

## Sexual attraction and relationships in adolescents with Autism

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### Abstract

Past research suggests more variation in sexual attraction in Autism Spectrum Disorder (ASD) using clinical samples. This study utilised a population representative group of 14/15 year olds from the Longitudinal Study of Australian Children. Ninety-four adolescents (73 males, 21 females) with ASD and 3454 (1,685 males, 1,675 females) without self-reported on sexual attraction and past sexual relationships. Females with ASD reported lower rates of heterosexual preference (adjusted odds ratio: 0.14,  $p < .001$ ), higher rates of bisexuality (adjusted odds ratio: 6.05,  $p < .001$ ) and uncertainty in attraction (adjusted odds ratio: 10.44,  $p < .001$ ) compared with non-ASD females. ASD males reported fewer prior [boyfriends/girlfriends](#). Findings confirm female adolescents with ASD have differences in sexual attraction compared with non-ASD females.

Key Words: Autism, adolescent health, sexuality, sexual attraction

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## Sexual attraction and relationships in adolescents with Autism

### Abstract

Past research suggests more variation in sexual attraction in Autism Spectrum Disorder (ASD) using clinical samples. This study utilised a population representative group of 14/15 year olds from the Longitudinal Study of Australian Children. Ninety-four adolescents (73 males, 21 females) with ASD and 3454 (1,685 males, 1,675 females) without self-reported on sexual attraction and past sexual relationships. Females with ASD reported lower rates of heterosexual preference (adjusted odds ratio: 0.14,  $p < .001$ ), higher rates of bisexuality (adjusted odds ratio: 6.05,  $p < .001$ ) and uncertainty in attraction (adjusted odds ratio: 10.44,  $p < .001$ ) compared with non-ASD females. ASD males reported fewer prior [boyfriends/girlfriends](#). Findings confirm female adolescents with ASD have differences in sexual attraction compared with non-ASD females.

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Autism Spectrum Disorder (ASD) is a heterogeneous behavioural disorder affecting neurodevelopment in around 1-2% of children (American Psychiatric Association, 2013; Randall et al., 2016). Symptoms include social deficits and impairment in verbal and non-verbal communication skills, as well as repetitive behaviours including fixated interests (American Psychiatric Association, 2013). These core deficits impact on the ability to form and maintain relationships with others. However, most individuals with ASD experience sexual interest, behaviour and desire and enter sexual relationships.

Adolescence is a critical time of development where biological and psychological changes take place, including the development of sexuality (Kar, Choudhury, & Singh, 2015). Exploring sexuality in ASD during adolescence has been paid minimal research attention. Both sexual attraction and sexual behaviours are varied across different cultures and depend on a range of factors including sexual norms and the way these constructs are measured. [For example, factors which can influence sexuality include parent education level and race \(Santelli, Lowry, Brener, & Robin, 2000\), and for girls whether they live in a single parent family \(Davis & Friel, 2001\).](#) Recent estimates in the general population suggest that non-heterosexual attraction is present in 1-15% of adolescents and young adults and generally higher in females (Savin-Williams & Ream, 2007). Other estimates from the general population of 14 year olds show 12.5% among females and 13.1% among males have had sex (Liu et al., 2015) and that around 40% of 14 year olds report having had a romantic relationship in the last 18 months (Carver, Joyner, & Udry, 2003).

There are mixed findings in regard to the sexual behaviour of those with ASD compared to control groups (Byers, Nichols, & Voyer, 2013; Hellemans, Colson, Verbraeken, Vermeiren, & Deboutte, 2007; Kellaher, 2015; Ousley & Mesibov, 1991; Pecora, Mesibov, & Stokes, 2016). For example, males and females with ASD have been found in on an online study, to have a later age of first sexual intercourse and to be more likely to have never had intercourse relative to controls (Bejerot & Eriksson, 2014). In contrast, an online study of adults with ASD found no difference in

marital status and sexual experience (Gilmour, Schalomon, & Smith, 2012). Studies of adolescents are lacking, however, one study of 15-18 year old male adolescents reported similar sexual experiences in regard to sexual debut and relationship experience (Dewinter, Vermeiren, Vanwesenbeeck, Lobbestael, & Van Nieuwenhuizen, 2015).

Research on sexual attraction in ASD suggests it may also differ from that in the general population (Hellemans et al., 2007). Higher rates of bisexuality and homosexuality have been reported in both male and female adults with ASD (Bejerot & Eriksson, 2014; Byers et al., 2013; Gilmour et al., 2012; Ingudomnukul, Baron-Cohen, Wheelwright, & Knickmeyer, 2007). Individuals with ASD have also been reported as having higher rates of asexuality or reduced sexual interest (Bejerot & Eriksson, 2014; Byers et al., 2013; Gilmour et al., 2012; Ingudomnukul et al., 2007).

