations for this finding. It may be that mothers are participating together with their sons or daughters in the activities. Alternatively, mothers who have higher rates of participation in such social and recreational activities may create a family climate that values and encourages participation in social activities. Nevertheless, both explanations point to the importance of the mother's role in encouraging and facilitating her son or daughter to develop and maintain an active social life.

The service context also played a role in the social and recreational activities of individuals with autism. Receiving a greater number of services and being educated in a fully or partially inclusive school environment were both associated with greater participation in social and recreational activities. These findings suggest that there may be spillover effects of the provision of community-based services for adolescents and adults with autism that enlarge their social worlds. While inclusion in school was not predictive of having peer relationships, its influence on participation in social and recreation activities may imply that including children with disabilities within the typical classroom sets the stage for greater participation of individuals with autism in a variety of non-school based activities.

There are several limitations of the study that warrant comment. First, participants in the study are volunteers and may not be representative of the

full population of adolescents and adults with autism. Notably, all the sample members in the present analysis co-reside with their parent(s) and thus, the peer relationships and social activities of individuals with autism who reside in other community or institutional settings may well differ from our results. Also, all of our data were obtained from the mother. The sample members may have had peer relationships in school or work about which the mother was less familiar. Future studies need to obtain information directly from the individuals with autism to examine their own perspectives on their social lives and friendships.

Counterbalanced against these limitations are several strengths of the current study. First, in contrast to much of the literature in this area, our study includes a large cohort of adolescents and adults with autism, lending greater confidence in the validity of the results. Second, we examined both individual and environmental factors associated with peer relationships and social and recreational activities. Inclusion of a multidimensional perspective on the social world of adolescents and adults with autism is an important challenge for future research. Third, our study is one of the first to examine the social lives of individuals with autism beyond the childhood period. The inclusion of adults within this research extends the current literature into a life stage that is rarely examined, but one that has increasing interest for families, service providers, and researchers.

The present findings suggest implications for interventions aimed at increasing peer relationships and participation in social and recreational activities in persons with autism. Much effort has been directed at improving the social skill deficits observed in individuals with autism, with the hope of increased success in developing and maintaining friendships and participating in the social world (e.g., Lord, 1990; Oke & Schreibman, 1990; Williams, 1989). Our data suggest that such programs should promote actual participation in social and recreational activities, but studies evaluating the effectiveness of such social skills training programs have generally not examined outcomes such as friendships and participation in daily social activities (Snell & Vogtle, 1997). This is fertile ground for future research.

For both the adolescents and adults with autism, there was evidence that supporting the family in their quest to maintain their own social relationships may have important ripple effects on the

social lives of the individual with autism. As is observed in much of the research on families of individuals with disabilities, the mother plays a particularly large role in the continuing development of her son or daughter throughout the life course and into adulthood, and is critical in providing both opportunity and structure for her adolescent or adult child to participate in society to the fullest extent. Thus, there is much to be learned in future research regarding how the social worlds of mothers and their offspring with disabilities are complementary and synergistic.

#### ACKNOWLEDGMENT

Support for this research was provided by the National Institute on Aging (Grant No. R01 AG08768), the National Institute of Disability and Rehabilitation Research via the Rehabilitation Research and Training Center on Aging with Developmental Disabilities at the University of Illinois at Chicago, and the Graduate School of the University of Wisconsin-Madison. We also thank the families who participated in this research.

