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Abstract

This study explored factors (gender, age, relationship status, symptomatology) associated with the sexual well-being of 141 (56 men and 85 women) adults with high-functioning autism and Asperger syndrome (HFA/AS) living in the community. Participants completed an online survey consisting of a measure of autistic symptoms as well as measures of dyadic and solitary sexual well-being. Canonical correlation analyses showed that participants who were currently in a romantic relationship reported more frequent dyadic affectionate and genital activity and greater sexual assertiveness and sexual satisfaction, pointing to the importance of context in an active sex life. After controlling for the first variate, men and individuals with less autism symptomatology, particularly in the social and communication domains, generally reported significantly greater dyadic sexual well-being, including greater sexual satisfaction, assertiveness, arousability, and desire and lower sexual anxiety and fewer sexual problems. Men also reported better solitary

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sexual well-being, including more sexual thoughts, more sexual desire, and more frequent solitary sexual activity; however, they had lower sexual knowledge. These results highlight the importance for research and sexuality education with individuals with HFA/AS to conceptualize sexual well-being as a multidimensional construct consisting of both dyadic and solitary aspects.

Keywords
sexuality, autism, Asperger syndrome, relationships

Autism spectrum disorders (ASDs) are characterized by impairments in social interactions and communication as well as repetitive and stereotyped interests and behaviors (American Psychiatric Association, 1994). Despite their intellectual strengths, individuals with high-functioning autism (HFA) and Asperger syndrome (AS) also experience these impairments (Howlin et al., 2000; Stokes and Kaur, 2005). The social skills and communication deficits associated with HFA/AS often create challenges in social relationships and, as individuals enter adulthood, may have a great impact on romantic and sexual relationships (Howlin et al., 2000; Orsmond et al., 2004). That is, the qualities and traits needed to understand, develop, and maintain close interpersonal and sexual relationships are precisely those traits that are impaired with ASDs (Renty and Roeyers, 2007; Tarnai and Wolfe, 2008). Secondary features of ASDs also may affect sexual functioning. For example, difficulty modulating sensory input may result in hypersensitivity, making physical touch unpleasant, or hyposensitivity, resulting in difficulty becoming aroused and reaching orgasm (Hénault, 2005). The effects of autistic traits on sexual functioning are exacerbated by internalization of social stereotypes and entrenched societal beliefs that cast individuals with disabilities, including individuals with HFA/AS, as asexual and uninterested in romantic relationships (Hénault, 2005; Koller, 2000; Shakespeare, 1996).

Sexuality is an important aspect of healthy development and overall adult adjustment for all individuals throughout their lives (Laumann et al., 1994; SIECUS, 2010). Thus, it is important to understand the sexual well-being of individuals with ASDs. Sexual well-being involves more than behavior with a partner. It also includes sexual knowledge, self-view, thoughts, feelings, and attitudes as well as solitary sexual behaviors (Hénault, 2005; Koller, 2000; SIECUS, 2004). According to the World Health Organization (2006), sexual well-being includes not only the absence of sexual problems and inappropriate sexual behavior, but also a positive orientation to the emotional, psychological and social aspects of sexuality. The aim of this study was to examine a wide range of aspects of sexual well-being in adults with HFA/AS living in the community who had been in a romantic relationship, with an emphasis on understanding positive sexual functioning (e.g. sexual desire, sexual self-esteem, sexual thoughts and fantasies).

Research on ASDs and sexuality

There has been little research on the sexual well-being of adults with ASDs. What research has been conducted indicates that individuals with ASDs, particularly those with higher verbal intellectual abilities, are interested in being in a romantic relationship and marrying; these individuals also express their sexuality through masturbation and sexual behavior with another person (Haracopos and Pedersen, 1992; Hellemans et al., 2007; Konstantareas and Lunsky, 1997; Stokes et al., 2007; Van Bourgondien et al., 1997). Individuals with ASDs may also show a number of problematic sexual behaviors, deficits in sexual knowledge, and negative sexual attitudes

(Hellemans et al., 2007; Konstantareas and Lunsky, 1997; Lunsky and Konstantareas, 1998; Stokes et al., 2007; Van Bourgondien et al., 1997).

