

Sexuality in autism: hypersexual and paraphilic behavior in women and men with high-functioning autism spectrum disorder

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Like nonaffected adults, individuals with autism spectrum disorders (ASDs) show the entire range of sexual behaviors. However, due to the core symptoms of the disorder spectrum, including deficits in social skills, sensory hypo- and hypersensitivities, and repetitive behaviors, some ASD individuals might develop quantitatively above-average or nonnormative sexual behaviors and interests. After reviewing the relevant literature on sexuality in high-functioning ASD individuals, we present novel findings on the frequency of normal sexual behaviors and those about the assessment of hypersexual and paraphilic fantasies and behaviors in ASD individuals from our own study. Individuals with ASD seem to have more hypersexual and paraphilic fantasies and behaviors than general-population studies suggest. However, this inconsistency is mainly driven by the observations for male participants with ASD. This could be due to the fact that women with ASD are usually more socially adapted and show less ASD symptomatology. The peculiarities in sexual behaviors in ASD patients should be considered both for sexual education and in therapeutic approaches.

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Introduction

Autism spectrum disorders (ASD) are neurodevelopmental disorders that comprise a heterogeneous group of conditions, which are characterized by impairments in social interaction and communication, as well as repetitive and stereotyped interests and behaviors.¹ Reported prevalence rates have risen markedly in recent decades (up to 1% lifetime prevalence), with more and more adults being diagnosed with ASD.² It is assumed that the male-to-female-ratio is between 3 and 4 to 1,³ and there exist particular gender differences in ASD.⁴ Although nearly half of individuals with ASD are not intellectually impaired and have normal cognitive and language skills (such as individuals with high-functioning autism or Asperger syndrome), the social interaction and communication deficits and difficulties in seeing the perspective of others and intuitively understand-

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ing nonverbal social cues constitute hidden barriers to the development of romantic and sexual relationships.^{5,6} Sexuality-related problems can arise, especially at the start of puberty, a time when the development of ASD individuals' social skills cannot keep up with increasing social demands, and the challenges of forming romantic and sexual relationships become particularly apparent.⁷

Studies on sexuality in individuals with ASD

About 10 years after the official entry of autism in the third edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-III)* in 1980, the first systematic studies on the sexuality of patients with ASD were published.⁸⁻¹¹ The current state of research on sexual experiences, sexual behaviors, sexual attitudes, or sexual knowledge of ASD individuals is rather mixed, with some studies finding differences from healthy controls (HCs) while others do not. However, because of the heterogeneous nature of the disorder spectrum and the diverse scientific methodology of the studies, this is not surprising. Previous studies have: (i) included female and/or male patients in residential settings with presumably more impairments and less opportunities for sexual experiences; (ii) focused on persons with intellec-

tual impairments or other comorbid developmental disabilities, thereby leading to confounding effects; (iii) used online surveys in which only higher-functioning individuals took part; (iv) relied on reports from family members and care-givers or from the patients themselves; and (v) assessed individuals with ASD in different age ranges.

These studies suggest that many individuals with ASD seek sexual and romantic relationships similar to the non-ASD population^{12,13} and have the entire spectrum of sexual experiences and behaviors.¹²⁻¹⁸ However, there are still many stereotypes and societal beliefs about individuals with ASD, referring to them as uninterested in social and romantic relationships and as being asexual.^{10,19,20} *Table I* presents an overview of studies assessing different aspects of sexuality in young and older adults with high-functioning autism, on the basis of self-report questionnaires.^{11,12,15,21-33} We specifically focused the literature review on these studies because their methodology corresponds to the research approach used in the study presented here. The studies presented in *Table I* confirm that sexuality does matter in ASD individuals, and it becomes clear that the whole spectrum of sexual experiences and behaviors is represented in this group.^{11-13,15,20-31}

Most of the hitherto existing research has focused on men, and few studies have addressed gender-spe-

Reference	Type of study	Autism diagnosis	Sample, age	Main results
Bejerot et al, ²¹ 2014 (Sweden)	Case-control	ASD diagnosis by psychiatrist or psychologist	50 ASD (24 women) vs 53 HCs matched for age and gender ASD _{male} : 31.8 years (SD=7.8 years) ASD _{female} : 28.1 years (SD=6.3 years)	ASD individuals were older at first sexual intercourse ASD individuals reported fewer moments of sexual arousal and less sexual interest More female ASD individuals were homosexual
Brown-Lavoie et al, ²² 2014 (Canada)	Case-control	Self-reported ASD diagnosis	95 ASD (36 women) vs 117 HCs matched for age ASD _{male + female} : 27.8 years (SD=4.3 years)	ASD individuals had less knowledge about sexuality-related issues ASD individuals had experienced more sexual victimization
Byers et al, ¹² 2013 (multiple countries)	Cross-sectional	Self-reported ASD diagnosis	141 ASD (81 women) ASD _{male + female} : 39.6 years At least one relationship lasting for at least three months	ASD individuals with less symptomatology reported better sexual well-being, higher sexual satisfaction, sexual assertiveness, sexual arousability, lower sexual anxiety, and fewer sexual problems

Table I. Literature overview. Note: The following terms were used in the systematic literature search: "sexual," "sexuality," "sexual behavior," "sexual disorder," sexual relationship," "Asperger," and "Autism" in different combinations. The databases PubMed, PsycINFO, and Web of Science were searched. Only studies assessing sexual behavior in individuals with high-functioning autism (HFA) and using self-report measures were included in the table. ASD, autism spectrum disorder; HC, healthy control; SD, standard deviation.

