ELSEVIER

Loneliness, social relationships, and a broader autism phenotype in college students

Lisa E. Jobe *, Susan Williams White

Virginia Commonwealth University, School of Medicine, United States

Abstract

Impaired social functioning is a hallmark of autism spectrum conditions. The purpose of this study was to investigate possible relationship between social functioning and a broader autism phenotype. With a sample of non-clinical undergraduate students from a large, urban university ($N = 97$; mean age = 19.4 ± 2 years), characteristics associated with autism were measured as well as self-reported dating and friendship history, feelings of loneliness, and social motivation. Results indicate that those individuals with a stronger autism phenotype (e.g., rigidity, preference for sameness, high attention to detail) report significantly more loneliness ($r = .52$, $p < 0.01$) and fewer and shorter duration friendships. Also, for participants in romantic relationships, a stronger phenotype was moderately and positively correlated with length of relationship ($r = .34$, $p < 0.05$). Findings support the view that individuals with characteristics of autism and related conditions do not necessarily prefer aloneness, as once assumed, but rather experience increased levels of loneliness related to lack of social skill and understanding. Significance and limitations of these findings are discussed and future directions for research and possibilities for social skills training in this population are explored.
© 2006 Elsevier Ltd. All rights reserved.

Keywords: Autism; Asperger's syndrome; Friendships; Dating; Personality; Autism phenotype; Autism Spectrum Quotient

* Corresponding author. Tel.: +1 804 307 8421.
E-mail address: lisajobe@memphis.edu (L.E. Jobe).

1. Introduction

Autism spectrum disorders (ASD) include clinical diagnoses of Autistic Disorder, Asperger's Disorder, and Pervasive Developmental Disorder – not otherwise Specified. Following the spectrum model of autism, there is considerable evidence for a broader autism phenotype, or a set of subclinical personality traits and symptoms associated with ASD, observable in relatives of individuals with spectrum disorders as well as in the general population. For example, social, communication, and language difficulties have been found in higher levels in relatives of individuals with autism than in the general population (Piven, Palmer, Jacobi, Childress, & Ardnt, 1997; Bishop, Maybery, & Maley, 2004). Beyond relatives of individuals with autism, and as evidence of the full spectrum of ASD characteristics in non-clinical samples, Baron-Cohen, Wheelwright, Skinner, Martin, and Clubley (2001) found that science students were more likely than art students to have characteristics related to autism.

Baron-Cohen et al. (2001) developed the Autism Spectrum Quotient (AQ), an empirically based self-report questionnaire, to detect characteristics of autism in the general population. The AQ has been used to investigate the relationship between characteristics of autism and personality factors such as neuroticism and extraversion (Austin, 2005) as well as decreased empathizing and increased systemizing, or the drive to control and construct strict rule-based systems (Wheelwright et al., 2006).

Autism is characterized by social and communication deficits, as well as stereotyped behaviors and restricted interests (DSM-IV-TR; American Psychiatric Association, 2000). In individuals with high-functioning autism and Asperger syndrome, social deficits can be especially detrimental due to acute self-awareness of their lack of social connectedness (Carrington & Graham, 2001). Many individuals become ostracized and subsequently withdrawn from peers, leading some to believe that persons with ASD *prefer* to be isolated.

However, recent research has indicated that adolescents and adults with ASD are typically interested in having friendships and sexual relationships (Henault & Attwood, 2002, cited in Henault, 2005), as well as marriage (Newport & Newport, 2002). Bauminger's (2002) work on social skill training with adolescents with Asperger's syndrome supports the idea that training in social and emotional understanding can help increase quality of social interactions. Henault (2005) summarized the main social challenge of individuals with high-functioning ASD as a discrepancy between normal social needs/desires, and social skill difficulties. Instead of ignoring such interpersonal needs, it is important to address these needs, as children without friends or close relationships have problems related to low self-esteem, delayed social skill development, and poor school performance (Rubin, Dwyer, & Booth-LaForce, 2004).

