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Social Participation Among Young Adults with an Autism Spectrum Disorder

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Abstract

Investigating social participation of young adults with an autism spectrum disorder (ASD) is important given the increasing number of youth aging into young adulthood. Social participation is an indicator of life quality and overall functioning. Using data from the National Longitudinal Transition Study 2, we examined rates of participation in social activities among young adults who received special education services for autism (ASD group), compared to young adults who received special education for intellectual disability, emotional/behavioral disability, or a learning disability. Young adults with an ASD were significantly more likely to never see friends, never get called by friends, never be invited to activities, and be socially isolated. Among those with an ASD, lower conversation ability, lower functional skills, and living with parent were predictors of less social participation.

Keywords

autistic spectrum disorder; social participation; young adulthood

A recent epidemiological study in England indicated that the prevalence of autism spectrum disorders (ASDs) in adults is similar to the rates recently observed among children (approximately 1 in 100; Brugha et al., 2011). Researchers have documented that the communication and social impairments that characterize the disorder continue throughout adulthood (Billstedt, Gillberg, & Gillberg, 2007; Seltzer et al., 2011; Shattuck et al., 2007). Although investigators have begun to document young adults' involvement in work and school settings (Shattuck et al., 2012), little is known about these adults' participation in social settings. Describing the social participation of young adults with an ASD is important as it is a central aspect of their quality of life (Verdugo, Navas, Gómez, & Schalock, 2012), and reflects current theoretical views emphasizing "participation" as a desirable outcome for individuals with behavior and health conditions (World Health Organization, 2001).

The growing number of individuals with an ASD aging into young adulthood increases the urgency to describe and understand social participation outcomes in this population. Accordingly, the Interagency Autism Coordinating Committee (IACC) has called for research aimed at improving the quality of life and functioning of adults with autism, with

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the overall goal of enabling adults to lead fulfilling and productive lives in the community (IACC, 2012). In this study, we aim to provide one of the first descriptions of the extent of social participation or isolation among young adults with an ASD. This information is necessary for the planning of adult services that can meet the specific needs of this transition-age population.

Social outcomes in adults with an ASD have been documented through longitudinal follow-up studies as well as research examining quality of life in adulthood. This research suggests that adults with an ASD often experience social isolation (Orsmond, Krauss, & Seltzer, 2004), with approximately one-half to two-thirds of this population having no close friendships (Billstedt et al., 2007; Eaves & Ho, 2008; Howlin, Mawhood, & Rutter, 2000; Howlin, 2003; Howlin, Goode, Hutton, & Rutter, 2004; Liptak, Kennedy, & Dosa, 2011; Whitehouse, Watt, Line, & Bishop, 2009). When friendships do occur, they appear to be less close and supportive than in the general population (Baron-Cohen & Wheelwright, 2003). The rates for social participation in the community are also low. In studies of Canadian and European populations, fewer than half of adults with an ASD participated in social events in the community, such as attending church or special interest groups or participating in recreational activities that would provide social opportunities (Billstedt et al., 2007; Eaves & Ho, 2008; Howlin et al., 2000). With respect to the predictors of social participation, researchers have documented that individuals with higher cognitive and adaptive skills, however, are more likely to have meaningful social relationships (Farley et al., 2009; Howlin et al., 2004; Liptak et al., 2011).

Although this research literature is fairly consistent in describing the social difficulties of adults with an ASD, few studies have focused exclusively on young adulthood. This life stage represents a potentially crucial turning point in the maintenance and development of social relationships. Oftentimes, friendships from school are severed or require considerable effort to maintain in the context of less frequent personal contact. Alternately, individuals may have the opportunity to develop new friendships or meaningful social relationships in new settings, such as higher education, work, volunteer, or day programs. In prior research, the data presented have been from samples that include individuals from adolescence through middle adulthood. More specific knowledge about young adulthood outcomes will aid in transition planning from school-based to adult services. Additionally, few studies have included comparison groups, so we know little about the unique aspects of social isolation in young adults with an ASD, compared to other disability groups. Moreover, much of the extant information is also based on studies with small samples that are not racially and socioeconomically diverse, nor nationally representative.

