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Sexuality in a Community Based Sample of Adults with Autism Spectrum Disorder

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### Abstract

Few studies have examined the sexual attitudes and behaviours of individuals with high functioning autism spectrum disorders (ASD) living in community settings. A total of 82 (55 female and 17 male) adults with autism were contrasted with 282 members of the general population on their responses to an online survey of sexual knowledge and experiences. Findings revealed that individuals with ASD display an interest in sex and engage in sexual behaviors and showed no significant differences in breadth and strength of sexual behaviors and comprehension of sexual language when contrasted with non-ASD participants. However, despite these similarities, a higher rate of asexuality was found among individuals with ASD. In addition, the results of the current study indicated that females with ASD show a significantly lower degree of heterosexuality when compared to males with ASD. The results also suggested a higher degree of homosexuality among females with ASD although this effect did not reach significance.

*Keywords:* Autism Spectrum Disorder; sexual behaviour; sexual orientation

## Sexuality in a Community Based Sample of Adults with Autism Spectrum Disorder

### **1. Introduction**

Autism spectrum disorders (ASDs) are a group of developmental disorders characterized by impairments in social interaction, verbal and non-verbal communication, and stereotyped and repetitive behaviours (American Psychiatric Association, 2000, pp. 69-70). Past research has rarely examined the sexual interests and behaviours exhibited by this population. Yet, research on this topic is of particular importance due to the fact that while individuals with ASDs demonstrate sexual behaviours and interests, these are often displayed inappropriately (Hellemans, Colson, Verbraeken, Vermeiren, & Deboutte, 2007). There is also some evidence indicating that sexuality among individuals with ASDs differs from that in the general population at a fundamental level. For example, an increase in sexual behaviors towards the same sex has been described (Haracopos & Pedersen, 2004). Differences in sexual attitudes were also apparent in individuals with ASD when compared to the general population and those with other disabilities. Higher levels of negative attitudes with respect to homosexual behaviour and masturbation have been reported among individuals with ASD compared to the general population (Konstantareas & Lunskey, 1997). However, the level of endorsement of these activities was higher among those with ASD than among individuals with other developmental disabilities. Konstantareas and Lunskey suggested that negative attitudes might have been imposed on ASD participants by caregivers.

Some studies have found a lack of person-oriented sexual behaviors among individuals with autism spectrum disorders. A study of 89 adults living in group homes in North Carolina (Van Bourgondien, Reichle, & Palmer, 1997) showed that person-oriented sexual behavior was exhibited by only 34% of the participants, although masturbation was common. A high degree of

asexuality among individuals with ASD was also found in a community based sample of individuals with ASD (Marriage, Wolverton & Marriage, 2009). Approximately 33% of Marriage et al.'s sample appeared to be asexual. A comparable figure for asexuality in the general population is suggested to be 1% (Bogaert, 2004). Of the ASD participants who displayed an interest in sexual behaviour, most had significant difficulties in this domain. Some attempted relationships that failed and two of the males in the study temporarily sought gender reassignment (Marriage et al.).

Much of past research on sexuality and ASDs has focused on persons living in group home settings. Haracopos and Pedersen (2004) conducted a nationwide study of the sexuality of individuals with autism living in group homes across Denmark. Of the 81 adults in the study, 74% displayed person-oriented sexual behaviours. Level of functioning seemed to be a determining factor in sexual orientation among participants. Among the highest functioning individuals, 75% directed their sexual behaviours exclusively towards the opposite sex. This was true of only 27% of the fair functioning individuals, and none of those who were low functioning. Of the 34 individuals who showed definite signs of sexual behaviour, 41% displayed exclusively heterosexual interactions, 35% directed behaviours towards both sexes, 9% showed exclusive homosexual interactions, and researchers were unable to determine the sexual preferences of the remaining 15% (Haracopos & Pedersen, 2004). Another study of 24 male adolescents with high functioning autism who lived in institutional settings showed that 58% of the patients had a clear heterosexual orientation, 13% had a clear bisexual orientation, 4% had a clear homosexual orientation, and the sexual orientation of the remaining 25% was unclear (Hellemans et al., 2007). By comparison, an international study on homosexuality in the general population (Sell, Wells & Wypij, 1995) reported that the incidence of males in the general

population engaging in homosexual activity within the last five years was between 4.5 and 10.7% for the United States, the United Kingdom, and France. Comparable figures for females were between 2.1 and 3.3%. The levels of homosexual attraction were considerably higher at between 16.3 and 20.8% for males and between 17.8 and 18.6% for females (Sell et al.).