In the general population, chronic loneliness during adolescence and college has been correlated with alienation and social anxiety, (Sandstrom & Zakriski, 2004), as well as decreased self-esteem (Moore & Schultz, 1983). More severe, cumulative outcomes of chronic loneliness include depression, aggression, and paranoia (Diamont & Windholt, 1981). Carr and Schellenbach (1993) theorized that, although following rigid social codes may be adaptive in childhood, this may become maladaptive when more intimate communication is expected as teenagers. Such immature social interaction patterns have been supported as a precursor to chronic loneliness in adolescents. As social difficulties are a hallmark of the entire ASD spectrum, it would be of interest to investigate loneliness in relation to characteristics of ASD. Autistic social impairment may best be viewed

along a continuum. Indeed, individuals with ASD diagnoses exhibit a range of deficits and strengths. Thus, in keeping with the spectrum concept of autism and related conditions, the present study operationalizes ASD symptoms along a continuum of impairment, rather than categorical ASD diagnoses. By examining social outcomes of ASD characteristics in the general population, it may be possible to assess social and communication skill and training needs of individuals with ASD as well as those not meeting diagnostic criteria.

This project was undertaken to examine relationships among characteristics broadly associated with ASD (i.e., the autism phenotype) and social motivation, loneliness, and social integration, including quality of friendship and dating relationships. As deficits similar to those of ASD correlate with the same social outcomes in both clinical and non-clinical populations, this study hypothesized a positive relationship between negative social outcomes (fewer friendships, shorter duration romantic relationships, and increased loneliness) and a strong ASD phenotype in the general population. It is also hypothesized that individuals with AQ scores in the upper and lower quartiles of the sample will show marked differences in social integration (friendships and dating) and loneliness variables. A secondary aim of this project included examination of the psychometric properties of the AQ in a non-clinical, college-age population.

2. Method

2.1. Participants

The sample included 97 (Cohen, 1992) undergraduate students enrolled in a large, urban university in the Southeast United States. Participants were recruited through the university-wide experimental database and received class credit for their participation. The sample was 67% female ($n = 65$) and the mean age was 19.4 years (SD = 2.28, range = 18–31 years).

All participants completed the AQ (Baron-Cohen et al., 2001), the UCLA Loneliness Scale (Russell, 1996), an adaptation of the Striving Assessment Scale (Emmons, 1986), and a dating and friendship history questionnaire. Surveys were completed anonymously in groups of approximately 15–20 participants in a classroom setting. The first author proctored the survey administration and was available for questions and debriefing following the study.

2.2. Measures

2.2.1. Autism spectrum quotient (AQ)

The AQ is a 50-item questionnaire designed to measure characteristics of autism in the general population. The AQ contains 5 subscales representing different domains of characteristics of autism. These subscales are: social skills deficit, problems with attention switching, high attention to detail, communication skill deficit, and lack of imagination. All items are rated on a 4-point scale: "definitely agree", "slightly agree", "slightly disagree", and "definitely disagree." High scores indicate characteristics more similar to ASD. Baron-Cohen et al. (2001) scored the measure in a binary manner (one for response in direction of autism characteristics, zero for response in opposite direction), producing total scores ranging from zero to 50. Austin (2005) preserved the four-point scale for scoring in order to yield higher item-item correlations, which was found

helpful for reliability and factor analysis. The present study scored the measure in both ways. Baron-Cohen et al.'s (2001) method was employed in order to compare data with his clinical cut-off point, yet all other analyses were computed with responses scored on the 4-point scale to preserve a higher level of differentiation among responses.

2.3. UCLA loneliness scale (version 3; Russell, 1996)

This scale is a 20-item self-administered questionnaire designed to measure loneliness. Version 3 is a shorter version of the original UCLA Loneliness Scale. It has been shown to have high reliability, with internal consistency of .92 for a college population, and test–retest reliability of .73 after a one-year period. Construct validity of the scale has been supported by significant positive correlations with other measures of loneliness (e.g., Differential Loneliness Scale, $r = .72$, $p < .01$) and negative correlations with reported social support (Russell, 1996).