A review of the literature revealed fewer than a dozen studies that have examined the sexual functioning of individuals with ASDs (Haracopos and Pedersen, 1992; Hellemans et al., 2007; Hénault and Attwood, 2005; Konstantareas and Lunsky, 1997; Lunsky and Konstantareas, 1998; Ousley and Mesibov, 1991; Realmuto and Ruble, 1999; Ruble and Dalrymple, 1993; Stokes and Kaur, 2005; Stokes et al., 2007; Van Bourgondien et al., 1997). Further, there are a number of methodological problems associated with this research that limit our understanding of the sexual well-being of adults with HFA/AS living in the community. First, most studies have used reports of parents or caregivers, not of individuals with ASDs themselves. As a result, these studies focused on observable behaviors and were not able to assess either private behavior or sexual thoughts and feelings. Second, most researchers have focused on problematic sexual behavior, such as public masturbation and inappropriate touching, and have neglected positive aspects of sexual well-being. Third, many of these studies included individuals with a wide range of cognitive functioning, including individuals with intellectual impairment. Thus, it is difficult to separate the contribution of ASDs from that of cognitive impairment to these individuals' sexual functioning. Fourth, many of these studies included both adolescents and adults, even though individuals with ASDs tend to demonstrate social skills gains with age. Fifth, most of the participants in the studies were not in a romantic relationship and many had never been in a relationship. Yet, the very fact of having been in a relationship is likely to affect sexual self-concept and other aspects of sexual well-being. Finally, most studies were based on small samples of individuals who were highly involved with the developmental disabilities or mental health system, often living in a group home environment. Thus, they excluded individuals with HFA/AS who likely have stronger skills in the behavioral, emotional, and social domains.

Predicting sexual well-being

We examined four factors likely to be associated with the sexual well-being of individuals with HFA/AS: the extent of autistic traits, gender, age, and relationship status.

The social, communication, and behavioral deficits associated with ASDs are likely to impact sexual functioning in interpersonal situations. Thus, it is likely that individuals with more autistic features will report poorer sexual well-being. However, this has not been studied empirically. A few studies have examined ASD traits and relationship functioning. For example, Stokes et al. (2007) found that adolescents and adults with HFA/AS and poorer social functioning had poorer intimate and romantic relationship functioning. Renty and Roeyers (2007) used the Autism Spectrum Quotient (AQ; Baron-Cohen et al., 2001) to assess the extent of ASD traits. They found that the severity of autistic traits in married men with HFA was negatively correlated with their wife's relationship satisfaction but was not associated with their own relationship satisfaction.

There is growing acceptance of the view that young people with ASDs need to be provided with sexuality education that meets their learning needs and styles (Hénault, 2005; Lunsky and Konstantareas, 1998; Nichols and Blakeley-Smith, 2010). In addition, individuals with HFA/AS now have access to sexual information over the Internet that was not available to previous generations. Thus, we expected that younger adults would report higher sexual well-being than would older individuals.

Society is, in general, more accepting of male sexuality and sexual expression than of female sexuality (Byers, 1996). These attitudes are likely to be even stronger for individuals with disabilities (Shakespeare, 1996). In keeping with this view, typically developing men tend to report greater

sexual desire, more frequent sexual thoughts and fantasies, more sexual experience, more frequent masturbation, and less sexual anxiety, although men and women do not differ in other aspects of their sexual well-being, such as their sexual satisfaction and sexual capacity (Baumeister et al., 2001; Lawrance and Byers, 1995; MacNeil and Byers, 2005; Petersen and Hyde, 2010). However, a review of the literature revealed only two studies, both with very small sample sizes, that compared men and women with ASDs on any aspect of sexuality. Konstantareas and Lunsky (1997; Lunsky and Konstantareas, 1998) did not find gender differences in either sexual interest or sexual attitudes. However, this study included only 15 participants, both adolescents and adults, with a wide range of cognitive functioning. Ousley and Mesibov (1991) ($N = 21$) found that men with ASDs were more interested in dating and sexuality than were women. Both the men and the women had limited interpersonal sexual experience. Nonetheless, based on the neurotypical literature, we predicted that men would report better sexual well-being than would women.

Being in a romantic relationship provides the opportunity to learn new skills in many areas, particularly related to sexuality. In addition, among typically developing individuals, men and women with better relational functioning report better sexual functioning (Lawrance and Byers, 1995). Thus, we expected that individuals who are currently in a romantic relationship would report better sexual well-being than those who were not currently in a romantic relationship.

Some but not all aspects of sexual well-being are likely to be affected by the severity of autistic traits, gender, age, or being in a romantic relationship. For example, lack of success in interpersonal situations and/or awareness of differences from typically developing individuals are likely to adversely affect interpersonal sexual experiences (that is, dyadic sexual well-being) but not aspects of sexual well-being that do not involve a partner (that is, solitary sexual well-being). Therefore, we examined patterns of association between the predictors and dyadic and solitary sexual well-being separately.

The AQ assesses ASD symptomatology related to social skills, attention switching, communication, imagination, and attention to detail. Of these domains, it is likely that deficits related to social functioning, communication, and attention switching have the most impact on sexual well-being, particularly dyadic sexual well-being. Therefore, we also examined the extent to which symptomatology in each of these five domains was associated with poorer dyadic and solitary sexual well-being.