cific issues concerning social, emotional, and cognitive domains, and even fewer studies exist examining sexuality independently in men and women with ASD.^{12,13,20,32} The few clinical observations³² and the small set of systematic studies indicate that women

with ASD might present less pronounced social and communication deficits and have special interests that are more compatible to the interests of their peer groups.³³⁻³⁶ Furthermore, women with ASD seem to apply coping strategies, such as imitating the social

Byers et al, ²³ 2013 (multiple countries)	Cross-sectional	Self-reported ASD diagnosis	129 ASD (68 women) ASD _{male + female} : 35.3 years	ASD individuals without previous relationship experience reported higher sexual anxiety, lower sexual arousability, lower sexual desire, and less positive sexual cognition
Byers and Nichols, ²⁴ 2014 (multiple countries)	Cross-sectional	Self-reported ASD diagnosis	205 ASD (128 women) in a relationship for at least three months ASD _{male + female} : 38.6 years (SD=9.9 years)	Individuals with more ASD symptoms reported lower sexual and relationship satisfaction
Cottenceau et al, ²⁵ 2012 (France)	Case-control	ASD diagnosis by psychiatrist	26 ASD (2 women) vs 44 adolescents with diabetes vs 250 HCs ASD _{male + female} : 15.0 years (SD=2.5 years)	ASD individuals had lower scores in affective and sexual relationships than the other two groups
Dekker et al, ²⁶ 2017 (Netherlands)	Case-control	ASD diagnosis by trained clinicians	58 ASD vs 91 HCs ASD _{male + female} : 16.8 years (SD=2.1 years)	ASD individuals did not report about more problems with sexual or intimate behaviors than HCs
Dewinter et al, ¹⁵ 2014 (Netherlands)	Case-control	ASD diagnosis by mental health professional	50 ASD (0 women) vs 90 HCs matched for age, ethnicity, and educational level ASD _{male} : 16.7 years (SD=0.8 years)	No difference in the number of ASD individuals and HCs who had experienced masturbation, oral sex, vaginal intercourse, anal intercourse No difference in the number of ASD individuals and HCs who had made use of explicit sexual materials and online pornography during the last six months
Dewinter et al, ²⁷ 2015 (Netherlands)	Cross-sectional	ASD diagnosis based on observation through clinician	43 ASD adolescents (0 women) and their parents ASD _{male} : 16.7 years (SD = - 0.8 years)	Parents tended to underestimate sexual experiences such as masturbation or experience with orgasm
Dewinter et al, ²⁸ 2016 (Netherlands)	Case-control	ASD diagnosis by mental health professional	30 ASD (0 women) vs 60 HCs matched for age and educational level ASD _{male} : 18.6 years (SD=1.0 years)	Fewer ASD individuals had experienced French kissing or petting with a partner No difference in the number of ASD individuals and HCs who had experienced masturbation, oral sex, vaginal intercourse, anal intercourse No difference in the number of ASD individuals and HCs who had made use of explicit sexual materials and online pornography
Gilmour et al, ²⁹ 2012 (multiple countries)	Case-control	Self-reported ASD diagnosis	82 ASD (55 women) vs 282 HCs ASD _{male + female} : 28.9 years (SD=9.3 years)	No differences in breadth and strength of sexual behaviors Higher rate of asexuality in ASD individuals

Table I. Continued

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skills of their non-ASD peers, therefore being more socially unobtrusive.³⁴ Regarding sexuality-related issues, women with ASD seem to have poorer levels of overall sexual functioning, feel less well in sexual relationships than do men with ASD, and are also at greater risk of becoming a victim of sexual assault or abuse.³⁷ Males with ASD were found to engage more in solitary sexual activities,^{11-14,18,37} as well as to have a greater desire for sexual and romantic relationships²⁰; however, there is some evidence that females with ASD, despite having lower sexual desire, more often engage in dyadic relationships.¹³

Although individuals with ASD seek sexual experiences and relationships, development and maintenance of romantic and sexual relationships are greatly affected by the deficits in social and communication skills and the difficulties in understanding nonverbal or subtle interactional cues and with mentalization (meaning being able to understand one's own and others' mental states, eg, emotions, desires, cognitions)

experienced by such individuals.⁶ Furthermore, many individuals with ASD do not receive sexual education that takes their behavioral peculiarities into consideration, and they are less likely to get information on sexuality from social sources.^{5,22,38}

Another point to consider is the restricted and repetitive interests, which may be nonsexual in childhood but can transform into and result in sexualized and sexual behaviors in adulthood. Furthermore, the frequently reported sensory sensitivities can lead to an overreaction or underreaction to sensory stimuli in the context of sexual experience.³⁹ In hypersensitive individuals, soft physical touches can be experienced as unpleasant; on the other hand, hyposensitive individuals may have problems in getting aroused and in reaching orgasm through sexual behaviors.²⁰ Taken together, the core symptoms of ASD combined with limited sexual knowledge and a lesser facility for having romantic and sexual experiences could predispose some individuals with ASD to developing challenging or problematic