In this paper, we present young adult social participation outcomes using data from a large nationally representative cohort study from the United States. We compare social participation in four groups of young adults who formerly received special education services for an ASD (special education designation of *autism*), intellectual disability (special education designation of *mental retardation*), emotional disturbance, and learning disability. Our selection of these comparison groups was both pragmatic and theoretical. These groups represent the largest disability populations receiving special education services, and thus our data includes large numbers and our findings are applicable to a large group of students. By comparing rates of social participation across different diagnostic groups, we will be able to determine if ASDs pose unique social challenges at this life stage, or whether disability more broadly contributes to social challenges. Based on prior research, we anticipated that young adults with an ASD would show higher rates of social isolation than the other disability groups.

We addressed three research questions: (1) What are the rates of participation in social activities among young adults with an ASD? (2) How do these participation rates compare to young adults with other types of disabilities? and (3) What personal and contextual factors are associated with limited social participation? In answering these research questions, we anticipate that our findings will provide important needed information that will raise awareness of the unique challenges that young adults with an ASD experience and provide a basis for framing the service and policy needs of this population at this life stage.

Method

Ethics Statement

Use of these data is governed by a data use agreement with the U.S. Department of Education and was deemed exempt by the Washington University Institutional Review Board.

Participants

The National Longitudinal Transition Study-2 (NLTS2) was a prospective study that collected data from multiple sources in five waves, two years apart, from 2001 to 2009. The study began with over 11,000 youth who were receiving special education services at baseline and followed them as they aged into young adulthood. The NLTS2 sampling plan was designed to yield nationally representative estimates that would generalize to all students who were receiving special education services and were 13 through 16 years old on December 1, 2000. This data set provides a unique opportunity to examine social participation in a racially and socioeconomically diverse sample that generalizes to the population.

This paper is primarily based on parent and student surveys collected for Wave 5, in 2009. Some covariates were not measured at Wave 5 and, thus, Wave 4 data were used where noted. Unweighted sample numbers in this report were rounded to the nearest ten, as required by the U.S. Department of Education. The multistage sampling procedure sampled school districts first and then students within districts (SRI International, 2000). Survey weights enable estimates to generalize to the national population of youth who were receiving special education services in the given age range and disability type. Weights were adjusted for attrition at each wave so that estimates always generalize to the same initial population. Full details of the weighting strategy for NLTS2 were previously published (Wagner, Kutash, Duchnowski, & Epstein, 2005).

We compared the social experiences of young adults with an ASD to those who had been served in other special education categories and who had also exited high school by Wave 5: intellectual disability (ID), emotional disturbance (ED), and learning disabilities (LD). The total number of young adults with ASD remaining in the study at Wave 5 was 660. We restricted analyses to those who were no longer in high school at the time of the interviews in 2009, reducing the number used for analysis to 620. We excluded 20 comparison group members (ID, ED, LD) from analyses who also had a parent report of ever receiving an autism-related diagnosis.

For each of these categories (ASD, ID, ED, and LD), determination of eligibility for special education services was made by each student’s school district. Thus, the groups represent young adults who received special education services using school-based criteria. Findings from this study should generalize to young adults who had received special education services through the autism eligibility category. Local schools deem students eligible and do not necessarily adhere to standardized clinical assessment or diagnostic guidelines. Thus, we use the term ASD throughout to refer to individuals who received special education services under the autism eligibility category, as they likely include students with Autistic Disorder, Asperger's Disorder and Pervasive Developmental Disorder – Not Otherwise Specified (PDD-NOS). Prior research has demonstrated that this labeling process results in very high specificity and moderate sensitivity (Bertrand et al., 2001; Yeargin-Allsopp et al., 2003).