The current study

The current study improved on the methodological problems inherent in past research by: (1) recruiting a sample of individuals from the community reporting a professional autism diagnosis; (2) including only individuals who were 21 years of age or older, reported average or above average intelligence, and had been in at least one romantic relationship of 3 months or longer; and (3) assessing a wide range of positive and negative behavioral, cognitive, and affective markers of sexual well-being.

The following research questions were investigated: (1) Are gender, age, relationship status, and ASD symptomatology associated with dyadic sexual well-being (sexual satisfaction, sexual assertiveness, sexual anxiety, sexual arousability, desire for partner sexual activity, frequency of sexual activity, sexual self-esteem, and sexual problems)?; (2) Are gender, age, relationship status, and ASD symptomatology associated with solitary sexual well-being (i.e. sexual knowledge, positive sexual cognitions, desire for solitary sexual activities, and frequency of solitary sexual activity)?; (3) What domains of ASD symptomatology (social skill, attention switching, communication, imagination, attention to detail) are associated with dyadic and solitary sexual well-being?

Methods

Participants

Participants were recruited for an Internet study of Sexual Well-Being of High-Functioning Adults with Autism Spectrum Disorders. Participants first completed a screening question that assessed their relationship history. Based on responses to this question, participants were either entered into the current study or into a parallel study. That is, only participants who indicated that they were currently in a romantic relationship or were not in a current relationship but had been in one of 3 months or longer in the past completed the current survey. In total, 483 individuals started the survey designed for individuals who had been in a romantic relationship. Of these, 342 were dropped from the sample: 12 because they did not indicate their age or they were younger than 21; 72 because they did not meet the autism screening cut-off (AQ score of 26 or greater); 127 because they had not received a professional diagnosis; four because they were transgendered (to increase the homogeneity of the sample); and 127 because they failed to finish the survey. The people who had and had not completed the survey did not differ significantly on gender, age, or current relationship status. Of those who completed the survey, those with and without a professional diagnosis did not differ significantly on the four predictor variables (AQ, gender, age, current relationship status) or sexual well-being variables, $F_{mult}(4, 263) = 2.70$, $p > .10$ and $F_{mult}(13, 254) = 2.55$, $p > .10$. The final sample consisted of 56 men and 85 women with a professional diagnosis of ASDs who ranged in age from 21 to 73 years ($M = 39.6$). The sample was largely white (91%) and highly educated (60% had completed an undergraduate or graduate degree). Most participants were living in the United States (57%), Australia/New Zealand (23%), United Kingdom (7%), Europe (9%), or Canada (4%). Sixty percent of participants indicated that they were currently in a relationship. Many participants were living with a spouse or romantic partner (47%); 29% were living alone. Only a minority were living with their parents (7%), or in a supported living arrangement (1%). Most participants identified themselves as either heterosexual (68%) or bisexual (12%).

Measures

Because none of the measures we used had been validated specifically on individuals with ASD, we examined all of the items to identify any that might be confusing to individuals with ASDs. Changes were made to a small number of items. These are detailed below. In addition, we examined the internal consistency of each scale to determine whether there were any bad items for this sample; none were identified.

Background information form. This instrument was used to gather demographic information about the participant, including gender, race/ethnicity, age, education, geographic region of residence, living situation, and relationship status. It also included a question about the source of their ASD diagnosis.

Autism Spectrum Quotient (Baron-Cohen et al., 2001). The AQ is a 50-item self-report questionnaire assessing autistic traits in adults with normal intelligence. It consists of ten items in each of five domains: social skill, attention to detail, communication, imagination, and attention switching. Responses are given on a 4-point Likert scale (strongly agree to strongly disagree) and then dichotomized to indicate presence or absence of the symptom. Responses were summed to yield possible scores ranging from 0 to 50 for the total score and 0 to 10 for each of the subscales, with higher scores indicating greater symptomatology. For screening, the cut-off of a total score of 26 or greater

was used. Woodbury-Smith et al. (2005) reported good discriminative validity and good screening properties for the AQ using this cut-off score (sensitivity 0.95, specificity 0.52, and positive predictive value 0.84). The AQ had good internal consistency in the current study (α = .77).