Hannah and Stagg, ³⁰ 2016 (United Kingdom)	Case-control	ASD diagnosis by trained clinician	20 ASD (8 women) vs 20 HCs ASD _{male + female} : 18-25 years	ASD individuals showed less sexual consciousness, sexual assertiveness, and sex-appeal consciousness No differences in feelings about sexual education and need for sexual education
Hénault and Attwood, ²⁰ 2006 (multiple countries)	Cross-sectional	Self-reported ASD diagnosis	28 ASD (9 women) vs population mean score ASD _{male + female} : 34.0 years; range: 18-64 years	ASD individuals had fewer sexual experiences during the last two months No significant differences in sexual satisfaction and sexual desire
May et al, ³¹ 2017 (Australia)	Case-control	ASD diagnosis confirmed by parents	94 ASD (21 women) vs 3454 HCs ASD _{male + female} : 14.8 years (SD=0.3 years)	No difference in the percentage of ASD individuals and HCs that reported previous sexual experiences Female ASD individuals were significantly younger at time of first sexual intercourse
Mehzabin and Stokes, ³² 2011 (Australia)	Case-control	Self-reported ASD diagnosis	21 ASD (9 women) vs 39 HCs ASD _{male} : 25.3 years (SD=3.6 years) ASD _{female} : 23.4 years (SD=1.9 years)	ASD individuals had fewer sexual experiences No differences in the level of public sexualized behavior
Ousley and Mesibov, ¹¹ 1991 (USA)	Case-control	ASD diagnosis by psychologist	21 ASD (10 women) vs 20 mentally retarded adults ASD _{male} : 27.3 years (SD=5.4 years) ASD _{female} : 27.3 years (SD=5.9 years)	ASD individuals had fewer sexual experiences and less interest in sexuality No difference in sexual knowledge
Strunz et al, ³³ 2017 (Germany)	Cross-sectional	ASD diagnosis by psychiatrist and self-reported ASD diagnosis	229 ASD (137 women) ASD _{male + female} : 34.9 years (SD=10.3 years)	30% of ASD individuals indicated that sexual activities are perceived as unpleasant

Table I. Continued

sexual behaviors,^{22,38} such as hypersexual and paraphilic behaviors, and even sexual offending.

Different terms have been used to describe quantitatively above-average sexual behaviors including sexual addiction, sexual compulsivity, sexual preoccupation, and hypersexuality. In this article, we will use the terms hypersexual behavior or hypersexuality referring to quantitatively relatively frequent sexual fantasies, sexual desire, and behaviors.^{40,41} However, one should note that the mere presence of quantitatively above-average sexual behaviors does not qualify for assignment of a psychiatric diagnosis (like hypersexual disorder or compulsive sexual behavior disorder). Kafka proposed that diagnostic criteria for a hypersexual disorder diagnosis be included in *DSM-5*.⁴⁰ These criteria define a hypersexual disorder as recurrent and intense sexual fantasies, urges, or sexual behaviors over a period of at least 6 months, causing clinically significant distress, and that are not due to other substances or medical conditions; also, the individual has to be at least 18 years of age.^{40,42} Although Reid and colleagues have shown that hypersexual disorder may be validly and reliably assessed through use of these diagnostic criteria, the American Psychiatric Association nevertheless rejected such use because of the still insufficient state of research, calling for more studies about the cross-cultural assessment of the disorder, for representative epidemiological studies, and for studies on the etiology and associated biological features.⁴³

For the proposed eleventh edition of the *International Classification of Diseases (ICD-11)*, the following definition for diagnosis of compulsive sexual behavior disorder⁴¹ is being considered:

Compulsive sexual behavior disorder is characterized by persistent and repetitive sexual impulses or urges that are experienced as irresistible or uncontrollable, leading to repetitive sexual behaviors, along with additional indicators such as sexual activities becoming a central focus of the person's life to the point of neglecting health and personal care or other activities, unsuccessful efforts to control or reduce sexual behaviors, or continuing to engage in repetitive sexual behavior despite adverse consequences (eg, relationship disruption, occupational consequences, negative impact on health). The individual experiences increased tension or affective arousal immediately before the sexual activity, and relief or dissipation of tension afterwards. The pattern of sexual impulses and behavior causes marked distress or significant impairment in per-

sonal, family, social, educational, occupational, or other important areas of functioning.

With regard to paraphilias, the *DSM-5* now distinguishes between paraphilias and paraphilic disorders, thereby aiming at a destigmatization of nonnormative sexual interests and behaviors that do not cause distress or impairment to the individual or harm to others.⁴² In the *DSM-5*, paraphilias are defined as "any intense and persistent sexual interest other than sexual interest in genital stimulation or preparatory fondling with phenotypically normal, physically mature, consenting human partners" (see *Box 1* for a list of paraphilic disorders included in *DSM-5*).⁴⁴ Although the proposed criteria for paraphilic disorders in the *ICD-11* resemble those of the *DSM-5*, one major difference between these two

Exhibitionistic disorder

- Sexual arousal through exposing one's genitals or sexual organs to a nonconsenting person.

Fetishistic disorder*

- Sexual arousal through play with nonliving objects.

Frotteuristic disorder

- Sexual arousal through rubbing one's sexual organs against a nonconsenting person.

Sexual masochism disorder*

- Sexual arousal by being bound, beaten, or otherwise made to suffer physical pain or humiliation.

Sexual sadism disorder

- Sexual arousal by inflicting psychological or physical suffering or pain on a sexual partner.

Transvestic disorder*

- Sexual arousal through dressing and acting in a style or manner traditionally associated with the opposite sex.