#### REFERENCES

- American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, D.C.: Author.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, D.C.: Author.
- Attwood, A., Frith, U., & Hermelin, B. (1988). The understanding and use of interpersonal gestures by autistic and Down's syndrome children. *Journal of Autism and Developmental Disorders*, 18, 241–257.
- Bauminger, N., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71, 447–456.
- Bruininks, R. H., Hill, B. K., Weatherman, R. F., & Woodcock, R. W. (1986). *Inventory for client and agency planning*. Allen, TX: DLM Teaching Resources.
- Bumpass, L., & Sweet, J. (1987). *A national survey of families and households*. Madison, WI: Center for Demography and Ecology, University of Wisconsin-Madison.
- Church, C., Alinsanski, S., & Amanullah, S. (2000). The social, behavioral, and academic experiences of children with Asperger syndrome. *Focus on Autism and other Developmental Disabilities*, 15, 12–20.
- DeMyer, M. K., Hingtgen, H., & Jackson, K. (1981). Infantile autism reviewed: A decade of research. *Schizophrenia Bulletin*, 7, 388–451.
- Duncan, D., Matson, J. L., Bamburg, J. W., Cherry, K. E., & Buckley, T. (1999). The relationship of self-injurious behavior and aggression to social skills in persons with severe and profound learning disability. *Research in Developmental Disabilities*, 20, 441–448.
- Hauck, M., Fein, D., Waterhouse, L., & Feinstein, C. (1995). Social initiations by autistic children to adults and other children. *Journal of Autism and Developmental Disorders*, 25, 579–595.
- Howlin, P., Mawhood, L., & Rutter, M. (2000). Autism and developmental receptive language disorder—a follow-up comparison in early adult life. II: Social behavioural, and psychiatric outcomes. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 41, 561–578.
- Konging, C., & Magill-Evans, J. (2001). Social and language skills in adolescent boys with Asperger syndrome. *Autism*, 5, 23–36.
- Krauss, M. W., Seltzer, M. M., & Goodman, S. J. (1992). Social support networks of adults with mental retardation who live at home. *American Journal on Mental Retardation*, 96, 432–441.
- Le Couteur, A., Rutter, M., Lord, C., Rios, P., Robertson, S., Holdgrafer, M., & McLennan, J. (1989). Autism diagnostic interview: A standardized investigator-based instrument. *Journal of Autism and Developmental Disorders*, 19, 363–387.
- Lee, S., & Odom, S. L. (1996). The relationship between stereotyped behavior and peer social interaction for children with severe disabilities. *The Journal of the Association for Persons with Severe Disabilities*, 21, 88–95.
- Lord, C. (1990). A cognitive behavioral model for the treatment of social-communicative deficits in adolescents with autism. In R. J. McMahon & R. DeV. Peters (Eds.), *Behavior disorders of adolescence: Research, intervention, and policy in clinical and school settings* (pp. 155–174). New York: Plenum Press.
- Lord, C., & Hopkins, J. M. (1986). The social behavior of autistic children with younger and same-age nonhandicapped peers. *Journal of Autism and Developmental Disorders*, 16, 249–262.
- Lord, C., & Magill-Evans, J. (1995). Peer interactions of autistic children and adolescents. *Development and Psychopathology*, 7, 611–626.
- Lord, C., Rutter, M., & Le Couteur, A. (1994). Autism Diagnostic Interview—Revised: A revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders*, 24, 659–685.
- Lord, C., Rutter, M., Goode, S., Heemsbergen, J., Jordan, H., Mawhood, L., & Schopler, E. (1989). Autism Diagnostic Observation Schedule: A standardized observation of communicative and social behavior. *Journal of Autism and Developmental Disorders*, 19, 185–212.
- Marks, S., Schrader, C., Longaker, T., & Levine, M. (2000). Portraits of three adolescents students with Asperger's syndrome: Personal stories and how they can inform practice. *The Journal of the Association for Persons with Severe Handicaps*, 25, 3–17.
- Mesibov, G. B. (1983). Current perspectives and issues in autism and adolescence. In E. Schopler & G. B. Mesibov (Eds.), *Autism in adolescents and adults* (pp. 37–53). New York: Plenum Press.
- Mesibov, G. B., & Handlan, S. (1997). Adolescents and adults with autism. In D. J. Cohen & F. R. Volkmar (Eds.), *Handbook of autism and pervasive developmental disorders* (2nd ed., pp. 309–322). New York: John Wiley & Sons.
- Oke, N. J., & Schreibman, L. (1990). Training social initiations to a high-functioning autistic child: Assessment of collateral behavior change and generalization in a case study. *Journal of Autism and Developmental Disorders*, 20, 479–497.
- Persson, B. (2000). Brief report: A longitudinal study of quality of life and independence among adult men with autism. *Journal of Autism and Developmental Disorders*, 30, 61–66.