Global Measure of Sexual Satisfaction (GMSEX; Lawrance et al., 2011). This was used to assess global sexual satisfaction. Respondents rate their sexual relationship with their partner on five 7-point bipolar scales: good–bad, pleasant–unpleasant, positive–negative, satisfying–unsatisfying, valuable–worthless. Total scores range from 5 to 35, with higher scores indicating greater sexual satisfaction. We altered the instructions to make the scale appropriate for both individuals in a current relationship and those not in a current relationship. Byers and colleagues (Glenn and Byers, 2009; Lemieux and Byers, 2008) have provided evidence for the internal consistency and validity of the scale using the revised instructions (α = .96 in the current study).

Self-Esteem Subscale of the Sexuality Scale (Snell and Papini, 1989). This ten-item scale assesses the tendency to view oneself positively as a sexual partner (e.g. 'I am confident about myself as a sexual partner'). Responses are on a 5-point scale from disagree (–2) to agree (+2) such that scores range from –20 to +20, with higher scores indicating greater sexual self-esteem. Snell and Papini (1989) report good internal consistency and adequate reliability (α = .96 in the current study).

Hurlbert Index of Sexual Assertiveness (Hurlbert, 1991). This scale assesses the frequency of engaging in 25 activities related to assertive behavior in sexual situations (e.g. 'I approach a partner for sex when I desire it') on a scale from never (0) to all of the time (4). The wording of four items was elaborated to reduce possible confusion: 'satisfy me' was changed to 'engage in sexual activities that satisfy me'; 'that is I tell them' was added in parenthesis after 'I am open with a partner'; 'tell a partner' was added in parentheses after 'speak up for [my sexual feelings]', and 'touch myself' was change to 'touch my genitals'. Participants who were not in a relationship at the time were instructed to respond to the questions with respect to their most recent partner. Scores range from 0 to 100, with higher scores indicating higher sexual assertiveness. The author reported high internal consistency and evidence for the scale's predictive validity (α = .93 in the current study).

Sexual Arousability and Sexual Anxiety Inventory (Hoon et al., 1976). This scale consists of 14 items that describe different sexual situations. We added two additional items that are likely to be particularly relevant to individuals with ASDs: 'When your partner touches you lightly' and 'When you are in close physical contact with your partner'. In addition, we changed 'pornographic' to 'erotic' on two items and 'touches' in parentheses after the term 'fondles' in one item. On the arousal scale, participants indicate how sexually aroused they feel or think they would feel in the described situation (e.g. 'when you have intercourse with a partner'). Responses range from 'adversely affects arousal; unthinkable, repulsive, distracting' (-1) to 'always causes sexual arousal; extremely arousing' (5). On the anxiety scale, participants indicate how anxious they feel or think they would feel in the same 16 situations. Responses ranged from 'no anxiety' (0) to 'always causes anxiety, extremely anxiety producing' (5). Ratings are summed such that higher scores indicate greater arousability or anxiety. The authors report high rest–retest reliability and good construct validity (α = .93 for sexual anxiety and.93 for sexual arousability in the current study).

Sexual Desire Inventory (Spector et al., 1998). This is a 14-item measure of the frequency and intensity of sexual desire in different situations (e.g. 'when you are in a romantic situation'). Responses are given on a scale ranging from 0 to 8. Eight items refer to desire for sexual activity with a partner and were summed to form the Partner Desire Scale with scores ranging from 0 to 62. Three items refer to desire to engage in solitary sexual activity and were summed to form the Solitary Desire Scale with scores ranging from 0 to 23. Spector et al. (1998) reported high internal

consistencies for the two subscales and provided evidence for the scale's validity (α = .92 and.91, respectively, in the current study).

Sexual Activity Questionnaire (Salisbury (2003). This scale assesses the frequency with which respondents engage in the following sexual behaviors with a partner: kissing, hugging and cuddling, whole body contact, touching breasts and genitals, oral sex, vaginal intercourse, and anal intercourse on a seven-point scale ranging from 'not at all' (0) to 'more than once a day' (6). These items were used to create measures of the frequency of affection and of genital activity. Because these activities frequently occur together, Frequency of Affection was operationally defined as the affectionate behavior (kissing, hugging and cuddling, or whole body contact) that the participant had engaged in most often. Similarly, Dyadic Genital Frequency was defined as the frequency of the genitally focused behavior (i.e. oral sex, vaginal intercourse, or anal intercourse) that they had engaged in most often. Participants also indicated the frequency with which they 'masturbated or engaged in pleasurable stimulation of their own genitals alone' in the previous month on a seven-point scale ranging from 'not at all' (0) 'to more than once a day' (6). This item was used as the measure of Solitary Genital Frequency.

Sexual Functioning Questionnaire (MacNeil and Byers, 1997). This scale measures the frequency of nine sexual problems (e.g. 'I have trouble getting sexual aroused') within the last year on a scale from 'never' (1) to 'always' (5). Scores range from 9 to 45, with higher scores indicating more frequent sexual problems. The authors report evidence for the scale's internal consistency and validity (α = .80 in the current study).