2.3.1. Adaptation of strivings assessment scale (SAS; Emmons, 1986)

The SAS was developed to measure personal strivings and dedication to goals. Personal strivings are defined as tasks which people are characteristically trying to do in their everyday lives (Emmons, 1986). The SAS examines a range of characteristics associated with personal goals (e.g., importance, effort, social desirability, confidence, probability if no action). Emmons' (1986) factor analysis showed 3 main factors: degree of striving, success, and ease. To measure social motivation in this study the components of the degree of striving factor were included: value of the task, commitment to the task, importance of reaching the goal, and the effort associated with each task. For this study, participants were asked to evaluate the life task of "finding and starting an intimate relationship with another person" (for persons currently single) or "maintaining an intimate relationship with another person" (for individuals currently in a relationship; Shafer, 2001). This assessment was also used in reference to the life tasks of "finding and starting new friendships" and "maintaining current friendships," yielding romantic, seeking friendship, maintaining friendship, and total motivation ratings. Emmons (1986) found a mean stability coefficient of .73 after 1 month for the 4 characteristics used in this study (value, commitment, importance, and effort) and mean stability of .60 after 3 months.

2.3.2. Dating and friendship history

This questionnaire was developed for this study, drawing from other relationship history measures (Glickman & La Greca, 2004; Shafer, 2001). Participants were asked to report on the number, length, and level of commitment in current and past dating relationships and friendships. It also included age of onset for dating and close friendships. Questionnaires, as well as other measures, were completed anonymously to help ensure unbiased responding.

3. Results

The AQ was scored using Baron-Cohen et al.'s (2001) binary method (producing scores between 0 and 50 points) in order to compare this study's sample to the established clinical cut-off scores. No participants scored above Baron-Cohen et al.'s (2001) clinical cut-off score of

32 on the AQ (Range = 9–27), which would indicate symptoms in range for a clinical diagnosis of ASD. For all other analyses, the 4-point response scale was retained, producing scores between 50 and 200 (mean score = 111.04, range = 83–144). There were no significantly outlying scores reported on any measures, and missing data were excluded casewise. Pearson correlation coefficients were used to initially explore relationships among variables. Relationship history demographics are presented in Table 1.

3.1. Reliabilities

Internal consistency (Cronbach's alpha) of the total AQ scale was .78. The social skill, attention to detail, and communication subscales showed similarly satisfactory reliabilities (.77, .71, .75, respectively), while the attention switching and imagination subscales were substantially lower (.47, .40, respectively). Overall AQ scale, as well as the social skill, attention to detail, and communication subscales had values similar to those reported previously (Austin, 2005; Baron-Cohen et al., 2001), while reliabilities for the attention switching and imagination subscales were lower than previously reported.

Based on Austin's (2005) factor analysis, the AQ comprises three main components: social skills, details/patterns, and communication/mindreading. In this study, the social skill factor had high internal consistency (.84), while the details/patterns and communication factors had lower reliabilities (.60, .46, respectively). The UCLA Loneliness Scale was found to have high (.92) overall internal consistency.

Table 1
Relationship demographics (*n* = 97)

	N (%)	Length of relationship
Current dating status		
Single	41 (42.3%)	–
Casually dating	6 (6.2%)	.67 ± .82 months
Somewhat seriously dating	11 (11.3%)	8.1 ± 9.1 months
Seriously dating	34 (35.1%)	15.3 ± 14.2 months
Engaged/married	5 (5.2%)	33.0 ± 22.0 months
Usual dating status		
Single	8 (8.2%)	
Casually dating	17 (17.5%)	
Somewhat seriously dating	32 (33.0%)	
Seriously dating	39 (40.2%)	
Engaged/married	1 (1.0%)	
Current best friend		
Yes	87 (89.7%)	6.9 ± 4.7 years
No	10 (10.3%)	–
	M + SD (age onset)	*M* ± SD length
First best friend	7.8 ± 3.7 yrs	6.5 ± 4.8 yrs
First date	15.3 ± 1.5 yrs	–
First romantic relationship	16.1 ± 1.6 yrs	–

3.2. Social outcome correlations

The main purpose of this study was to assess characteristics associated with ASD in the general population in relation to social integration (friendships, dating). Overall AQ score was significantly negatively correlated with length of best friendship ($r = -.23$, $p = .02$). As predicted, individuals with a stronger ASD phenotype, therefore, reported having shorter duration friendships. Similar results were found for the social skill subscale of the AQ and duration of friendship ($r = -.28$, $p < .01$). A non-significant, inverse correlation was found for the communication subscale and length of current best friendship ($r = -.20$, $p = .05$).