Voyeuristic disorder

- Sexual arousal from watching others when they are naked or engaged in sexual activity.

Pedophilic disorder

- Primary or exclusive sexual attraction to prepubescent children.

Box 1. Overview of paraphilic disorders included in current diagnostic manuals. *Reflecting conditions that are based on consenting behaviors and usually do not involve nonconsenting others and are not in and of themselves associated with distress or functional impairment. The Working Group on the Classification of Sexual Disorders and Sexual Health has proposed removing these conditions from the *ICD-11*.

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diagnostic manuals is the removal of paraphilic disorders diagnosed primarily on the basis of consenting behaviors that are not in and of themselves associated with distress or functional impairment. This led to the *ICD-11* exclusion of fetishistic, sexual masochism, and transvestic disorder,^{41,45} behaviors that have been reported in ASD individuals.

So far, only very few studies have assessed hypersexual or paraphilic behaviors in individuals with ASD, and most of them are case reports reporting about ASD individuals showing excessive masturbation,⁴⁶⁻⁵⁰ exhibitionistic behaviors,⁵¹ pedophilic fantasies or behaviors,^{52,53} fetishistic fantasies or behaviors,^{54,55} sadomasochism,⁵⁰ or other forms of paraphilias.⁵⁶ However, to our knowledge, all previous studies on hypersexual and paraphilic behaviors have been conducted in males and in most cases with cognitively impaired ASD individuals.

After having reviewed the literature, we aimed to investigate hypersexual behaviors as well as paraphilic fantasies and behaviors in a large sample of male and female ASD patients compared with HCs matched according to gender, age, and educational level.

Methods

Participants

To get direct information from individuals with ASD and to study a preferably homogeneous sample, we only included adult individuals with ASD without intellectual impairments. The rationale to include only individuals with high-functioning autism or Asperger syndrome was to reduce the potentially confounding effect of intellectual disability and thus be able to directly study the impact of ASD on sexuality. On the basis of self-report, all patients were diagnosed by an experienced psychiatrist or psychologist ($n=90$, Asperger syndrome; $n=6$, atypical autism); the mean age at which patients received their ASD diagnosis was 35.7 years (standard deviation [SD]=9.1 years; range=17 to 55 years). The ASD patient group (mean score [M]=26.7; SD=4.9) had significantly higher scores than HCs (M=6.4; SD=3.3) on the German version of the Autism Spectrum Quotient Short Form (AQ-SF; $P<0.001$).⁵⁷ All ASD patients and none of the HCs scored above the proposed cut-off value of 17 points.⁵⁷ Participants in both groups were matched for gender, age, and years of education (*Table II*).

Procedure

The ethical review board of the Hamburg Medical Council approved the study protocol. For recruitment of individuals diagnosed with ASD, self-help groups throughout Germany were contacted and asked to distribute the study brochure among their participants. Further participants were recruited through the autism outpatient center at the University Medical Center Hamburg-Eppendorf, Germany. HCs were recruited through advertisements at the University Medical Center Hamburg-Eppendorf and the University Medical Center Mainz in Germany, at local shopping malls, and through personal contacts of the investigators.

	ASD (n=96)	HCs (n=96)
Sex (n, %)		
Male	56 (58.3)	57 (59.4)
Age (years, SD)	39.2 (9.5)	37.9 (9.7)
School education (years, SD)	11.9 (1.5)	12.4 (1.3)
Sexual orientation (n, %)		
Exclusively/predominantly heterosexual	75 (78.2)	96 (100)
Exclusively/predominantly heterosexual, males	45 (80.4%)	57 (100%)
Exclusively/predominantly heterosexual, females	30 (75.0%)	39 (100%)
Exclusively/predominantly homosexual	10 (10.4)	0
Exclusively/predominantly homosexual, males	6 (10.7)	0
Exclusively/predominantly homosexual, females	4 (10)	0
Equally heterosexual and homosexual (bisexual)	8 (8.3)	0
Bisexual, males	4 (7.1)	0
Bisexual, females	4 (10.0)	0
No sexual orientation	3 (3.1)	0
No sexual orientation, males	1 (1.8)	0
No sexual orientation, females	2 (5.0)	0

Table II. Characteristics of participants. ASD, autism spectrum disorder; HCs, healthy controls; n, number; SD, standard deviation

Measures

Autism Spectrum Quotient Short Form, German version

The German version of the Autism Spectrum Quotient Short Form (AQ-SF) questionnaire⁵⁷ was used for the assessment of autistic symptoms in all participants. A threshold score of 17 was identified to be a good cutoff value for screening purposes and yielded a sensitivity of 88.9% and a specificity of 91.6% with an area under the curve of the receiver operating characteristics curve of 0.92 in the German validation sample.⁵⁸

Hypersexual Behavior Inventory (HBI-19)

The Hypersexual Behavior Inventory (HBI-19)^{58,59} consists of 19 items and assesses hypersexual behaviors. All items have to be answered on a 5-point Likert scale and are phrased gender neutrally. Participants that have a score above 49 are usually classified as hypersexual. The German version of the questionnaire yielded an excellent internal consistency of $\alpha=0.90$ for the total score.⁶⁰

Questionnaire about Sexual Experiences and Behaviors (QSEB)

The Questionnaire about Sexual Experiences and Behaviors (QSEB)⁶¹ consists of 120 items and assesses information concerning family background, sexual socialization, sexual behaviors, and different sexual practices. Furthermore, the questionnaire assesses information about sexual fantasies and behaviors (including paraphilic sexual fantasies and behaviors). Most items refer to an observational period of 12 months; in clinically relevant items, the questionnaire asks participants to specify the duration the clinical symptom has been present. For the present study, only the items concerning the frequency of masturbation and partnered sexual activities, as well as paraphilic fantasies and behaviors, were analyzed.