Procedure

Parent/guardian telephone interviews were conducted in 2009. The interview began by identifying the adult who was best able to respond about the sampled youth. Parents/guardians reported on demographics and measures of impairment severity. They were then asked about the young adult's capacity for answering questions independently. If the parent/guardian indicated that the young adult would not be able to answer questions independently, the interview continued with parents, including the sequence of questions about social participation. If deemed capable by the parent/guardian respondent then youth or youth adult himself or herself was asked to respond to these questions.

Measures

We examined 3 measures of social activity and participation and 1 composite measure created from the 3 measures. Survey respondents were asked to think about "the past 12 months" when answering questions about social participation. Two questions, "getting together with friends" and "friends calling on the phone," were asked as six-category ordinal questions. The term "friends" was not defined for survey respondents. One question, "being invited to activities," was dichotomous. We created dichotomous indicators of limited social participation during the past 12 months for our logistic regression models: (1) never got together with friends; (2) friends never called on the phone; (3) was never invited to other friends' social activities; and (4) the created variable of "social isolation" (young adult never had any of these 3 forms of social participation during the past 12 months). We used this strategy in order to facilitate interpreting all 4 statistical models consistently as correlates of the complete absence of each type of social participation.

Demographic correlates included gender, age, ethnicity and race, and overall health status. Fewer than 10% of young adults with an ASD were living independently, so we also used parent/guardian household income as our measure of socioeconomic position. A 4-category ordinal question asked parents how well their child could carry on a conversation. A functional skills scale was constructed by summing eight 4-category (not at all well, not very well, pretty well, very well) questions about how well a youth could do the following tasks without help: tell time on an analog clock, read and understand common signs, count change, look up telephone numbers and use a telephone, get to places outside the home, use local public transportation, buy their own clothes, arrange plane or train trip out of town (Cronbach's alpha = .92 in the ASD group). Indicators of functional skill were not measured in wave 5 so wave 4 responses, collected from 2006–2007, were used instead.

The number of years since each young adult left high school (range 0–8 years in the ASD group) was collapsed into 4 categories (<1 – 2, 2 – 4, 4 – 6, 6 – 8). A composite variable indicating each young adult's current postsecondary educational enrollment status was created from 3 dichotomous survey questions (Is young adult currently attending any of the following: vocational/technical school, 2-year, or 4-year college?). Other current status variables were whether young adult was currently employed, where young adult resided (with parent, alone, or under supervision) and whether they utilized adult day services.

Data Analysis

Rates of missing data per variable ranged from 0% to 21%: household income (21%), functional skills scale (20%), years since high school (16%), social participation measures

(14–15%), and all remaining variables (< 8%). We imputed missing data using sequential regression in IVEware (2002; Version 0.1) to create 50 implicates with no missing values (Raghunathan, Lepkowski, Van Hoewyk, & Solenberger, 2001)

We accounted for the complex sampling and the multiple imputations using the "mi svy" procedures available in Stata v 12, which uses standard methods for pooling estimates in the analysis of multiply imputed data (Rubin, 1987). Univariate point estimates and 95% confidence intervals were computed for describing the covariates across 4 groups based on special education designation in high school (see Table 1). Unadjusted rates of social participation were compared across groups (see Table 2). We tested for the significance of differences between the young adults with an ASD compared with each other disability group using logistic regression with dummy coding. In Table 3, we reported odds ratios comparing rates of social participation in the other groups versus the ASD group, adjusting for covariates. Finally, we used logistic regression to estimate the adjusted association between correlates and the 4 indicators of limited social participation among the young adults with an ASD (see Table 4).

Results

Compared to young adults with other types of disabilities (see Table 1), those with an ASD were more likely to be male, more concentrated in the highest income category, had a higher rate of significant conversational impairment, and were more likely to live with a parent/guardian or under supervision. The rate of Hispanic ethnicity was similar for ASD and ID but lower than ED and LD.