Sexual Knowledge Questionnaire. This 23-item true-false questionnaire was created for the current study to assess knowledge of, and misinformation about, various aspects of sexuality that could affect sexual well-being (e.g. 'It is not emotionally healthy to masturbate every day'; 'the clitoris is a very sensitive area of female genitals'). Correct responses were summed such that scores could range from 0 to 23, with higher scores reflecting greater knowledge.

Sexual Cognitions Checklist (SCC; Renaud and Byers, 2011). This scale consists of a list of 57 possible sexual cognitions (e.g. 'having sex with an anonymous stranger', 'receiving or giving genital stimulation', 'watching someone have sex'). We elaborated on three items: 'mouth-genital stimulation' was added in parentheses after 'oral sex' on two items; and 'having many casual sexual relationships' was added in parentheses after 'being promiscuous'. Participants reported how often they have experienced each sexual cognition as positive on a scale ranging from 'I have never had this thought' (0) to 'I have this thought frequently during the day' (6). Positive Cognitions were defined for participants as sexual cognitions that the participant experienced as acceptable, pleasant, and the type of thought he or she would expect to have (egosyntonic). Ratings were summed such that scores ranged from 0 to 342. Renaud and Byers (2011) provided evidence for the reliability and the validity of the scales (α = .96 in the current study).

Procedure

Following ethical review, we contacted approximately 190 national and international autism organizations, including professional organizations, professionals who serve clients with ASDs, online ASDs-related message boards, and support groups. Contacts were mostly via email, with contact with some local agencies via phone to ask for their assistance in recruiting potential participants. Information about the study was provided to each organization or professional and they were asked to share the flyer in whatever way would be convenient for them (e.g. post, distribute, information

Table 1. Descriptive statistics on the sexual well-being measures and zero-order correlations

Sexual well-being measures	M	SD	Gender r_{pb}	Age r	Relationship status r_{pb}	AQ r
Sexual satisfaction	23.1	8.3	−.18*	.11	.29***	−.21*
Self-esteem	0.7	12.5	.00	.15	.25**	−.19*
Assertiveness	55.3	18.5	−.12	.09	.28***	−.22*
Anxiety	21.4	16.7	.17	−.16	−.22**	.33***
Arousability	38.0	19.1	−.39***	.10	−.03	−.19*
Dyadic desire	36.5	16.3	−.36***	–.01	.01	–.07
Frequency of affection	2.8	2.4	.06	−.13	.75***	−.13
Dyadic genital frequency	1.4	1.6	−.01	−.11	.57***	−.10
Problems	21.8	6.5	.20*	−.15	.04	.12
Knowledge	18.5	2.4	.19*	–.02	.01	−.07
Positive cognitions	74.2	48.8	−.36***	–.09	−.08	−.05
Solitary desire	11.8	7.1	−.22**	.05	−.06	−.02
Solitary genital frequency	2.9	1.9	−.33***	.04	−.16	.01

N = 141. Gender: 1 = male, 2 = female; relationship status: 0 = not in a relationship, 1 = in a relationship. * $p < .05$ ** $p < 0.01$. *** $p < .001$.

table). The flyer directed potential participants to the study website. Once they accessed the website, participants first read an informed consent page describing the purpose of the study, procedures, potential benefits and risks, and confidentiality. Information about how to contact the researchers with any questions about the study was also included. Participants who agreed to participate were linked to an identification number page and the survey. Participants were given an identification number to record or print out to allow the option of exiting early and returning later.

Participants first completed the demographic information followed by the AQ, Sexual Knowledge Questionnaire, GMSEX, and SCC. Finally the remaining measures were presented in random order. Participants finished with a debriefing page that explained the purpose of the study and provided further resources on sexuality with suggested websites and books.

Results

Of the 141 participants, 60% were in a romantic relationship at the time of the study; the remainder had been in at least one relationship of 3 months or longer in the past. Participants' scores on the AQ ranged from 28 to 49 (M = 38.4, SD = 5.4). Descriptive data on the sexual well-being measures used in this study and the zero-order correlations between the predictors and the criteria are presented in Table 1. In terms of dyadic sexual well-being, participants reported moderate sexual satisfaction, sexual self-esteem that was neither positive nor negative, being neither assertive nor unassertive, low sexual anxiety, moderate sexual arousability, moderate sexual desire for partnered sexual activities, engaging in affectionate activities once a week and genitally focused behaviors between once and twice in the last month, and rarely to sometimes experiencing sexual problems. In terms of solitary sexual well-being, they correctly answered 80% of the knowledge items and reported having each of the sexual thoughts once or twice ever, moderate sexual desire for solitary sexual activities, and engaging in solitary sexual activity once a week on average.