Statistical analyses

Group differences were analyzed using χ^2 tests in categorical variables, and *t*-tests for independent samples for continuous variables. Because multiple statistical tests were performed on the same data set, we controlled the level of significance for the accumulation of type-I error

through use of the false discovery rate (FDR) based on the approach developed by Benjamini and Hochberg.⁶² Controlling for multiple testing leads to a reduction in the *P*-value threshold. In the present study, the corrected *P*-value threshold was 0.0158, meaning that only *P*-values below this cutoff should be considered as significant. Thereby, the FDR is less conservative than the traditionally used Bonferroni correction; however, just recently, it was suggested that the FDR should receive preference over the Bonferroni method, especially in health and medical studies.⁶³

Results

Relationship status

Of the individuals with ASD, significantly more women ($n=18$; 46.2%) than men ($n=9$; 16.1%) were currently in a relationship ($P<0.01$). No significant difference was found in the number of women ($n=11$; 27.5%) and men ($n=8$; 14.3%) with ASD who reported having their own children. Comparing the ASD individuals with the HCs, we observed that significantly more HC women ($n=31$; 79.5%; $P<0.01$) and more HC men ($n=47$; 82.4%; $P<0.01$) than individuals with ASD were currently in a relationship. No differences were observed in the number of participants having their own children (HCs: $n=7$; 7.3%).

Solitary and dyadic sexual behaviors

Females

As shown in *Table III*, no differences were found between the female participants in the frequency of masturbation ($P>0.05$). However, female HCs indicated more frequent sexual intercourse than the female ASD patients ($P<0.05$). The same pattern was found with regard to the question "how often do you desire to have sexual intercourse," indicating that HC women had a greater desire for sexual intercourse than their ASD counterparts ($P<0.05$).

Males

With regard to the masturbation frequency in men, male ASD participants reported more frequent masturbation than male HCs ($P<0.01$). In comparison of the frequency of sexual intercourse, an opposite pat-

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tern was found, with HCs reporting a higher frequency of sexual intercourse than ASD individuals. ASD men reported a greater sexual desire for sexual intercourse than their HC counterparts ($P < 0.05$, Table III).

	ASD	HCs	P-value
Men			
<i>Masturbation frequency</i>			
			< 0.01
Multiple times a day	9 (16.1%)	0	
Four to six times a week	18 (32.1%)	6 (10.5%)	
Two to three times a week	22 (39.3%)	19 (33.3%)	
Once a week	4 (7.1%)	11 (19.3%)	
Two to three times a month	2 (3.6%)	4 (7.0%)	
Once a month	0	2 (3.5%)	
Less than once a month	0	6 (10.5%)	
Never	0	8 (14.0%)	
<i>Frequency of sexual intercourse</i>			
			< 0.01
Multiple times a day	0	0	
Four to six times a week	2 (3.6%)	8 (14.0%)	
Two to three times a week	0	23 (40.4%)	
Once a week	4 (7.1%)	15 (26.3%)	
Two to three times a month	4 (7.1%)	4 (7.0%)	
Once a month	0	4 (7.0%)	
Less than once a month	20 (35.7%)	2 (3.5%)	
Never	25 (44.6%)	0	
<i>Desire for sexual intercourse</i>			
			< 0.05
Multiple times a day	13 (23.2%)	0	
Four to six times a week	9 (16.1%)	29 (50.9%)	
Two to three times a week	13 (23.2%)	25 (43.9%)	
Once a week	13 (23.2%)	0	
Two to three times a month	0	2 (3.5%)	

Table III. Solitary and dyadic sexual behavior in high-functioning autism patients compared with healthy controls. ASD, autism spectrum disorder; HCs, healthy controls; ns, not significant

Once a month	0	0	
Less than once a month	6 (10.7%)	0	
Never	2 (3.6%)	0	
Women			
<i>Masturbation frequency</i>			
			ns
Multiple times a day	0	0	
Four to six times a week	4 (10.0%)	3 (7.7%)	
Two to three times a week	9 (22.5%)	3 (7.7%)	
Once a week	0	8 (20.5%)	
Two to three times a month	9 (22.5%)	10 (25.6%)	
Once a month	2 (5.0%)	5 (12.8%)	
Less than once a month	9 (22.5%)	8 (20.5%)	
Never	7 (17.5%)	3 (7.7%)	
<i>Frequency of sexual intercourse</i>			
			< 0.05
Multiple times a day	0	0	
Four to six times a week	0	0	
Two to three times a week	2 (5.0%)	13 (33.3%)	
Once a week	2 (5.0%)	5 (12.8%)	
Two to three times a month	4 (10.0%)	10 (25.6%)	
Once a month	0	10 (25.6%)	
Less than once a month	11 (27.5%)	0	
Never	20 (50.0%)	0	
<i>Desire for sexual intercourse</i>			
			< 0.05
Multiple times a day	0	0	
Four to six times a week	2 (5.0%)	3 (7.7%)	
Two to three times a week	8 (20.0%)	18 (46.2%)	
Once a week	2 (5.0%)	16 (41.0%)	
Two to three times a month	4 (10.0%)	3 (7.7%)	
Once a month	0	0	
Less than once a month	6 (15.0%)	0	
Never	17 (42.5%)	0	