The link between ASD and increased homosexuality might arise from the fact that both the development of autistic traits and homosexuality are related to prenatal androgen exposure. Prenatal androgens are believed to masculinize the brain and exposure to extremely high levels of androgens in utero may contribute to both homosexuality and ASD (Baron-Cohen, 2002; Auyeung et al., 2009). Persons exposed to high levels of prenatal androgens have lower 2D:4D digit ratios than expected, with females showing patterns more typical of males (Lutchmaya, Baron-Cohen, Raggatt, & Manning, 2004). Individuals who score high on autistic traits also exhibit digit ratio patterns indicative of prenatal androgen exposure (Manning, Baron-Cohen, Wheelwright, & Sanders, 2001). Furthermore, Kraemer et al. (2006) found a relationship between low digit ratios and homosexuality in females but not in males, suggesting that prenatal androgen exposure is related to female homosexuality.

At present, research on sexual orientation and ASD outside of group home settings is lacking. Studies involving individuals with ASD living in group homes may be difficult to generalize to those living independently in the community. Several factors contribute to this lack of generalizability. Individuals living in group homes are typically lower functioning than those who are capable of independent living. Furthermore, group homes often house members of only one sex and there are few opportunities for social interactions with the opposite sex or individuals without disabilities. This might affect the sexual behaviour patterns of those housed in group homes. Since the incidence of homosexuality among those with ASD may be different

among males and females, it is also of importance to state that none of the previous studies on autism and sexual orientation compared the participants by gender.

The present study utilized an online survey aimed at comparing the sexual knowledge and experiences of individuals with high-functioning ASD living in the community to that of members of the general population. We predicted that individuals with ASD would score lower on measures of both sexual knowledge and experience than those without ASD. This study also aimed to determine whether there was a relationship between high-functioning autism and homosexuality in a community based sample of participants. The prenatal androgen theory suggests that there would be a higher incidence of same-sex oriented behaviours and attitudes and a correspondingly lower incidence of behaviours and attitudes targeting members of the opposite sex among females with ASD. The reverse finding, i.e. a lower rate of homosexuality and higher rate of heterosexuality would be expected among males. The lower rate of homosexuality among males is expected because a hypermasculinized brain would likely result in increased gynephilia.

## **2. Method**

### *2.1. Participants*

Data was collected from 484 participants. Data from a total of 120 participants was not analyzed due to refusal or inability to provide informed consent, or due to missing data with respect to ASD status. Of the 364 participants retained for analysis, 95% resided in a country with English as an official language. Eighty-two participants had been diagnosed with ASD, and 282 were members of the general population. The ASD group was composed of 55 female and 27 male participants. Of these, 14 had additional family members with ASD. The control group

of participants from the general population was composed of 180 female and 102 male participants. Of these, 28 had family members with ASD.

## *2.2. Materials and Procedure*

Online survey software was used to create a survey that utilized standardized tests to measure estimated degree of ASD, sexual experiences, and sexual orientation among participants. The survey was advertised on websites which post links to research pertaining to ASD or general psychology. Examples include the Edmonton Autism Society website, North American and European sites featuring links to studies in the Social Sciences, and a personal Asperger's Syndrome themed blog operated by one of the authors. Additional participants from the general population were recruited from a research participation site for introductory psychology students at a small Canadian University.