- Piven, J., Harper, J., Palmer, P., & Arndt, S. (1996). Course of behavioral change in autism: A retrospective study of high-IQ adolescents and adults. *Journal of the American Academy of Child and Adolescent Psychiatry*, 35, 523–529.
- Ruble, L. A., & Dalrymple, N. J. (1996). An alternative view of outcome in autism. *Focus on Autism and other Developmental Disabilities*, 11, 3–14.
- Rutter, M. (1970). Autistic children: Infancy to adulthood. *Seminars in Psychiatry*, 2, 435–450.
- Seltzer, M. M., & Krauss, M. W. (1989). Aging parents with mentally retarded children: Family risk factors and sources of support. *American Journal on Mental Retardation*, 94, 303–312.
- Seltzer, M. M., & Krauss, M. W. (1999). Families of adults with Down syndrome. In J. F. Miller, M. Leddy, & L. A. Leavitt (Eds.), *Improving the communication of people with Down syndrome* (pp. 217–240). Baltimore: Brookes.
- Seltzer, M. M., Krauss, M. W., Orsmond, G. I., & Vestal (2001). Families of adolescents and adults with autism: Uncharted territory (pp. 267–294). In L. M. Glidden (Ed.), *International review of research on mental retardation* (Vol. 23). San Diego: Academic Press.
- Seltzer, M. M., Krauss, M. W., Shattuck, P., Orsmond, G. I., Swe, A., & Lord, C. (2003). Changes in the symptoms of autism in adolescence and adulthood. *Journal of Autism and Developmental Disorders*, 33, 565–581.
- Sigman, M., & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, Down syndrome, and developmental delays. *Monographs of the Society for Research in Child Development*, 64 (1, Serial No. 256).
- Snell, M. E., & Vogtle, L. K. (1997). Facilitating relationships of children with mental retardation in schools. In R. L. Schallack & G. N. Siperstein (Eds.), *Quality of life. Vol II: Application to persons with disabilities* (pp. 43–61). Washington, D.C.: American Association on Mental Retardation.
- Stone, W. L., & Caro-Martinez, L. M. (1990). Naturalistic observations of spontaneous communication in autistic children. *Journal of Autism and Developmental Disorders*, 20, 437–453.
- Travis, L. L., & Sigman, M. (1998). Social deficits and interpersonal relationships in autism. *Mental Retardation and Developmental Disabilities Research Review*, 4, 65–72.
- Venter, A., Lord, C., & Schopler, E. (1992). A follow-up study of high-functioning autistic children. *Journal of Child Psychology and Psychiatry*, 33, 489–507.
- Volkmar, F. R. (1987). Diagnostic issues in the pervasive developmental disorders. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 28, 365–369.
- Volkmar, F. R., Carter, A., Grossman, J., & Klin, A. (1997). Social development in autism. In D. J. Cohen & F. R. Volkmar (Eds.), *Handbook of autism and developmental disorders* (2nd ed., pp. 173–194). New York: John Wiley & Sons.
- Volkmar, F. R., Carter, A., Sparrow, S. S., & Cicchetti, D. V. (1993). Quantifying social development. *Journal of the American Academy of Child and Adolescent Psychiatry*, 32, 627–632.
- Volkmar, F. R., & Klin, A. (1995). Social development in autism: Historical and clinical perspectives. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from autism* (pp. 40–55). New York: Oxford University Press.
- Williams, T. I. (1989). A social skills group for autistic children. *Journal of Autism and Developmental Disorders*, 19, 143–155.
- World Health Organization (1992). *The ICD-10 classification of mental and behavioral disorders: Clinical descriptions and diagnostic guidelines*. Geneva: Author.