Table III. Continued

	ASD	HCs	P-value
Males			
<i>Hypersexuality</i>			
HBI sum score (max. 95)	41.6 (SD=11.89)	30.26 (SD=9.2)	< 0.001*
Hypersexual (> 49)	17 (30.4%)	2 (3.5%)	< 0.001*
<i>Paraphilic fantasies and behaviors</i>			
Masochistic fantasies	22 (39.3%)	6 (10.5%)	< 0.001*
Masochistic behaviors	16 (28.6%)	6 (10.5%)	0.02
Sadistic fantasies	24 (42.9%)	4 (7.0%)	< 0.001*
Sadistic behaviors	16 (28.6%)	6 (10.5%)	0.02
Voyeuristic fantasies	22 (39.3%)	6 (10.5%)	< 0.001*
Voyeuristic behaviors	16 (28.6%)	2 (3.5%)	< 0.001*
Exhibitionistic fantasies	6 (10.7%)	2 (3.5%)	0.14
Exhibitionistic behaviors	2 (3.6%)	2 (3.5%)	0.98
Frotteuristic fantasies	15 (26.8%)	0	< 0.001*
Frotteuristic behaviors	9 (16.0%)	0	0.003*
Pedophilic sexual fantasies of female children	16 (28.6%)	0	< 0.001*
Pedophilic sexual behaviors with female children	0	0	n/A
Pedophilic sexual fantasies of male children	2 (3.6%)	0	0.15
Pedophilic sexual behaviors with male children	0	0	n/A
Females			
<i>Hypersexuality</i>			
HBI sum score (max. 95)	26.61 (SD=11.36)	26.79 (SD=7.28)	0.934
Hypersexual (> 49)	4 (10.0%)	3 (7.7%)	0.718
<i>Paraphilic fantasies and behaviors</i>			
Masochistic fantasies	13 (32.5%)	11 (28.2%)	0.678
Masochistic behaviors	2 (5%)	11 (28.2%)	0.006*
Sadistic fantasies	2 (5%)	3 (7.7%)	0.623

Table IV. Indications for hypersexuality and paraphilias in high-functioning autism patients compared with healthy controls. ASD, autism spectrum disorder; HCs, healthy controls; HBI=Hypersexual Behavior Inventory; max, maximum; n/A, not applicable. *P-values still significant after false discovery rate (FDR) corrections for multiple testing.

Hypersexual behaviors

On the HBI, ASD patients ($HBI_{sum}=35.1$; $SD=13.7$) had a significantly higher sum score than the HCs ($HBI_{sum}=29.1$; $SD=8.7$; $P<0.001$), and significantly more ASD individuals had scores above the proposed cutoff value of 49 points and could thus be classified as hypersexual ($P<0.01$). As shown in *Table IV*, men with an ASD diagnosis reported more hypersexual behaviors, whereas there were no such differences between female patients with ASD and female HCs. Furthermore, whereas 17 male individuals with ASD scored above the cutoff value of 49 points and could thus be described as hypersexual, only two male HCs scored above the proposed cutoff ($P<0.001$). No difference was found between female ASD patients and HCs in the rate of hypersexuality.

Paraphilic fantasies and behaviors

Altogether, paraphilic sexual fantasies and behaviors were reported more frequently in male patients with ASD than in male HCs. After correcting for multiple testing, significant differences were still present in the number of individuals reporting masochistic fantasies, sadistic fantasies, voyeuristic fantasies and behaviors, frotteuristic fantasies and behaviors, and pedophilic fantasies with female children (see *Table IV*). Female

Sadistic behaviors	0	5 (12.8%)	0.03
Voyeuristic fantasies	10 (25.0%)	10 (25.6%)	0.948
Voyeuristic behaviors	4 (10.0%)	0	0.12
Exhibitionistic fantasies	0	0	n/A
Exhibitionistic behaviors	0	0	n/A
Frotteuristic fantasies	2 (5%)	0	0.157
Frotteuristic behaviors	0	0	n/A
Pedophilic sexual fantasies of female children	0	0	n/A
Pedophilic sexual behaviors with female children	0	0	n/A
Pedophilic sexual fantasies of male children	0	0	n/A
Pedophilic sexual behaviors with male children	0	0	n/A

Table IV. Continued

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patients with ASD showed no differences in the frequency of paraphilic fantasies or behaviors in comparison with their HC counterparts, except in the frequency of masochistic behaviors, where more female HCs indicated masochistic behaviors than the female ASD patients.

Discussion

To our knowledge, this is the first study to explore gender-specific aspects of hypersexual and paraphilic fantasies and behaviors in a cohort of high-functioning individuals with ASD in comparison with a matched control group. Our main findings are that individuals with ASD show more hypersexual and paraphilic fantasies and behaviors than HCs.