Predicting sexual well-being

Dyadic sexual well-being. We used canonical correlation analysis to determine the relationship between our predictor set (gender, age, relationship status, AQ score) and dyadic sexual well-being (sexual satisfaction, self-esteem, assertiveness, anxiety, arousability, dyadic desire, frequency of affection, dyadic genital frequency, and problems). Two significant variates emerged at step 1, $F(36, 481) = 5.96$, $p < .001$ (Table 2). The first variate accounted for 61% of the variance. Only relationship status was associated with the predictor variate. Sexual satisfaction, sexual assertiveness, frequency of affection, and dyadic genital frequency were correlated with the sexual well-being variate. Taken together, this pair of variates indicates that individuals currently in a relationship reported more frequent dyadic affectionate and genital activity, greater sexual assertiveness, and greater global sexual satisfaction. The second variate accounted for 24% of the remaining variance. Gender and AQ score were associated with the predictor variate. All of the sexual well-being variables except self-esteem, frequency of affection, and dyadic genital frequency were associated with the sexual well-being variate. Together, this pair of variates indicates that men and individuals with less ASD symptomatology reported better sexual well-being, including higher sexual satisfaction, sexual assertiveness, sexual arousability, and dyadic sexual desire as well as lower sexual anxiety and fewer sexual problems.

To determine which aspects of ASD symptomatology affect dyadic sexual well-being we conducted a canonical correlation analysis between the five AQ subscales and our measures of dyadic sexual well-being. The analysis produced one significant canonical function that accounted for 22% of the variance, $F(45, 571) = 1.79$, $p = .002$. The social skill and communication subscales were associated with the AQ variate. Sexual satisfaction, sexual esteem, and sexual anxiety were

Table 2. Canonical correlation analysis between the predictor set and the dyadic sexual well-being set

	Variate 1		Variate 2	
	r	Stand. coeff.	*r*	Stand. coeff.
Predictors Set				
Gender	−.15	−.12	**−.90**	−.95
Age	.17	.16	.08	−.29
AQ score	.17	.07	**−.42**	−.39
Relationship status	**−.97**	−.97	.10	.03
Dyadic sexual well-being set				
Sexual satisfaction	**−.32**	−.03	**.47**	.18
Self-esteem	−.29	.07	.07	−.41
Assertiveness	**−.32**	−.13	**.36**	−.18
Anxiety	.24	.05	**−.50**	−.51
Arousability	.10	.04	**.86**	.51
Dyadic desire	.03	.16	**.76**	.50
Frequency of affection	**−.98**	−.87	.12	.08
Dyadic genital frequency	**−.73**	−.13	.19	−.04
Problems	−.10	−.12	**−.41**	.16
R_c	**.78*** **		**.49*** **	

N = 141. Structure coefficients (correlations) greater than .30 were included in the interpretation of each canonical variate and are in bold. Gender: 1 = male, 2 = female; Relationship status: 0 = not currently in a relationship, 1 = currently in a relationship. ***$p < .001$.

Table 3. Results of the canonical correlation analysis between the predictor set and the solitary sexual well-being set

	r	Stand. coeff.
Predictors set		
Gender	**.88**	1.01
Age	.09	.40
AQ score	−.01	.02
Relationship status	.26	.27
Solitary sexual well-being set		
Knowledge	**.35**	.46
Positive cognitions	**–.78**	–.72
Solitary desire	**–.40**	.30
Solitary genital frequency	**–.67**	–.59
R_c	**.54*** **	

N = 141. Structure coefficients (correlations) greater than .30 were included in the interpretation of each canonical variate and are in bold. Gender: 1 = male, 2 = female; Relationship status: 0 = not currently in a relationship, 1 = currently in a relationship. ***$p < .001$.

associated with the sexual well-being variate. Taken together these variates indicate that greater ASD symptomatology in the social and communication domains was associated with lower sexual satisfaction and sexual esteem, and higher sexual anxiety. ASD symptomatology related to attention switching, lack of imagination, and high attention to details was not associated with dyadic sexual well-being.

Solitary sexual well-being. We took the same approach to analyzing the relationship between our predictor set and solitary sexual well-being (knowledge, positive cognitions, solitary desire, and solitary genital frequency). One significant variate emerged, accounting for 29% of the variance, $F(16,406) = 3.37$, $p < .001$ (Table 3). Only gender was associated with the predictor variate. All of the solitary sexual well-being variables were associated with their variate. Taken together, this pair of variates indicates that the women reported fewer sexual thoughts, lower solitary sexual desire, and less frequent solitary genital activity, but greater sexual knowledge. The canonical correlation analysis between the AQ subscales and solitary sexual well-being was not significant, $F(20, 438) = 1.40$, $p > .05$.