However, most of these studies did not control for other factors which might impact on sexuality such as country of origin, religious background, race and education level (Bejerot & Eriksson, 2014; Byers et al., 2013; Gilmour et al., 2012). In young people, one study of 24 high-functioning male adolescents with ASD (mean age 17 years, range 15-21) in a residential care setting similarly found elevated rates of bisexuality (13%) and unknown sexual attraction (25%) (Hellemans et al., 2007). Another study exploring 50 clinically and community referred adolescent high-functioning males aged 15-18 years with ASD found no difference with a comparison group in self-reported rates of heterosexuality and homosexuality, but did not enquire regarding asexuality or uncertainty of sexual attraction (Dewinter et al., 2015).

A number of explanations for the differences in sexual attraction found in ASD have been proposed. This includes individuals with ASD not being influenced by the sexual norms of the community and a "gender blindness" favouring personal qualities over one's gender (Bejerot & Eriksson, 2014). Higher rates of asexuality may be associated with lower libido (Bejerot & Eriksson, 2014) or could be due to the social challenges involved in finding a partner (Ingudomnukul et al., 2007). Another theory proposes there may be increased rates of foetal androgen exposure in individuals with ASD resulting in masculinised behaviour which could potentially explain elevated

rates of bisexuality and homosexuality in women with ASD (Bejerot & Eriksson, 2014; Ingudomnukul et al., 2007). Consistent with this, increased levels of foetal testosterone have been correlated with later autistic traits (Auyeung et al., 2009) including communication impairment (Whitehouse et al., 2010), although they fail to explain the higher rates of bisexuality and homosexuality in men with ASD.

One significant caveat with the existing studies that have explored sexuality in ASD is that they have generally used clinical participants, participants from residential settings and online surveys (Bejerot & Eriksson, 2014; Byers et al., 2013; Gilmour et al., 2012) rather than samples derived from the general population, which may bias the findings in various ways. For example, clinical participants and those from residential settings are likely to represent individuals who show greater impairment and may have reduced opportunities to access to sexual partners, while online surveys are likely to recruit higher-functioning individuals [potentially with motivation to complete a questionnaire about their sexuality](#). Another limitation of studies to date is that most have used adult samples, which – unlike exploring adolescent sexuality – will fail to provide insights into the emergence of sexual attraction in individuals with ASD. The present study utilised an Australian population representative sample to explore self-reported: 1) sexual attraction and 2) sexual relationship behaviour in adolescent males and females with ASD relative to non-ASD adolescents.

## Method

### Study Design

The Longitudinal Study of Australian Children (LSAC) employs a cross-sequential design that follows two Australian population representative cohorts of children, initially aged 0-1 years (Birth (B) cohort; N=4,983) and 4-5 years (Kindergarten (K) cohort; N=5,107) in 2003, assessed at 2 yearly waves. Data from the K cohort at Wave 6 (14-15 years) was used in the current study when retention was N=3,454.

## Measures

*ASD status* was determined using parent report when the children were aged 14-15 years. During parent interview, where the primary caregiver was asked: 'Does your child have any of these ongoing conditions?' from which parents could respond "yes" or "no" to 'Autism, Aspergers, or other autism spectrum'. If parents answered yes, the child was classified as having an ASD.

*Sexual attraction* was a self-report by the child at 14-15 years using an audio computer-assisted self-interview (ACASI) by themselves. This method allows for sensitive content to be answered by the child with anonymity. *If children asked a question during the ACASI, interviewers were instructed to encourage the child to use their own knowledge as best they can and were instructed to refrain from providing any detailed explanations to ensure interviews were standardised across study participants.* Children were asked: "Which of these statements best describes your sexual feelings at this time in your life" with response options: "I'm attracted only to males; I'm attracted only to females; I'm attracted to males and females; I'm not sure who I'm attracted to; I don't feel any attraction to others."

*Sexual behaviour* questions included self-report using ACASI on the following: "Have you ever had sex? How old were you the first time you had sex? Are you going out with anyone, that is, do you currently have a boyfriend or girlfriend? How many boyfriends/girlfriends have you had?"

*Cognitive and Language functioning.* Language functioning was assessed using the short version of the Peabody Picture Vocabulary Test Third-edition (PPVT-III) (Dunn & Dunn, 1997) at 8 years of age.