Previous research suggested that in individuals with ASD, although mainly regarded as being heterosexual,¹⁸ there were higher rates (up to 15% to 35%) of homosexual or bisexual orientation than in the non-ASD population.^{14,64} In the present study also, fewer individuals with ASD reported being heterosexual than HCs; however, it has to be noted that all HCs were heterosexual and are thus not comparable to the general population. In the Global Online Sexuality Survey, a total of 10% of participants indicated being homosexual.⁶⁵ Different assumptions have been made about the broader range of sexual orientation in the ASD population. Maybe gender is not that relevant in choosing a partner, due to limited access to romantic or sexual relationships and limited experience and sociosexual exchange with their peers. In combination with less sexual knowledge, this could lead to a restricted understanding of sexual orientation or preference.^{33,35,37} Furthermore, there is evidence that ASD individuals are possibly more tolerant toward same-sex relationships,¹⁵ and it could be possible that ASD individuals choose their sexual preferences more independently of what is socially accepted or demanded, maybe partly due to a lower sensitivity to social norms or gender roles.¹⁵

Significantly more HCs than individuals with ASD reported being in a relationship with marked gender-specific differences. More women than men with ASD were in a relationship. The results of other studies examining gender differences in relationship status are inconclusive, but there is some evidence that although men desire dyadic relationships more than women, ASD women are more often in a romantic and sexual

relationship.^{11,31} This could be due to the ASD women's ability to call on more advanced coping strategies (eg, imitating the social skills of their non-ASD peers), leading to less impairment in social functioning.³³⁻³⁶ Regarding the frequency of sexual behavior, women with ASD reported more solitary than person-oriented sexual behavior and less desire to have sexual intercourse with a partner than their non-ASD female counterparts. A similar pattern was found in ASD males, which is in line with other studies.^{12,23,24,33}

However, disregarding social norms together with the frequently found restricted social skills and the sensory hyposensitivities or hypersensitivities could also increase the risk for engaging in nonnormative or quantitatively above-average sexual behaviors.^{22,38} Underscoring this assumption, we found that hypersexual behaviors were more frequently reported for ASD individuals than HCs; however, these differences were mainly driven by the male ASD patients, and no differences between the female groups were observed. On the basis of precise operationalization of hypersexual behaviors, previous studies have found prevalence estimates ranging from 3% to 12% for healthy male subjects.⁶⁶⁻⁶⁸ In an online survey of almost 9000 German men, Klein and colleagues found a prevalence of hypersexual behaviors (defined as more than seven orgasms per week over a period of 1 month) of 12%.⁶⁹ Clearly, this indicates that more male ASD subjects in our study showed hypersexual behaviors than these population-based estimates. So far, only Fernandes and colleagues have assessed hypersexual behaviors in ASD individuals and found lower rates than we did.⁷⁰ Of the 55 high-functioning male ASD individuals assessed, 7% reported on hypersexual behaviors, defined as more than seven sexual activities per week, and 4% were engaged in sexual activities for more than 1 hour a day, which is clearly below the numbers found in the present study. However, Fernandes et al did not mention how they defined sexual activities, and it is possible that the participants in their study only rated dyadic sexual activities, explaining the lower number of hypersexual behaviors.⁷⁰ The possible causes of the higher rates of hypersexuality in ASD men remain unclear, but it can be hypothesized that they are a part of the repetitive behaviors or influenced by sensory peculiarities. Because we did not differentiate between person-oriented and self-oriented sexual behavior, the higher rate of hypersexual behaviors in the ASD men could also be an

expression of excessive masturbation, which has been found in other studies and case reports. It was suggested that excessive masturbatory behavior could reflect the desire to be sexually active although not being able to achieve this because of problems engaging in a dyadic sexual relationship due to limited social skills.^{14,46-48,52} With regard to women, much less research has been conducted about the frequency of hypersexual behaviors, and due to small sample sizes, prevalence estimates range from 4% to 40% in the general population.⁶⁰ In the German validation study of the HBI, 4.5% of the almost 1000 women included scored above the proposed hypersexuality cutoff.⁵⁹ As part of the *DSM-5* field trials for hypersexual disorder, it was found that 5.3% of all patients seeking help at a specialized outpatient care center were women,⁴³ indicating that the rate of hypersexual behaviors might be much lower in women than in men. As female ASD patients seem to be better socially adapted and usually show less-pronounced ASD symptomatology (eg, less repetitive behaviors), it is not surprising that hypersexual behaviors in the present study were also found less frequently in female than in male ASD individuals.

So far, there are almost no existent systematic studies about paraphilias in the ASD population^{64,70}; most of the information comes from case studies. Moreover, almost all case studies addressed paraphilic behaviors in male ASD individuals with some kind of cognitive impairment; thus, comparison with findings from the present study is clearly limited. In the study of Fernandes and colleagues (to our knowledge the only previous study that addressed paraphilias in high-functioning ASD men), the paraphilias found most frequently were voyeurism and fetishism.⁷⁰ Voyeuristic fantasies and behaviors were also among the most frequently found paraphilias for ASD men and women in the present study. Furthermore, frequently reported paraphilias were masochistic and sadistic fantasies and behaviors. Again, this could be an expression of the pronounced hyposensitivity in the ASD population, indicating that such individuals need above-average stimulation to become sexually aroused. Furthermore, Fernandes et al found that the occurrence of a paraphilia was associated with more ASD symptoms, lower levels of intellectual ability, and lower levels of adaptive functioning, pointing out that lower cognitive abilities seem to be an important factor in the etiology of paraphilic fantasies and behaviors in ASD.⁷⁰ It can be hypothesized that awareness of social norms and