AQ scores did not predict relationship status (single, dating, etc). Of individuals currently in romantic relationships (i.e., those reporting not being single), there was a positive correlation between length of relationship and AQ score ($r = .34$, $p = .02$). A similar association was found between length of relationship and AQ social skills subscale scores ($r = .28$, $p = .05$). These results indicate that, contrary to what was expected, individuals with a stronger phenotype had romantic relationships of longer duration, in comparison to those with fewer ASD characteristics. AQ scores were not found to have any significant relationship to age of first date or age of first romantic relationship.

Total social motivation was not correlated with total AQ score. Yet, both motivation for making new friends and keeping old friends were negatively correlated with total AQ score, AQ social skill subscale, and communication subscale. Romantic motivation (finding, starting, or keeping a romantic relationship), on the other hand, was positively correlated with the attention switching subscale of the AQ.

As hypothesized, there was a significant inverse correlation between loneliness and length of friendships, $r = -.28$, $p < .01$. Current dating status and length of current romantic relationship, however, were not correlated with loneliness. These results indicate that long-term friendships are related to decreased loneliness, while long-term dating relationships are not. All social outcome correlations are presented in Table 2. Therefore, the first set of analyses focused on the relationship between friendship history, characteristics of autism measured by the AQ, and loneliness.

Table 2
Social outcome correlations

| | Curr-BF | First-BF | Curr-Rom | Lon | Motivation | | | |
					Tot	Rom	New-F	Old-F
Total AQ	−.23[a]	−.18	.32[a]	.52[b]	−.14	.13	−.14	−.29[b]
Social skills	−.28[b]	−.17	.27[a]	.53[b]	−.29[b]	.02	−.28[b]	−.38[b]
Attention switching	−.10	−.10	.19	.32[b]	.09	.24[a]	.04	−.10
Attention to detail	−.06	−.03	.19	.01	.04	.08	.02	−.02
Communication	−.20	−.13	.05	.52[b]	−.29[b]	−.08	−.27[b]	−.28[b]
Imagination	−.01	−.11	.19	.17	.13	.17	.14	−.06

Curr BF = length of current best friendship, First BF = length of first best friendship, Curr Rom = length of current romantic relationship, Motivation: Tot = total social motivation, Rom = Romantic Motivation, New-F = motivation for making new friends, Old-F = motivation to keep current friendships. $N = 97$ for all correlations except romantic relationship length where $N = 55$ (excludes single participants).
[a] $p < .05$.
[b] $p < .01$.

3.3. Group differences: high vs. low AQ scores

Beyond characterizing social integration along the range of AQ scores, this study also aimed to look at variance of social–emotional variables (loneliness, social motivation) in relation to both social integration and AQ scores. First, a one-way ANOVA was performed to investigate possible gender differences in AQ scores. There were no significant differences between genders on the AQ or its subscales. For this reason, it was not entered into further analyses. Regarding social motivation, total social motivation was not correlated with AQ score. Yet, there were significant group differences between individuals with very high AQ scores (upper quartile) and those with very low AQ scores (lowest quartile) in terms of total social motivation and relationship history. When the upper quartile (scores above 75th percentile on AQ) was removed from the sample, social motivation was positively correlated with longer friendships ($r = .35$, $p < .01$). For individuals scoring above the 75th percentile, there was no correlation between social motivation and length of friendship.

Multivariate Analysis of Variance (MANOVA) was conducted to compare high AQ participants (i.e., those above the 75th percentile; AQ score $\geqslant 119$; $n = 25$) to low AQ participants (those below the 25th percentile; AQ score $\leqslant 102$; $n = 25$) on length of friendships and loneliness. Length of current best friendship, length of first best friendship, age at which acquired first best friendship, and loneliness were used as dependent variables. Wilks' Lambda indicated the combined DVs were significantly affected by AQ score, $F(3,46) = 9.97$, $p < .001$.