Cognitive functioning was assessed using the Matrix Reasoning subtest from the Wechsler Intelligence Scale for Children IV (WISC-IV) (Wechsler, 2003) at 10 years of age which has a mean of 10 and a standard deviation of 3.

*Covariates.* A number of covariates which might impact on sexual behaviour were investigated in the analyses: Socioeconomic disadvantage status, body mass index (BMI), child age, whether English was the main language spoken at home, whether the child was living in a two parent family.

Neighbourhood socioeconomic disadvantage was measured using the Socio-Economic Indexes for

Areas Disadvantage Index (SEIFA) corresponding to the family's postcode of residence (Australian Bureau of Statistics, 2013).

### Procedure

At each LSAC wave, trained interviewers conducted face-to-face interviews with the primary caregiver in the home, supplemented by direct assessments of children and administration of parent and teacher surveys. Children self-reported on sensitive content using ACASI. The LSAC study is approved by the Australian Institute of Family Studies Ethics Committee, and parents provided written informed consent.

### Data Analyses

Survey methods were used to account for the unequal probability of participant selection into the sample, non-response and sample attrition, and the multi-stage, clustered sampling design (Soloff, Lawrence, Misson, Johnstone, & Slater, 2006). This method ensured that a representative sample of the Australian population was used. Summary statistics were used to compare ASD and non-ASD demographic characteristics for each cohort using simple linear or logistic regression analyses. A series of logistic regression analyses controlling for the covariates (Socioeconomic disadvantage status, body mass index (BMI), child age, whether English was the main language spoken at home, whether the child was living in a two parent family) were used to compare the proportions for each category of sexual attraction between ASD and non-ASD groups for each sex separately. Where there were categories with 100% prediction by a group z-tests comparing proportions were used. Logistic and linear regression analyses adjusted for the covariates listed above were conducted to examine the association between the sexual behaviour measures and gender and ASD status. To control for multiple comparisons the alpha level for interpreting significant findings was set to .01. Analyses were conducted in Stata version 14.0.

## Results

## Demographics

Demographic details for the ASD and non-ASD group at 14-15 years of age are detailed in Table 1. There were 73 males and 21 females with ASD in the K cohort at age 14-15 years according to parent report and 1685 males, 1675 females without ASD. There were relatively more males in the ASD compared to the non-ASD group. Children with ASD were more socioeconomically disadvantaged than their non-ASD peers and performed more poorly on the cognitive and language tasks. The proportion of those in the ASD group scoring below the second percentile on these measures was 4% for the language task (3% in the non-ASD group) and 15% for the cognitive task (2% in the non-ASD group) indicating a relatively high-functioning ASD group. The groups were similar on other factors including age, number of children in the family, English language spoken at home, indigenous status, remote location, single parent family, and maternal and paternal age at birth.

<insert table 1 about here>

Sexual Attraction. Sexual attraction for males and females with and without ASD are reported in Table 2. Logistic regression adjusted for the covariates showed males with ASD had lower odds of attraction only to females, however, this was not significant with the corrected alpha level. Around half of the females with ASD did not have a heterosexual preference which was significantly lower odds than non-ASD females. There were also higher odds of females with ASD being attracted to both males and females, or not being sure who they were attracted to, compared with non-ASD females.

<insert table 2 about here>

Sexual Relationships. None of the male adolescents with ASD (N=61) reported ever having had sex, compared with 5% of the non-ASD males (N=1624), which was not significantly different in a z-test

of proportions weighted for LSAC design ( $p=.07$ ). For females, 11% ( $N=3/19$ ) of the ASD females reported having ever had sex, compared with 4% ( $N=61/1600$ ) of the non-ASD females, which was not statistically different. Of these, the mean age of first sex for females without ASD was 14.2 years ( $SD=0.8$  years) and 12.7 years ( $SD=0.6$  years) for those with ASD which was significantly different in a regression adjusted for the covariates ( $p=.001$ ), however, the low number of females with ASD makes this tentative.

Of the  $N=61$  males with ASD, 11% reported having a current [boyfriend/girlfriend](#), relative to 15% in the non-ASD group; and 20% of the  $N=19$  ASD females compared with 16% of non-ASD females reported having a current [boyfriend/girlfriend](#); with neither being significantly different in an adjusted regression controlling for the covariates.

The mean number of prior boyfriends/girlfriends was 0.86 ( $SD=1.72$ ) for males with ASD, 1.61 ( $SD=1.86$ ) for non-ASD males, which was significantly different in an adjusted regression controlling for the covariates ( $p<.01$ ). For females, the mean number was 1.66 ( $SD=4.5$ ) for those with ASD and 1.00 ( $SD=2.19$ ) for those without ASD, which was not significantly different in an adjusted regression controlling for the covariates.