behavioral self-control is even lower in ASD individuals with cognitive impairments, explaining the higher rate of paraphilic behaviors. Although many ASD individuals in the present study had paraphilic fantasies, considerably fewer individuals actually showed overt paraphilic behaviors, supporting the suggestion that high-functioning ASD individuals could have higher self-control abilities than ASD patients with cognitive impairments. Information on paraphilias in the general population is also scarce, with most of the studies involving men, mainly recruited in clinical or forensic settings.⁷¹ In the general population, the prevalence rate of any paraphilia is assumed to be between 0.4% and 7.7%.⁷²⁻⁷⁵ Also, using the QSEB, Ahlers et al found a rate of 59% for any paraphilic fantasies and a rate of 44% for any paraphilic behavior in their general-population sample of 367 German men, with the most common paraphilic fantasies being voyeuristic (35%), fetishistic (30%), and sadistic (22%) fantasies.⁶¹ In the present study, especially for male ASD individuals, the rates of paraphilic fantasies and behaviors were higher than the prevalence estimates found in most of the general-population studies. Again, we found pronounced gender differences in the frequency of paraphilic fantasies and behaviors in our ASD population. A possible explanation for these differences could be that a stronger sex drive in ASD men could mediate the existence of paraphilias via a heightened energy in acting out their sexual interests or that those with a high sex drive more easily habituate to certain activities, thereby leading them to strive for novel activities.^{71,76,77} Furthermore, hypersexuality could also lead to lower baseline sexual disgust or aversion toward paraphilic fantasies or behaviors clarifying the link between the higher rate of hypersexual, as well as paraphilic, behaviors.⁷⁷

The results of our study are limited because they are solely based on self-report, and one cannot be sure that all participants were diagnosed by a trained psychologist or psychiatrist. However, all ASD participants scored above the cutoff value of the German version of the AQ, ensuring that they showed pronounced ASD symptomatology. Furthermore, all participants were recruited through ASD self-help groups or ASD outpatient care centers, indicating that their contact with the medical system was due their symptomatology. Our study results are also limited by the potential that individuals with a higher interest in sexuality-related issues, and perhaps also having more sexual problems, were more likely to volunteer to participate, thus affecting

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the study population. This could have led to an overestimation of the actual rate of hypersexual and paraphilic fantasies and behaviors in the ASD group. Nevertheless, if true, this should also have occurred in the HC group.

The present study is the first to examine hypersexual and paraphilic fantasies and behaviors in a large sample of high-functioning male and female ASD individuals in comparison with a matched control group, showing

that although ASD individuals have a high interest in sexual behaviors, because of their specific impairments in social and romantic functioning, many of them also report some sexual peculiarities. □

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La sexualidad en el autismo: la conducta hipersexual y parafilica en mujeres y hombres con trastorno del espectro autista de alto funcionamiento

Al igual que los adultos normales, los sujetos con trastornos del espectro autista (TEA) presentan toda la gama de conductas sexuales. Sin embargo, debido a los síntomas centrales del espectro del trastorno, que incluyen déficits en las destrezas sociales, hiper e hipo sensibilidad sensorial y conductas repetitivas, algunos sujetos con TEA pueden desarrollar intereses y conductas sexuales hipernormales o no habituales. Se revisa la literatura más relevante sobre la sexualidad en sujetos con TEA de alto funcionamiento y se presentan los nuevos hallazgos provenientes de los estudios del grupo de trabajo sobre la frecuencia de las conductas sexuales normales y sobre la evaluación de las conductas y fantasías hipersexuales y parafilicas. Al parecer los sujetos con TEA tienen más conductas y fantasías hipersexuales y parafilicas que lo sugerido por estudios en población general. Sin embargo, esta inconsistencia se debe principalmente a las observaciones realizadas en los hombres con TEA. Esto podría deberse al hecho que las mujeres con TEA están más adaptadas socialmente y presentan menos síntomas del TEA. Las peculiaridades en la conducta sexual de los pacientes con TEA deben ser tomadas en cuenta para la educación sexual y en los abordajes terapéuticos.

La sexualité dans l'autisme : comportement hypersexuel et paraphilique chez les femmes et les hommes ayant un trouble du spectre de l'autisme de haut niveau

Comme les adultes non atteints, les personnes ayant un trouble du spectre de l'autisme (TSA) présentent le tableau complet des comportements sexuels. Cependant, certaines personnes ayant un TSA peuvent développer des intérêts et comportements sexuels hypernormaux ou non standard, à cause des symptômes fondamentaux du trouble, comme les déficits de socialisation, les hyposensibilités et hypersensibilités et les comportements répétitifs. Après une analyse de la littérature pertinente sur la sexualité des personnes ayant un TSA de haut niveau, nous présentons des données nouvelles, issues de notre propre étude sur la fréquence des comportements sexuels normaux et sur l'évaluation des comportements et fantasmes hypersexuels et paraphiliques chez les personnes ayant un TSA : celles-ci semblent avoir de tels comportements plus souvent que les études de population générale ne le suggèrent. Cependant, cet écart est principalement le fait des observations des participants masculins ayant un TSA, peut-être parce que les femmes ayant un TSA sont habituellement plus adaptées socialement et moins symptomatiques. Les particularités des comportements sexuels des patients ayant un TSA devraient être prises en charge à la fois pour une éducation sexuelle et des approches thérapeutiques.