The survey included demographic questions regarding the participants' age, country of origin, religious background, current relationship status of the participants (single, married etc.), and diagnostic status. Baron-Cohen et al.'s (2001) Autism Quotient (AQ) test was one standardized test included in the survey. The AQ is a self-report measure of 50 questions about characteristics generally associated with autism spectrum disorders. These characteristics include difficulties with social skills, communication skill impairments, imagination deficits, problems diverting attention, and exceptional attention to detail. In addition, participants completed Trotter and Alderson's (2007) Sexual Experience Questionnaire which consists of 12 multiple choice questions about various sexual experiences ranging from deep kissing to intercourse. The choices reflect the degree to which individuals engage in each activity. This test was included to explore the level of sexual experience among participants. The sexual vocabulary test (Ousley, & Mesibov, 1991), included in this survey is a multiple choice test consisting of two subsections of

seven questions. The first section contains questions about sexual experience. The second section contains questions about what sexual activities the participant would like to engage in. The Sexual Vocabulary Test was designed for individuals with developmental disabilities and sexual activities are explained in simpler terms than in Trotter and Alderson's Sexual Experience Questionnaire. The Sexual vocabulary test was included to confirm that the responses on Trotter and Alderson's Sexual Experience questionnaire were valid and not affected by potential difficulties in vocabulary among participants.

One limitation in research on homosexuality in individuals with ASD is that it is difficult to define homosexuality even in the general population. Most researchers believe homosexuality is not a unitary trait. The Sell Scale of Sexual Orientation (Gonsiorek, Sell, & Weinrich, 1995) was selected as a measure of sexual orientation because it is a comprehensive test that measures multiple aspects of sexual orientation. The test ascertains individuals' biological sex, followed by separate measures of sexual interests, sexual behaviours, and sexual identity. For the purposes of the current study, the scores on the Sell Scale were re-coded into four orientation categories: asexuality, heterosexuality, bisexuality and homosexuality. Behaviours and interests were coded into one measure of Breadth of Sexuality (overall number of sexual partners and number of potential partners the participant was interested in) and another measure of Strength of Sexuality (frequency of occurrence of sexual behaviours and interests, and reported strength of interest).

### **3. Results**

Control participants in the current sample were significantly younger than ASD participants ( $M_{ASD}=28.9$  years,  $SD=9.3$ ;  $M_{controls}=23.2$  years,  $SD=7.3$ ;  $t=5.04$ ,  $p<.001$ ). The two groups also differed significantly with respect to country of origin ( $t=5.25$ ,  $p<.001$ ), as 70.2% of the control group lived in Canada, and 20.6% lived in the United States. By contrast, 26.8% of

ASD participants lived in Canada and 52.4% lived in the United States. In addition, the two groups differed with respect to religious background, as 22.2% of the participants in the ASD group were Catholic or Protestant, and 48% were Atheist, as compared to 40.9% of control participants who were Catholic or Protestant, and 31.7% Atheist ( $t=3.71, p<.001$ ). ASD participants were more likely than control participants to be of Caucasian origin (87.7% of ASD participants and 78.6% of control participants were Caucasian,  $t=1.99, p=.048$ ). There were no significant group differences with respect to biological sex, mother tongue, or marital status.

Scores on Baron-Cohen et al.'s (2001) AQ test differed significantly between the two groups ( $t=16.93, p<.001$ ), confirming that participants in the ASD group were exhibiting significantly more traits characteristic of autism than participants in the control group. Baron-Cohen et al. stated that AQ scores at or above 32 were clinically significant indicators of autistic traits. The mean AQ score of the ASD group was above this cutoff score ( $M=36.98, SD=8.33$ ), whereas the mean AQ score of the control group was well below the cutoff score ( $M=17.32, SD= 7.12$ ).

The two groups did not differ significantly with respect to previous sexual experience as measured by Trotter and Alderson's (2007) Sexual Experience Questionnaire ( $t=-.87, p=.39$ ). To confirm that these scores were valid and not affected by potential language problems in the ASD participants, correlations were computed between the responses to the question "How often have you gone further than necking (this means doing more than kissing and hugging)?" on the Sexual Vocabulary Test (Ousley, & Mesibov, 1991) and responses to "Have you ever engaged in penile-vaginal intercourse (penis in vagina)?" on Trotter and Alderson's Sexual Experience Questionnaire. Responses to these two questions were significantly correlated in both groups (Spearman's  $\rho_{ASD}=.681, n= 67, p<.001$ ; Spearman's  $\rho_{Controls}=.699, n=245, p<.001$ ), and a

post hoc test indicated that the two correlations did not differ significantly ( $p < .807$ ). This would suggest that the community based sample of ASD participants was equally conversant with the sexual terminology used in the survey as the sample of control participants.