## Discussion

This study explored self-reported sexual attraction and behaviour in a population representative group of 14/15 year old adolescents with ASD. Prior studies have used primarily adult clinical, community or online samples which may have a referral bias. The findings confirm higher proportions of non-heterosexual attraction relative to the non-ASD group in females. Adolescent males with ASD reported no significant differences from non-ASD males in sexual attraction. The prior studies of sexual attraction in male adolescents found higher rates of uncertainty and homosexual attraction, but lacked a control group and had a smaller number of participants (Hellems et al., 2007). Hence, our findings suggest adolescent males with ASD have generally similar sexual attraction at this age to non-ASD males. Female adolescents with ASD reported lower odds of heterosexual preference, higher odds of bisexuality and uncertainty in whom they were

attracted to compared with non-ASD females. The higher rates of bisexuality in females with ASD, but not males is similar to prior findings in adults with ASD (Bejerot & Eriksson, 2014). There may be a variety of explanations, however, these authors suggested that an increased rate of bisexuality in females could be a delayed consequence of increased foetal androgens. Testosterone levels have been hypothesised to be associated with sexual attraction, such that low levels in males and high levels in females are associated with homosexuality (Balthazart, 2011), and high levels in males and low levels in females with heterosexuality (Balthazart, 2011). Increased rates of bisexuality in females with ASD is therefore consistent with the androgen theory of ASD, but the decreased rate of heterosexuality in males with ASD does not support this theory.

The adolescent males with ASD reported fewer prior relationships than males without ASD which contradicts the only other prior research in a smaller sample of community adolescents with ASD (Dewinter et al., 2015). The different finding may be due to the males in the current study being younger and from a population sample. Findings of fewer prior relationships are consistent with the social deficits inherent in ASD and with prior studies of reduced friendships in ASD (Kuo, Orsmond, Cohn, & Coster, 2013). Findings regarding the age of first sex in adolescent females being lower than non-ASD females should be interpreted cautiously given the very small number of females who had had sex in the ASD group (N=3). Further research on the age of first sex in females with ASD is needed to confirm this finding. Some past studies in adults with ASD have similarly found that males with ASD have lower rates of relationships than females with ASD (Byers et al., 2013). The present findings suggest that this is present in early adolescence.

These findings have a number of implications for clinical practice. Adolescents with ASD require sexual education as the findings from this study indicate they are entering relationships and some are having sex by 14 years of age. Research suggests that young people with ASD may need further sex education than is provided by mainstream programs (Hannah & Stagg, 2016). There are some emerging sex education programs (Corona, Fox, Christodulu, & Worlock, 2016) but also gaps in evidence-based programs targeted for ASD (Beddows & Brooks, 2015). Discussing sexual diversity

with adolescents with ASD may help support them. Bisexual attraction is strongly associated with social stigma, school bullying and mental health problems, such as depression and suicide (Shearer et al., 2016). Being alert to these potential downstream concerns and managing them appropriately should therefore be kept in mind when seeing young adolescent females with ASD in clinical practice.

Strengths of the current study include the use of a population ascertained sample of adolescents with ASD without a study focus on sexuality, which is likely to reduce bias in the current findings. In addition, self-report measures were used, rather than parent or carer reports of sexual behaviour which may not be valid. Limitations include the cohort being relatively young, with sexual behaviour emerging at this time and having the potential to change as the adolescents reach adulthood. Further longitudinal data from LSAC will provide an opportunity to track the profile of sexual attraction over the remainder of adolescence and into adulthood. A diagnosis of ASD was ascertained via parent report only and was not verified by researchers, which could mean some parents have reported their child as having ASD when they may not. However, past research suggests there is high reliability (over 96%) of parent ASD report with clinical reports (Warnell et al., 2015). The questions about sexual attraction and behaviour were asked using ACASI which allowed for anonymity, but it is possible that some adolescents with ASD may not have understood some the questions. For example, what “had sex” means could be interpreted in a variety of ways and interpretation may have been compounded by low cognitive and language level in some children. Young people with ASD have been found to report a higher number of friends than their parents, which, in this study, could lead to a possible inflation of past number of boyfriends/girlfriends (Kuo et al., 2013). There were only a small number of questions regarding sexual attraction and behaviour and additional questions for example, differentiating sexual orientation from attraction and understanding the different types of past sexual experiences, would provide further clarity. This is especially important given that sexual attraction may be fluid, particularly in females (Katz-Wise, 2015). The comparison group did not exclude children with other developmental and psychiatric