Individual variables were investigated with separate ANOVAs, protecting the overall error at $p = .05$. Participants scoring above the 75th percentile on the AQ had significantly higher levels of reported loneliness ($F(1,49) = 28.28$, $p < .001$). Individuals with high AQ scores also had significantly shorter duration current best friendships ($F(1,49) = 6.28$, $p = .016$). The differences in length of first best friendship were not significant at the more stringent significance level ($F(1,49) = 5.04$, $p = .027$). Differences between groups for friendship and loneliness variables can be found in Table 3.

3.4. Predicting loneliness

The second set of analyses was conducted to evaluate the ability of AQ scores, as well as specific subscales of the AQ, to predict loneliness. As expected, the overall model including AQ total scores and length of current best friendship as predictors of loneliness was significant

Table 3
High vs. low AQ scores

	High AQ (above 75th percentile) mean	Low AQ (below 25th percentile) mean	Differences $F(1,49)$
Length of current best friendship	4.5 years	7.9 years	6.28[a]
Length of first best friendship	5.4 years	8.0 years	5.04[a]
Age of onset-first best friend	8.3 years old	7.0 years old	0.28
Length of current dating relationship	18.8 months	11.3 months	2.42
Loneliness (UCLA Loneliness Scale)	50.6	37.8	28.28[a]

[a] $p < .05$.

($F(2,96) = 20.11$, $p < .001$). Linear regression showed total AQ score to be a valid predictor of loneliness ($\beta = .48$, $p < .001$) and the contribution made by length of current best friendship approached significance ($\beta = -.17$, $p = .056$). Squared semipartial correlations indicated AQ scores accounted for 23.9% of variance in loneliness ($p < .001$) and length of current best friendship accounted for 3.8% of variance ($p = .05$). In other words, although friendship lengths are negatively correlated with loneliness and approach significance, they do not predict a significant amount of variation in loneliness beyond that predicted by strength of ASD phenotype. A second regression was performed in order to evaluate possible roles of AQ subscales in predicting loneliness. As hypothesized, both social skill and communication subscale scores made unique contributions to variance in loneliness scores. Squared semipartial correlations indicated an 8.9% ($p = .003$) unique contribution to variance from the social skills subscale, and 7.1% ($p = .009$) from the communication subscale, with a total $R^2 = .331$ (indicating a significant amount of shared variance). These results indicate that some specific characteristics of ASD, namely social skill and communication difficulties, may play unique roles in experiences of loneliness.

4. Discussion

These results support the concept of ASD characteristics residing on a spectrum in the general population. Further, there are some clear differences in interpersonal functioning when comparing individuals at the ends of this spectrum. Although none of the students in this sample scored above the clinical cutoff, the wide range of scores indicates a fair degree of variability in social and communicative impairment in this non-clinical population. For example, 25 participants (approximately 1/4 of participants) scored in the "autistic" direction (i.e., slightly or definitely agreed/disagreed in the direction of the ASD characteristic; Baron-Cohen et al., 2001) on at least 7 out of the 10 social skill items, indicating a considerable deficiency in social skill.

Where one falls on the spectrum appears to be related to interpersonal history. Individuals at the higher end of the ASD spectrum (i.e., more characteristics of autism) reported fewer friendships that are of shorter duration. Also, those participants without a current best friend reported significantly higher total AQ scores and social skill deficit subscale scores. Friendship history and AQ scores were both significantly related to reported levels of loneliness, with AQ scores explaining more of the variance in loneliness scores than did friendship history. This supports the possibility of a relationship between non-clinical characteristics of ASD and loneliness.