Young adults with an ASD were significantly more likely to *never see friends* (38.6%), *never get called by friends* (47.2%), and *never be invited to activities* (48.1%) compared to other groups (see Table 2). The rate of being *socially isolated* (no participation in any of the three activities) in the ASD group (28.1%) ranged from 3 to 14 times higher than other groups. After controlling for other covariates (see Table 3), adjusted odds ratios predicting social participation outcomes revealed that young adults with an ASD had significantly higher odds of friends never calling and of being socially isolated compared to all three disability comparison groups. Additionally, young adults with ASD had higher adjusted odds of never seeing friends compared to young adults in the ID and LD groups. Finally, young adults with ASD had higher adjusted odds of never being invited to activities compared to young adults from the LD group. Focusing on the young adults with ASD (see Table 4) those with more limited conversation ability had significantly higher odds of friends never calling and of being socially isolated. Young adults with lower functional skills also had significantly higher odds of friends never calling. Those who were not living independently had higher odds of never seeing friends.

Discussion

This study examined the social participation outcomes from a nationally representative U.S. sample of young adults who had received special education services for a diagnosis of autism. Our findings illustrate the uniquely high levels of social isolation experienced by those with an ASD. The young adults with an ASD in our study experienced significantly more social isolation than young adults who had received special education services under the categories of intellectual disability, emotional disturbance, or learning disability. Almost 40% of youth with an ASD never got together with friends. This was twice the rate observed for young adults with ID. Similarly, almost 50% of young adults with an ASD never received phone calls from friends and were never invited to activities by friends. In contrast, only 17% of young adults with ID never received phone calls from friends, and 37% were never invited to activities. Overall, almost one-third of young adults with an ASD were socially isolated, with no contact with friends, no phone calls, and no invitations to activities. Less than 10% of young adults with ID were socially isolated, and only 2–3% of young adults with ED or LD were socially isolated.

It was not surprising to see that the unadjusted rates of social isolation were higher among young adults with an ASD compared to the other disability groups, given that difficulty with social interaction is a defining feature of ASDs. However, the odds of social isolation were still much higher for those with an ASD compared to those in other groups even after adjusting for a wide range of correlates including demographics, family income, conversation ability, functional skills, and involvement in contemporaneous activities like work and school. Our previous work found that the adjusted odds of involvement in postsecondary education and employment were also lower among those with an ASD (Shattuck et al., 2012). Individual attributes and level of family resources do not seem to account for all the between-group variability observed.

Information gained from the current study on the prevalence of social isolation in young adulthood adds to a growing body of research documenting consistent social participation impairments from adolescence through adulthood. Similar to the findings from a previous publication on adolescents from this data set (Shattuck, Orsmond, Wagner, & Cooper, 2011) the majority of young adults with an ASD do not have regular contact with friends. Based on this cross-sectional analysis, social participation does not appear to change drastically from the high school years to the early post-high school years, despite the contextual changes that come with transition to adulthood (such as decreased opportunity to socialize with peers from school, and new opportunities to socialize with peers from college or work). Our findings are also consistent with prior research on adult outcomes in autism, based on smaller and less diverse samples. Other researchers have also found that approximately 40% of adults with autism do not experience reciprocal friendships (Kobayashi & Murata, 1998; Howlin et al., 2000). Future longitudinal research is needed to determine whether the same individuals who struggle with friendship and social participation in adolescence are the same who lack friendships and are socially isolated in adulthood.

Among the factors measured that might account for variability in social isolation among young adults with an ASD, we observed very few significant correlates. Not surprisingly, young adults with significant communication and functional impairments were most likely to never receive phone calls from friends. Young adults who lived independently were more likely to get together with friends compared to those who lived with their parents. These findings are similar to, yet slightly different from what was observed for this same population in 2001 using Wave 1 of NLTS2 when these young adults were in their teens (Shattuck et al., 2011). Similar to the previous study, we found that impaired conversation ability and functional cognitive skills were associated with increased odds of social isolation for the “never sees friends” and “never invited to activities” indicators.