A univariate 2 (group) x 2 (sex) Analysis of Variance (ANOVA) was computed to test whether the two groups differed significantly with respect to measures of sexual orientation and whether sexual orientation was affected by sex. ASD participants scored significantly lower on measures of heterosexuality ( $M_{ASD}=14.45$ ,  $SD=9.40$ ;  $M_{Controls}=20.59$ ,  $SD=6.78$ ) and scored significantly higher on measures of bisexuality ( $M_{ASD}=4.47$ ,  $SD=6.73$ ;  $M_{Controls}=1.60$ ,  $SD=3.76$ ), homosexuality ( $M_{ASD}=4.71$ ,  $SD=6.91$ ;  $M_{Controls}=1.16$ ,  $SD=4.57$ ), and asexuality ( $M_{ASD}=1.29$ ,  $SD=3.27$ ;  $M_{Controls}=0.27$ ,  $SD=2.09$ ) than control participants (see Table 1). The main effect of sex was statistically significant for the measures of homosexuality, bisexuality, and breadth of sexuality. On average, males were more strongly heterosexual than females ( $M_{male}=20.05$ ,  $SD=7.65$ ;  $M_{female}=19.02$ ,  $SD=7.80$ ), less strongly bisexual than females ( $M_{male}=1.49$ ,  $SD=3.54$ ;  $M_{female}=2.53$ ,  $SD=5.10$ ), and had a greater breadth of sexuality than females ( $M_{male}=6.37$ ,  $SD=3.43$ ;  $M_{female}=4.47$ ,  $SD=3.25$ ). There was a significant interaction effect of sex by group for heterosexuality. While heterosexuality was overall lower in ASD participants than controls, female ASD participants had significantly lower scores on the measure for heterosexuality than male ASD participants, whereas male and female control participants had almost identical strengths of heterosexuality (see Tables 1 and 2). In addition, a significant sex by group interaction was found for breadth of sexuality. Whereas breadth scores of male and female ASD participants did not differ significantly, male control participants had a significantly greater breadth of sexuality than female control participants (see Tables 1 and 2).

Table 1

*Univariate ANOVAs for Sex and Group Differences in Sexuality Measures*

Measure	Sex		Group		Sex by Group	
	<i>F</i> (1,3)	<i>p</i>	<i>F</i> (1,3)	<i>p</i>	<i>F</i> (1,3)	<i>p</i>
Heterosexuality	4.22	.041*	20.47	<.001**	4.56	.034*
Bisexuality	3.93	.048*	13.16	<.001**	1.07	.301
Homosexuality	1.62	.204	9.99	.002**	3.65	.057
Asexuality	2.10	.149	9.61	.002**	0.16	.693
Breadth	5.82	.016*	0.47	.494	5.47	.020*
Strength	2.23	.137	.001	.970	0.02	.897

\* $p \leq 0.05$ \*\* $p \leq 0.005$

Table 2

*Means and Standard Deviations of Sexual Orientation Measures by Group and Sex*

Measure	ASD group				Control group			
	Females (n=55)		Males (n=27)		Females (n=180)		Males (n=102)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Heterosexuality	12.95	9.50	17.78	8.48	20.62	6.42	20.53	7.42
Bisexuality	5.13	7.30	3.00	5.12	1.84	4.10	1.17	3.06
Homosexuality	5.50	7.29	2.94	5.79	1.43	4.09	1.94	5.34
Asexuality	1.47	3.42	0.90	2.94	0.39	1.91	0.07	0.64
Breadth of Sexuality	5.11	4.33	5.15	3.36	4.29	2.87	6.65	3.40
Strength of Sexuality	12.50	8.50	11.35	6.18	12.58	5.02	11.21	4.51

In order to test whether participants in the ASD and control groups differed with respect to whether their sexual behaviour patterns were indeed reflective of the direction of sexual attraction, Spearman's rho correlations between the direction of sexual attraction (from homo- to heterosexual) and the sex of sexual partners (from same sex to opposite sex) were calculated for each group ( $\rho_{ASD}=.678$ ,  $n=59$ ;  $\rho_{Controls}=.704$ ,  $n=241$ ). Post-hoc comparisons of the correlations indicated that there was no significant group difference in how closely sexual interests were related to sexual behaviour patterns ( $p<.737$ ).