Discussion

This study is the first to provide information on the sexual well-being of high-functioning adults on the autism spectrum who had been in a romantic relationship of at least 3 months duration at some point in their lives. In keeping with the definition of sexual health and sexual well-being adopted by the World Health Organization (2006), we defined sexual well-being broadly to include knowledge, cognitions, and affect as well as sexual behavior. Most of these aspects of sexual well-being, particularly sexual thoughts and feelings, have not previously been assessed among individuals with ASDs. The results counter social stereotypes that cast individuals with disabilities, including individuals with HFA/AS, as asexual and/or that highlight sexual behavior problems (Hénault, 2005; Koller, 2000; Konstantareas and Lunsky, 1997; Shakespeare, 1996). That is, on average, participants were quite knowledgeable about areas of sexuality that can affect sexual functioning and reported engaging in both solitary and partnered sexual activity on a regular basis.

Furthermore, they reported moderate sexual desire and arousability, both of which are positive markers of sexual well-being. In terms of negative markers of sexual well-being, they reported infrequent sexual problems and low sexual anxiety. We did not find support for our prediction that younger individuals would report greater sexual well-being, despite growing acceptance of individuals with ASDs as being sexual people and access to sexual information on the Internet (Nichols and Blakeley-Smith, 2010). These results do not, however, negate findings that individuals with ASDs are more likely to engage in inappropriate sexually related behavior than are typically developing individuals (Allen et al., 2008; Stokes et al., 2007; Woodbury-Smith et al., 2006). However, the results demonstrate that positive sexual outcomes and sexual well-being also characterize this population, at least those members who are capable of being in an ongoing romantic relationship.

ASD symptoms and sexual well-being

As with neurotypical individuals, the results point to the importance of context rather than symptomatology as key to having an active sex life. That is, ASD symptomatology was not related to the frequency of affectionate or genital activity with a partner or to the frequency of solitary genital activity. In contrast, participants who were currently in a relationship reported more frequent affectionate and sexual activity and greater sexual assertiveness and sexual satisfaction than did participants who did not have a current partner. This suggests that the frequency of initiating and engaging in affectionate and dyadic sexual activity and, relatedly, sexual satisfaction is determined by the availability of a partner not by ASD symptomatology. Further, individuals with fewer symptoms were not more likely to be in a relationship (r = .08, ns).

In contrast, AQ scores (but not whether participants were in a relationship) were associated with other aspects of dyadic sexual well-being. This extends previous research that has demonstrated a link between autistic traits and romantic relationship functioning (Baron-Cohen et al., 2001; Renty and Roeyers, 2007). That is, regardless of relationship status, men and individuals with fewer symptoms reported higher sexual satisfaction, assertiveness, arousability, and desire, lower anxiety, and fewer sexual problems. As predicted, the severity of deficits in the areas of social skills and communication appear to particularly influence these relationships. That is, individuals with greater ASD symptomatology in the social and communication realms reported lower sexual satisfaction and sexual esteem and higher sexual anxiety. These results suggest that interventions to enhance the sexual relationships of adults with ASDs need to particularly target individuals with more ASD symptoms in these areas. On the other hand, some individuals with high ASD symptoms experience intimacy and/or sensory stimulation by a partner as overwhelming. These individuals may prefer to express their sexuality in solitary ways. This is an important alternative because, as expected, ASD symptomatology was not associated with solitary sexual well-being, including the extent of sexual knowledge, frequency of sexual thoughts, and/or desire for or frequency of solitary sexual activity. This suggests that, in keeping with social deficits inherent to ASDs, the effects of ASD symptoms on sexual well-being is specific to the interpersonal context. However, our sample was restricted to individuals who had been in a romantic relationship and, indeed, two-thirds of the sample were currently in a relationship. Thus, it is possible that ASD symptomatology is negatively associated with solitary sexual well-being in a sample of individuals who had never been in a relationship.