This study had some limitations. We did not have measures of the size or composition of friendship and acquaintance networks. Nor did we have information about the participants’ level of satisfaction with their social participation. The adequacy of outcomes in adulthood should ideally take into account the gap between a given outcome and the preferences and goals of the individual (Henninger & Taylor, 2012). We also did not have community-level data on the availability of services and activities, another unmeasured factor that may have contributed to variability in outcomes. The lack of information on services may limit external validity of the findings. Counterbalancing these limitations were many strengths. The large and population-representative nature of the sample increases the generalizability of findings relative to a smaller clinical or community-based sample. Our ability to make between-group comparisons increased our ability to contextualize and interpret the meaning of findings.

In summary, our findings add to the growing body of literature documenting the persistent social participation impairments in adults with an ASD. In our analysis, we focused on the specific life stage of young adulthood, primarily the early years of transition from school-based to adult services. The high rates of social isolation in young adults with an ASD are concerning. Our findings have important implications for quality of life and service delivery in this growing population. Young adulthood is a high-risk developmental period for the onset of mental health conditions, particularly depression and anxiety, in this population (Farley et al., 2009; Hofvander et al., 2009). Moreover, research with children with an ASD has documented an association between lower quality social relationships and heightened levels of anxiety (Eussen et al., 2012; Mazurek & Kanne, 2010).

Creating opportunities for social engagement in this population during adulthood may improve quality of life as well as lessen the impact of comorbid conditions or exacerbated autism symptoms. Supporting social participation in adulthood for individuals with an ASD will require continued individual intervention to refine social and communication skills, as well as resources directed towards families and service providers who provide social opportunities. Addressing social isolation should be a priority for service providers who have contact with this population: vocational service providers, day program providers, and those who have access to creating opportunities for community recreation. Overall, these findings call for continued efforts to develop and evaluate interventions, supports, and community programs to enable young adults on the autism spectrum to participate in social activities with peers and in the community.

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Table 1

Percentage and 95% Confidence Intervals of Population Characteristics Across Groups

Covariates	**ASD**	**ID**	**ED**	**LD**
Sex				
Male	85.0 [79.6, 89.2]	54.7 [48.8, 60.4]	72.3 [65.2, 78.4]	64.5 [58.1, 70.5]
Female	15.0 [10.8, 20.4]	45.3 [39.6, 51.2]	27.7 [21.6, 34.8]	35.5 [29.5, 41.9]
Age				
21	7.1 [4.9, 10.0]	6.3 [4.0, 9.8]	9.2 [5.6, 14.7]	10.5 [7.3, 15.0]
22	24.2 [19.6, 29.4]	20.8 [16.3, 26.1]	23.3 [18.1, 29.6]	27.3 [22.2, 33.2]
23	24.1 [19.6, 29.1]	24.5 [19.5, 30.3]	24.5 [18.3, 32.0]	20.7 [16.3, 25.8]
24	25.6 [20.0, 32.1]	29.5 [24.2, 35.5]	23.2 [17.7, 29.8]	21.2 [16.6, 26.6]
25	19.2 [13.6, 26.3]	18.9 [14.2, 24.8]	19.7 [14.6, 26.1]	20.3 [15.5, 26.1]
Hispanic				
No	90.0 [83.7, 94.1]	88.6 [83.4, 92.4]	85.8 [79.6, 90.4]	77.2 [69.0, 83.8]
Yes	10.0 [5.9, 16.3]	11.4 [7.6, 16.6]	14.2 [9.6, 20.4]	22.8 [16.2, 31.0]
Race				
White	70.0 [63.0, 76.2]	57.2 [49.2, 64.9]	60.1 [48.2, 70.9]	66.8 [56.6, 75.6]
African-American	18.7 [13.5, 25.3]	31.7 [25.1, 39.0]	23.3 [14.3, 35.6]	15.7 [10.2, 23.2]
Mixed/other	11.3 [7.9, 16.0]	11.1 [7.4, 16.2]	16.6 [11.9, 22.7]	17.6 [12.4, 24.3]
Parent, guardian household income				
≤$25,000	16.5 [11.3, 23.3]	46.4 [39.5, 53.4]	33.0 [25.9, 40.9]	32.5 [26.2, 39.5]
$25,001–50000	31.5 [25.0, 38.8]	28.4 [22.4, 35.3]	31.9 [25.2, 39.4]	28.4 [22.1, 35.6]
$50,001-$75,000	34.1 [27.3, 41.5]	21.5 [16.6, 27.3]	27.1 [21.0, 34.1]	31.5 [25.0, 38.8]
Over $75,000	17.9 [12.9, 24.4]	3.7 [2.2, 6.2]	7.9 [4.7, 13.2]	7.6 [4.8, 11.8]
Years since high school				
< 1–2	18.3 [12.1, 26.6]	10.3 [6.8, 15.2]	7.3 [4.0, 12.5]	5.4 [2.5, 10.7]
2–4	33.0 [26.7, 40.0]	23.3 [18.3, 29.2]	16.8 [12.7, 21.8]	21.6 [16.6, 27.5]
4–6	35.3 [28.2, 43.0]	42.3 [36.4, 48.5]	46.8 [40.3, 53.3]	38.6 [32.6, 44.9]
6–8	13.4 [8.2, 20.9]	24.1 [19.1, 29.9]	29.2 [23.3, 35.9]	34.5 [28.9, 40.5]