disorders and is hence a population representative comparison group rather than a typically developing comparison group. There were also only N=21 females with ASD in the sample which is the major limitation of this study. As this is a population based study and ASD is a relatively rare condition small sample size is an ongoing issue for this type of research. Nevertheless, the findings are consistent with prior reports of diverse sexual attraction in females with ASD, and in particular, higher rates of bisexuality in females with ASD. Exploring the factors associated with these differences will be important as they may provide further insights into the aetiology of ASD, for example any potential influences of androgens. Parents, educators and clinicians need to be aware of the diversity of sexual attraction in this group and ensure appropriate mental health support and sexual education programs are provided to young people with ASD.

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Table 1. Sample characteristics for children with and without ASD in the K cohort at 14-15 years<sup>c</sup>

Measure	ASD (N=94)	Non-ASD (N=3,454)	<i>p</i>
Child age in months, mean (SD) <sup>a</sup>	178.9 (3.8)	179.2 (4.1)	.616
Male % <sup>b</sup>	77.5	50.8	<.001*
Number of children at home, mean (SD) <sup>a</sup>	2.3 (1.1)	2.5 (1.1)	.108
English main language spoken at home (%) <sup>b</sup>	95.5	86.8	.072
Indigenous (%) <sup>b</sup>	3.1	2.6	.773
Remote/very remote location (%) <sup>b</sup>	2.5	3.0	.809
Single parent family (%) <sup>b</sup>	28.6	19.6	.064
Maternal age at childbirth, mean (SD) <sup>a</sup>	29.9 (6.5)	30.6 (5.3)	.376
Paternal age at childbirth, mean (SD) <sup>a</sup>	32.3 (6.8)	33.3 (6.1)	.209
Primary caregiver did not complete high school (%) <sup>b</sup>	60.3	49.6	.050
Neighbourhood disadvantage, mean (SD) <sup>a</sup>	985.3 (74.0)	1008.1 (74.0)	.006*
Cognitive functioning (Matrices), mean (SD) <sup>a</sup>	9.1 (3.8)	10.7 (2.9)	.008*
Language functioning (PPVT) <sup>a</sup>	76.3 (6.0)	78.3 (4.8)	.027

ASD: autism spectrum disorder; SD: standard deviation; PPVT, Peabody Picture Vocabulary test; \**p*<.01; <sup>a</sup>Simple linear regression; <sup>b</sup>Simple logistic regression; <sup>c</sup>All proportions are weighted and adjusted for LSAC sample design;

Table 2. Proportion<sup>a</sup> of self-reported sexual attraction and odds ratios in males and females with and without ASD in the K cohort at age 14-15 years

	ASD	Non-ASD	Odds ratio <sup>b</sup>	95% CIs	<i>p</i>
<b>Males</b>	<b>N=59</b>	<b>N=1,627</b>			
I'm attracted only to girls	49 (82%)	1,509 (93%)	0.38	.16 - .90	.03
I'm attracted only to boys	0 (0%)	6 (0.4%)	NA <sup>c</sup>	NA <sup>c</sup>	.65 <sup>c</sup>
I'm attracted to girls and boys	3 (5%)	31 (2%)	2.18	.56 - 8.46	.26
I'm not sure who I am attracted to	1 (3%)	28 (1%)	2.49	.30 – 20.67	.40
I don't feel any attraction to others	6 (9%)	53 (3%)	2.79	.97 – 8.08	.06
<b>Females</b>	<b>N=18</b>	<b>N=1,600</b>			
I'm attracted only to girls	0 (0%)	20 (1%)	NA <sup>c</sup>	NA <sup>c</sup>	.63 <sup>c</sup>
I'm attracted only to boys	9 (47%)	1,369 (86%)	0.14	.06 - .36	<.001*
I'm attracted to girls and boys	5 (27%)	66 (4%)	6.05	2.17 – 16.921	.001*
I'm not sure who I am attracted to	3 (21%)	68 (4%)	10.44	2.38 – 45.86	.002*
I don't feel any attraction to others	1 (5%)	77 (5%)	1.25	.16 – 9.98	.83

<sup>a</sup>All proportions are weighted and adjusted for LSAC sample design. <sup>b</sup>Adjusted logistic regression model controlling for covariates; <sup>c</sup>As there is 100% prediction in the ASD group two-sample z-tests of proportions weighted for LSAC design are reported; ASD, Autism Spectrum Disorder; \**p*<.01

#### Sexual attraction and relationships in adolescents with Autism

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