Interestingly, instead of high AQ scores relating to shorter and fewer romantic relationships (as friendship findings suggested), high AQ scores were in fact related to dating relationships of longer duration. Similarly, characteristics of autism were not related to age of onset for dating or romantic relationships. This seems to suggest that in the general population, dating begins at roughly the same time (82% of respondents had their first date within a three-year span, ages 13–16), unrelated to social skill or communication difficulties. Preference for sameness, and also resistance of change, are hallmark characteristics of ASD. There is a possibility that this plays a role in the tendency for individuals with stronger ASD phenotypes to maintain long-term romantic relationships. This possibility is also tentatively supported by the positive correlation found in this study between romantic motivation and the attention switching subscale of the AQ. Future directions for this finding could include investigation into quality and satisfaction in long-term

relationships for individuals with characteristics of ASD and their partners, as well as possible correlations of AQ scores between partners. Yet, individuals in long-term and serious dating relationships did not report lower levels of loneliness. In other words, sustained, close friendships, but not dating relationships, were related to decreased loneliness. Yet, deficits in social and communication skills may limit individuals' abilities to begin and maintain long-lasting reciprocal friendships.

For all participants scoring below the 75th percentile on the AQ (i.e., those with low or moderate scores), high social motivation was related to longer friendships. In other words, the more socially motivated participants were, the more enduring their friendships. Yet, when looking only at participants scoring above the 75th percentile on the AQ, this correlation was not present. In other words, in participants with many characteristics of ASD, high social motivation is not necessarily related to longer friendships. Correlations found by the present study indicate a relationship between decreased motivation to maintain and seek out friendships and the social skill and communication subscales of the AQ. One future direction of this study would be to examine the hypothesis that lack of social skill moderates the relationship between social motivation and friendship length and quality. This would support previous findings that individuals with characteristics similar to ASD do not lack social motivation, but rather lack social skill and understanding necessary for sustaining successful, long-term friendships (Henault, 2005).

One additional goal of this study was to investigate psychometric properties of the AQ in the general population, based on Baron-Cohen et al.'s (2001) subscales as well as Austin's (2005) factor analysis. Previous studies have cited Baron-Cohen's social and communication subscales as valid predictors of characteristics of autism, with other subscales significantly less able to predict such characteristics. For example, Bishop et al. (2004) concluded that, using the communication and social skill deficits subscales alone, the AQ was sensitive to the broad phenotype, based on a study of parents of children with autism. The present study also found a significant relationship between these two categories (social and communicative) of characteristics of autism (measured by the social and communication subscales of the AQ) and expected friendship and loneliness variables. Therefore, the social skill and communication domains may be particularly important in determining social outcomes for people with and without autism spectrum conditions. One of Austin's (2005) factors (social skill deficit) showed high reliability and a positive correlation with loneliness in the present study. These findings suggest that the characteristics of autism most related to outcomes such as loneliness and diminished social motivation in the general population are those related to social skill and communication difficulties.

Overall, there seems to be a significant relationship between some characteristics of autism and social and emotional variables. These results support a dimensional view of ASD, with characteristics, as well as related impairment, present in varying degrees in the general population as well as clinical populations. The findings of the present study have implications for individuals with characteristics of autism, including those who do not necessarily meet diagnostic criteria. Negative social outcomes such as diminished friendships and loneliness can have considerable, negative consequences, such as depression and social withdrawal (Sandstrom & Zakriski, 2004; Seepersad, 2006). The sample used in this study comprised mainly college freshmen and sophomores; individuals just beginning to navigate the stressful and sometimes challenging college environment. These results show that individuals with non-clinical characteristics of ASD may still experience negative social outcomes related to social and communicative impairment.

These findings highlight the importance of assistance for non-diagnosed college-age students in areas such as friendship maintenance, social communication, and dating strategies through group or individual coaching or therapies. As these results indicate, high social motivation may not be sufficient to ensure continued friendships when high levels of ASD characteristics are also present. Indeed, there is emerging research that psychosocial interventions aimed at improving the social skills of individuals with ASD can be effective (Williams White, Koenig, & Scahill, in press). Such interventions could have a positive impact on the social connectedness of individuals with social and communicative difficulties. However, further investigation on how to identify and help individuals with ASD characteristics enhance their social functioning in the general population is needed.

References

American Psychiatric Association. (2000). Diagnostic and statistical manual of mental disorders, Fourth Edition, Text Revision. Washington, DC: APA.

Austin, E. J. (2005). Personality correlates of the broader autism phenotype as assessed by the Autism Spectrum Quotient (AQ). *Personality and Individual Differences, 38*, 451–460.