Covariates	**ASD**	**ID**	**ED**	**LD**
Overall health				
Excellent	27.9 [21.6, 35.1]	20.9 [16.0, 26.7]	23.9 [18.3, 30.7]	25.4 [20.4, 31.2]
Very good	37.3 [30.5, 44.6]	29.6 [24.3, 35.5]	25.0 [20.0, 30.7]	30.8 [24.5, 37.8]
Good	26.5 [20.2, 33.9]	31.0 [25.5, 37.0]	24.9 [19.5, 31.1]	30.8 [25.2, 37.0]
Fair/poor	8.3 [5.5, 12.5]	18.6 [14.5, 23.5]	26.2 [20.2, 33.2]	13.0 [8.3, 19.6]
How well youth converses				
No trouble	12.0 [8.5, 16.6]	45.3 [38.1, 52.6]	67.2 [59.2, 74.4]	70.4 [62.8, 77.1]
Little trouble	41.3 [33.7, 49.4]	32.7 [27.2, 38.7]	24.6 [19.4, 30.8]	21.9 [16.7, 28.1]
Lot of trouble	29.9 [24.3, 36.1]	14.7 [10.6, 20.1]	4.9 [2.1, 10.4]	4.8 [1.8, 11.2]
Not at all	16.9 [11.7, 23.6]	7.3 [3.6, 13.5]	!	2.9 [0.5, 11.0]
Functional skills scale				
High ability (28–32)	19.8 [13.6, 27.9]	24.0 [17.9, 31.4]	44.8 [38.4, 51.4]	52.3 [45.3, 59.1]
3 (20–27)	33.8 [26.1, 42.3]	45.9 [37.5, 54.6]	42.6 [29.9, 56.2]	32.3 [22.0, 44.3]
2 (12–19)	29.5 [23.2, 36.6]	21.3 [14.6, 29.6]	12.6[†]	15.4[†]
Lowest ability (8–11)	17.0 [12.1, 23.1]	8.7 [5.4, 13.7]	[3.0, 33.7]	[6.2, 31.0]
Currently attending postsecondary school				
No	87.6 [82.2, 91.6]	97.6 [95.7, 98.7]	87.2 [81.9, 91.1]	82.7 [77.4, 86.9]
Yes	12.4 [8.5, 17.8]	2.4 [1.3, 4.3]	12.8 [8.9, 18.1]	17.3 [13.1, 22.6]
Currently has a paid job				
No	66.5 [57.9, 74.1]	61.7 [55.4, 67.7]	52.2 [45.6, 58.8]	33.0 [26.1, 40.7]
Yes	33.5 [25.9, 42.1]	38.3 [32.3, 44.6]	47.8 [41.2, 54.4]	67.0 [59.3, 73.9]
Current residence				
With a parent/guardian	82.0 [76.8, 86.1]	70.3 [63.7, 76.1]	46.6 [39.9, 53.5]	48.4 [41.3, 55.5]
Alone/with a roommate	7.8 [4.9, 12.3]	25.6 [20.5, 31.5]	46.9 [39.7, 54.4]	50.6 [43.1, 58.0]
Under supervision	10.2 [7.2, 14.3]	4.1 [2.1, 7.9]	6.4 [3.2, 12.5]	1.1 [0.4, 2.9]
Currently attending adult day program				
No	87.5 [82.5, 91.3]	94.3 [90.3, 96.7]	99.5 [97.3, 99.9]	100
Yes	12.5 [8.7, 17.5]	5.7 [3.3, 9.7]	!	0