#### **4. Discussion**

This current study suggests that high functioning individuals with ASD living in the community do display an interest in sex and engage in sexual behaviors. Participants' responses on the Sell Scale of Sexual Orientation (Gonsiorek et al., 1995) showed no significant differences in breadth and strength of sexual behaviors between the ASD and non-ASD participants, only between males and females of both groups. The Sexual Vocabulary Test (Ousley & Mesibov, 1991) also indicated there was no significant difference between ASD participants and control participants with respect to comprehension of sexual language. However, despite these similarities, a higher rate of asexuality was found among individuals with ASD. In addition, the results of the current study indicated that females with ASD show a significantly lower degree of heterosexuality when compared to males with ASD. The results also suggested a higher degree of homosexuality among females with ASD although this effect did not reach significance.

These results fit with what we know about the neural basis of ASD. Auyeung et al. (2009) stated that prenatal testosterone is correlated with both masculine brain development and autistic traits. Androgen receptors are found in the amygdala, fusiform gyrus, and medial

prefrontal cortex. These regions of the brain contribute to the interpretation and expression of emotions (Chapman et al., 2006). Deficits in these areas of development are key features of an ASD diagnosis. (American Psychiatric Association, 2000, pp. 69-70).

The above neuroanatomical findings are complemented by several behavioural studies. Research has provided evidence of a negative correlation between levels of prenatal testosterone and ability to empathize with others and interpret non-verbal cues (Chapman et al., 2006). There is also evidence of an inverse relationship between levels of prenatal testosterone and the quality of social relationships (Knickmeyer, Baron Cohen, Raggatt, & Taylor, 2005). Nettle (2007) found that women score higher on identifying and interpreting emotions than men, and men score higher than women on problem-solving in non-social domains. According to Nettle, homosexual women score lower than heterosexual women on cognitive abilities related to identification and interpretation of emotions.

The results of this study did not support our prediction of a lower rate of homosexuality among males with ASD. One possible explanation is that testosterone plays a more crucial role in the development of homosexuality and ASD in females than it does in males. Some support for this suggestion can be found in digit-ratio studies. Persons exposed to high levels of prenatal androgens have lower 2D:4D ratios than expected (Lutchmaya et al., 2004). Individuals who score high on autistic traits also demonstrate these digit ratio patterns (Manning et al., 2001). However, this difference in digit ratios among individuals with ASD is larger in females with autistic features than in males (Debruin, De Nijs, Verheij, Verhagen, & Ferdinand, 2009). Kraemer et al. (2006) also found a relationship between low digit ratios and homosexuality in females but not in males. Although lower than normal levels of prenatal androgens in males contribute to an increased incidence of homosexuality (Dörner et al., 1980), it is possible that the

reverse is not true. In other words, excessive prenatal testosterone may not be correlated with a lower rate of homosexuality among males. In fact, Jenkins (2010) suggested that homosexuality in both females and males may be associated with a hypermasculinized brain. Our finding of an overall higher rate of homosexuality among both male and female participants with ASD would support Jenkins' suggestion.

Low sample sizes, especially in the group of males with ASD, made it difficult for us to compare ASD participants across gender. Replicating the current study with a larger sample size would permit more valid conclusions about the effect of ASD diagnosis on bisexuality and homosexuality. A longitudinal study measuring fetal testosterone levels during routine amniocentesis followed by measures of sexual orientation in adulthood could determine whether a negative correlation exists between excessive prenatal testosterone and male homosexuality. Such a study could also confirm whether excessive prenatal testosterone is more strongly correlated with autistic traits in females than in males.