Baron-Cohen, S., Wheelwright, S., Skinner, R., Martin, J., & Clubley, E. (2001). The Autism-Spectrum Quotient (AQ): evidence from Asperger syndrome/high-functioning autism, males and females, scientists and mathematicians. *Journal of Autism and Developmental Disorders, 31*(1), 5–17.

Bauminger, N. (2002). The facilitation of social–emotional understanding and social interaction in high-functioning children with autism: intervention outcomes. *Journal of Autism and Developmental Disorders, 32*(4), 283–298.

Bishop, D., Maybery, M., & Maley, A. (2004). Using self-report to identify the broad phenotype in parents of children with autistic spectrum disorders: a study using the Autism-Spectrum Quotient. *Journal of Child Psychology and Psychiatry, 45*(8), 1431–1436.

Carrington, S., & Graham, L. (2001). Perceptions of school by two teenage boys with Asperger's Syndrome and their mothers: a qualitative study. *Autism, 5*(1), 37–48.

Carr, M., & Schellenbach, C. (1993). Reflective monitoring in lonely adolescents. *Adolescence, 28*, 737–747.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155–159.

Diamont, L., & Windholt, G. (1981). Loneliness in college students: some theoretical, empirical, and therapeutic considerations. *Journal of College Student Personnel*, 512–522.

Emmons, R. A. (1986). Personal strivings: an approach to personality and subjective well-being. *Journal of Personality and Social Psychology, 51*(5).

Glickman, A., & La Greca, A. (2004). The dating anxiety scale for adolescents: scale development and associations with adolescent functioning. *Journal of Clinical Child and Adolescent Psychology, 33*(3), 566–578.

Henault, I. (2005). Sexual relationships. In L. Baker & L. Welkowitz (Eds.), *Asperger's syndrome: Intervening in schools, clinics, and communities* (pp. 243–255). New Jersey: Lawrence Erlbaum Associates, Inc.

Henault, I. & Attwood, T. (2002). Sexual profile of individuals with Asperger's Syndrome: The need for understanding, support, and sex education. Melbourne, Australia: Melbourne World Autism Congress.

Moore, D., & Schultz, N. (1983). Loneliness at adolescence: correlates, attributes, and coping. *Journal of Youth and Adolescence, 12*, 95–100.

Newport, J., & Newport, M. (2002). *Autism-Asperger's and sexuality: Puberty and beyond*. Arlington, TX: Future Horizons, Inc.

Piven, J., Palmer, P., Jacobi, D., Childress, D., & Ardnt, S. (1997). Broader autism phenotype: evidence from a family history study of multiple-incidence autism families. *American Journal of Psychiatry, 154*, 185–190.

Rubin, K., Dwyer, K., & Booth-LaForce, C. (2004). Attachment, friendship, and psychosocial functioning in early adolescence. *Journal of Early Adolescence, 24*(4), 326–356.

Russell, D. (1996). UCLA loneliness scale (Version 3): reliability, validity, and factor structure. *Journal of Personality Assessment, 66*(1), 20–40.

Sandstrom, M., & Zakriski, A. (2004). In J. Kupersmidt & K. Dodge (Eds.), *Children's peer relations: From development to intervention* (pp. 101–118). Washington, DC: American Psychological Association.

Seepersad, S. (2006). Understanding and helping the lonely: an evaluation of the LUV program. Dissertation Abstracts International:. *The Sciences and Engineering, 66*(7B), 4002.

Shafer, A. B. (2001). The big five and sexuality trait terms as predictors of relationships and sex. *Journal of Research in Personality, 35*(3), 313–338.

Wheelwright, S., Baron-Cohen, S., Goldenfeld, N., Delaney, J., Fine, D., Smith, R., et al. (2006). Predicting Autism Spectrum Quotient (AQ) from the Systemizing Quotient-Revised (SQ-R) and Empathy Quotient (EQ). *Brain Research, 1079*(1), 47–56.

Williams White, S. K., Koenig, K., & Scahill, L. (in press). Toward the development of effective social skills intervention in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*.