[!] Point estimate not reported because of low cell count for this category.

[†] Point estimates for these categories were too low to report individually and were combined.

Note. Source: National Longitudinal Transition Study 2, Wave 5.

Number of multiply imputed data sets = 50. Weighted to population levels. Variances adjusted for sampling method.

Table 2

Percentage and 95% Confidence Intervals of Social Participation During the Prior 12 Months

	ASD	**ID**	**ED**	**LD**
How often sees friends				
Never	38.6 [31.1, 46.7]	19.5*** [15.4, 24.4]	15.9*** [10.8, 22.7]	7.1*** [4.2, 11.6]
Sometimes, not weekly	16.5 [11.6, 22.9]	20.0 [14.8, 26.3]	8.6* [5.1, 14.2]	10.7 [6.9, 16.0]
About once weekly	16.0 [11.4, 22.1]	12.6 [8.8, 17.8]	13.7 [9.4, 19.4]	14.4 [10.0, 20.3]
> once weekly	28.8 [21.5, 37.2]	47.9** [40.9, 55.0]	61.8*** [52.9, 69.9]	67.8*** [60.6, 74.2]
How often friends call				
Never	47.2 [38.6, 55.9]	16.5*** [12.1, 22.1]	7.2*** [4.0, 12.5]	4.4*** [2.2, 8.2]
Less than monthly	19.5 [14.2, 26.0]	17.1 [12.5, 22.9]	12.0 [7.5, 18.4]	5.5*** [2.9, 9.7]
About once weekly or a few times per month	15.3 [10.5, 21.7]	25.0* [20.2, 30.6]	23.6 [17.2, 31.4]	26.3* [20.4, 33.1]
> once weekly	18.0 [12.1, 25.9]	41.4*** [35.3, 47.7]	57.2*** [49.1, 65.0]	63.8*** [56.2, 70.9]
Never invited to activities	48.1 [40.4, 56.0]	37.0* [30.7, 43.7]	22.9*** [16.6, 30.5]	10.4*** [6.5, 16.0]
Socially isolated [never sees friends, friends never call, and never invited to activities]	28.1 [21.7, 35.5]	8.9*** [5.9, 13.1]	2.7*** [1.2, 5.7]	2.0*** [0.8, 4.8]

*p < .05,

**p < .01,

***p < .001

Note. Source: National Longitudinal Transition Study 2, Wave 5.

Number of multiply imputed data sets = 50. Weighted to population levels. Variances adjusted for sampling method.