Gender

In keeping with predictions, based on both the zero-order correlations and the canonical correlation analyses, we found that the men reported greater sexual well-being than did the women in a

number of areas. In particular, the men reported greater sexual satisfaction, dyadic arousability, desire, and fewer sexual problems and more frequent positive sexual thoughts and greater desire for and frequency of solitary sexual activity. This is in keeping with societal standards that are generally more accepting of male than of female sexuality, particularly for individuals with disabilities (Byers, 1996; Shakespeare, 1996) and with the results of research with neurotypical individuals (Baumeister et al., 2001; MacNeil and Byers, 1997; Nicolosi et al., 2004; Petersen and Hyde, 2010; Renaud and Byers, 1999; 2001; Sanchez and Kiefer, 2007; Spector et al., 1998). These differences were not due to a lack of knowledge on women's part – in fact the women's sexual knowledge was greater than was the men's. There were also a number of aspects of dyadic sexual well-being on which men and women did not differ. For example, in keeping with past research with neurotypical individuals (Morokoff et al., 2009; Snell and Papini, 1989), we did not find gender differences in sexual esteem, sexual assertiveness, sexual anxiety, or frequency of affection and sexual activity with a partner. Thus, for the most part, the effects of gender roles on sexual functioning appear to be similar for individuals with HFA/AS who have been in a romantic relationship and for neurotypical individuals.

Conclusions

These results must be interpreted in light of both the limitations and strengths of the study. First, although all participants reported that they had received a diagnosis of ASD from a professional, because this was a community sample we cannot be sure that all individuals in fact met the criteria for a diagnosis of ASDs. However, all participants also fell above the recommended cut-off on the AQ. The AQ is well validated as a research screening instrument that discriminates individuals with ASDs from individuals without ASDs and, in fact, the mean AQ score for the sample fell considerably above the cut-off. As such, it is likely that participants retained in the sample fell on the autism spectrum. Further, our approach of recruiting participants through ASDs organizations and online communities enabled us to access individuals with HFA/AS who were less likely to be known to the mental health and developmental disability systems. Thus, it is likely that our sample was more diverse than would be obtained through clinical referrals. This approach also allowed us to recruit individuals who would not be willing to complete a questionnaire in a research setting that lacked anonymity.

Second, the extent to which selection bias may have influenced the results is unknown. Participants were highly educated. Further, 60% were women even though current estimates suggest that the ratio of males to females with ASDs in the general population is 4:1 and might be even higher among HFA/AS (Fombonne, 2003). This may be because we recruited from self-help groups and women are more likely than men to use the Internet to interact with similar others, to seek self-help, and to respond to requests to participate in research (Addis and Mahalik, 2003; Santor et al., 2007; Sax, Gilmartin, and Bryant, 2003; Weiser, 2000). In addition, only 74% of individuals who started the survey completed it. Among neurotypical individuals, participants in sexuality research tend to hold more permissive attitudes about sexuality and be more experienced than those who do not volunteer (Strassberg and Lowe, 1995; Wiederman et al., 1994), suggesting that HFA/AS individuals with the poorest sexual functioning may not be well represented in the sample. Finally, the study excluded individuals with ASDs who had never been in a relationship. Thus, the extent to which these results are generalizable to all individuals with HFA/AS is not known.

Nonetheless, this study provides the first comprehensive view of the sexual well-being of individuals with HFA/AS and provides a more positive report card than might be expected. Further, although we found that autism symptoms did affect sexual well-being, these effects were selective to the interpersonal context rather than generalized. These results highlight the importance of

conceptualizing sexual well-being as a multidimensional construct and assessing a wide range of aspects of sexual well-being to get an accurate picture of the sexual well-being of individuals with ASDs. The results also have implications for sexual health education for HFA/AS individuals. That is, it is important to go beyond presenting biological information and include discussion of solitary sexual arousal activities, such as sexual fantasy and self-pleasuring as equally positive alternatives (and not inferior alternatives) to dyadic sexual activities for individuals with HFA/AS, but particularly to individuals with high ASD symptoms.

The information provided by this study can serve as a basis to develop proactive strategies to enhance the sexual well-being of individuals with HFA/AS. It is essential that we provide young people with ASDs with sexuality education that meets their learning needs and style of learning. Such sexuality education needs to foster a positive attitude toward sexuality, enhance self-awareness and self-esteem, and focus on thoughts, feelings, attitudes, and behavior. Our results suggest that girls with ASDs, in particular, may need support in developing a positive sexual self-view and sexual relationships. The finding that greater ASD symptomatology was associated with less positive dyadic sexual well-being suggests that it is critical that sexuality education curricula for individuals with ASDs include core social and relationship skill development (e.g. perspective taking, effective communication) that is fully integrated with more traditional sexuality content. In addition, caregivers/parents and professionals in the community must develop a greater understanding of the breadth of what constitutes healthy sexuality for individuals with ASDs (e.g. not only activity with a partner). By starting early, providing positive messages about sexuality, and emphasizing foundational social development, individuals with ASDs will have the opportunity to develop a positive sexual self-view, build confidence and self-knowledge, avoid potentially dangerous situations for themselves and others, and seek the sexual well-being that best meets their needs and desires.

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