There is some evidence conflicting with Baron-Cohen's (2002) Extreme Male Brain Theory of Autism. This theory suggests that individuals with ASD should score higher than controls on visual-spatial tasks. Yalof (2006) presented a case of a male child with characteristics of Asperger's Syndrome with high verbal skills and low visual spatial skills. Falter, Plaisted, and Davis (2008) found no correlation between 2D:4D ratios, autism diagnosis, and performance on rotational aspects of mental rotation tasks. Individuals with ASD scored higher than controls on non-rotational tasks, suggesting that increased performance on these tasks was due to different factors than an extreme male brain. Voracek and Dressler (2006) found a lack of correlation between 2D:4D ratios and the Autism-Spectrum Quotient (Baron-Cohen et al., 2001). They also found that 2D:4D ratios were correlated with neither the Empathy Quotient (Baron-Cohen &

Wheelwright, 2004) which measures ability to empathise with others and interpret emotion, nor with the Systemizing Quotient (Baron-Cohen, Richler, Bisarya, Guranathan, & Wheelwright, 2003), which examines processing of cognitive aspects of the environment in non-social domains.

Studies that do not support the Extreme Male Brain theory suggest that prenatal testosterone levels are not the only factors contributing to the development of ASD. There are in fact several other risk factors for Asperger's Syndrome including family history, prenatal factors, and perinatal factors (Gillberg & Cederlund, 2005). Prenatal and perinatal factors are said to contribute to Asperger's in only 25% of cases. Therefore, even if prenatal testosterone and a resulting brain masculinisation is a contributing factor in some cases of ASD, it likely does not contribute in all cases. Similarly, prenatal testosterone levels are probably not the only etiological factor contributing to homosexuality. Instead, interactions between various biological and environmental factors contribute to homosexuality (Jenkins, 2010).

There are several possible non-biological explanations for the present findings. One possibility is that a lack of suitable partners makes individuals with ASD less gender selective and more likely to select a suitable same-sex partner over an unwilling or unsuitable opposite-sex partner. However, this is not what our results demonstrated. Examination of both ASD and control participants showed a high correlation between sexual interests and sexual behavior. There was no significant difference in these measures between the ASD and control group. Another possible explanation is that individuals in the general population are more concerned with social norms than individuals with ASD. If members of the general population have both homosexual and heterosexual interests, they may be more likely to suppress homosexual interests and behaviours. Therefore, it is possible that some of the group differences we found do

not reflect actual differences in sexual orientation between the two groups, but differences in adhering to social norms and possibly in socially desirable responding on tests.

### **5. Limitation**

One bias present in the current survey is that volunteer participants in sex surveys are likely to have a high pre-existing interest in sexuality. Our study did indicate a higher rate of asexuality among ASD participants compared to controls. However, it is possible that asexual ASD participants were still underrepresented in our study, as they would be less likely to volunteer for sex research than sexual persons with ASD. One piece of evidence supporting this contention is the fact that the Marriage et al. (2009) study found a higher degree of asexuality in a community based sample of individuals with ASD than was found in the current sample of ASD participants.

### **5. Conclusions**

The present study investigated the sexual knowledge and experiences of individuals with high-functioning ASD living in the community to that of members of the general population. The findings revealed that caregivers, family members, and friends of individuals with ASD must be made aware that the majority of these individuals do have sexual interests and behaviors. The present study demonstrated the sexual nature of individuals with ASD living in the wider community. There is no priori reason to suggest that individuals with ASD living in group homes would lack significant levels of sexual interests. Further research should focus on developing sex education programs that are developmentally appropriate for individuals with ASD. Teaching strategies and content of programs would differ depending on individuals' intellectual level and severity of ASD. One possible addition to sex education programs for individuals with ASD, especially among higher functioning individuals, would be a discussion of

the potential differences in sexuality faced by the ASD population when compared with the general population. For instance, if future research supported our finding of increased rates of bisexuality and homosexuality among this population, this should be discussed with patients in order to help them understand and accept their sexual identities. Future studies should also address appropriate sexual outlets for individuals on all levels of the Autism Spectrum. Research in this area should be conducted with the goal of reducing frustration and increasing understanding for individuals with ASD and those who associate and work with them.

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