Table 3

Odds Ratios and 95% Confidence Intervals of Social Participation Among Young Adults Compared to Those with Autism, Controlling for Covariates[1]

	ID	ED	LD
Never sees friends	0.4** [0.2,0.7]	0.5 [0.2,1.0]	0.2*** [0.1,0.5]
Friends never call	0.3** [0.1,0.6]	0.2** [0.1,0.5]	0.2*** [0.1,0.4]
Never invited to activities	0.8 [0.5,1.5]	0.6 [0.3,1.3]	0.3** [0.1,0.8]
Socially isolated	0.3* [0.1,0.8]	0.2* [0.1,0.7]	0.2** [0.1,0.6]

* p < .05,

** p < .01,

*** p < .001

Note. Source: National Longitudinal Transition Study 2, Wave 5.

Number of multiply imputed data sets = 50. Weighted to population levels. Variances adjusted for sampling method.

[1] Covariates: gender, age, race, ethnicity, parent household income, years since leaving high school, overall health, how well youth converses, functional skills, currently attending postsecondary school, currently has a paid job, current residence, currently attending adult daycare.

Table 4

Logistic Regression Odds Ratios and 95% Confidence Intervals of Social Participation Outcomes Among Youth with ASD

Covariate	Never sees friends	Friends never call	Never invited to activities	Socially isolated
Sex				
Male	(reference)	(reference)	(reference)	(reference)
Female	0.7 [0.3,1.9]	0.6 [0.2,1.6]	0.6 [0.2,1.6]	0.6 [0.3,1.6]
Age	0.9 [0.7,1.2]	1 [0.7,1.3]	1 [0.8,1.3]	0.9 [0.7,1.2]
Hispanic	1.2 [0.5,3.1]	0.8 [0.4,2.0]	1.6 [0.6,4.3]	1.4 [0.6,3.4]
Race				
White	(reference)	(reference)	(reference)	(reference)
African-American	0.7 [0.3,1.8]	0.6 [0.2,1.7]	0.5 [0.2,1.4]	0.5 [0.2,1.4]
Mixed/other	1.3 [0.5,3.0]	0.8 [0.3,1.9]	1 [0.4,2.4]	1 [0.4,2.4]
Parent, guardian household income	0.9 [0.8,1.1]	0.9 [0.8,1.0]	0.9 [0.8,1.0]	0.9 [0.8,1.0]
Years since high school	0.9 [0.7,1.2]	1 [0.8,1.2]	0.9 [0.7,1.2]	1 [0.7,1.3]
Overall health	1 [0.7,1.4]	0.8 [0.6,1.2]	0.9 [0.6,1.2]	0.9 [0.6,1.3]
How well youth converses	0.7 [0.5,1.1]	0.5*** [0.3,0.7]	0.8 [0.5,1.2]	0.6* [0.4,0.9]
Functional skills scale	0.8 [0.5,1.2]	0.5** [0.3,0.9]	0.7 [0.4,1.0]	0.8 [0.5,1.2]
Currently attending postsecondary school	0.7 [0.3,1.6]	0.4 [0.2,1.2]	0.7 [0.3,1.6]	0.8 [0.3,2.2]
Currently has a paid job	0.6 [0.3,1.2]	0.5 [0.3,1.1]	0.5* [0.2,1.0]	0.6 [0.3,1.2]
Current residence				
With a parent/guardian	(reference)	(reference)	(reference)	(reference)
Alone/with a roommate	0.2* [0.1,1.0]	0.8 [0.2,4.0]	0.7 [0.2,2.5]	0.3 [0.0,2.1]
Under supervision	1.2 [0.6,2.7]	1.2 [0.5,2.7]	1.5 [0.7,3.3]	1.7 [0.7,3.9]
Currently attending adult day program	1 [0.5,2.1]	0.7 [0.3,1.7]	0.6 [0.3,1.3]	0.9 [0.4,2.0]

* $p < .05$,

** $p < .01$,

*** $p < .001$

Note. Source: National Longitudinal Transition Study 2, Wave 5.

Number of multiply imputed data sets = 50. Weighted to population levels. Variances adjusted for sampling method.