



Positive and Negative Sexual Cognitions of Autistic Individuals

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Abstract

Sexual cognitions are an important aspect of sexual well-being for all individuals; however, little is known about the sexual cognitions of autistic individuals. Therefore, our study aimed to explore the diversity, content, and frequencies of positive (PSC) and negative (NSC) sexual cognitions in this population. A total of 332 participants (57.5% women; 42.5% men) between the ages of 21 and 73 ($M=37.72$, $SD=11.15$) completed an online survey. Our results showed that almost all participants had experienced both positive and negative sexual cognitions. PSC were more diverse and experienced with greater frequency than NSC. In addition, gender (self-identified as being male) and having had relationship experience were associated with greater diversity and frequency of PSC, but not NSC. In terms of content, the most common experienced sexual cognitions for both men and women were intimacy-related. The men experienced 22 of the 56 PSC and 3 of the 56 NSC significantly more frequently than did the women; there were no cognitions that the women experienced more frequently than the men. A comparison to the results of studies of sexual cognitions among neurotypical individuals suggests that autistic individuals experience sexual cognitions in much the same way as their peers. However, sexual cognitions occur slightly less frequently and are somewhat less diverse. Nonetheless, the way in which they are experienced, and the content of the most frequent cognitions (mainly PSC about intimacy) may be indicative of sexual well-being.

Keywords Sexual cognitions · Autism · Gender differences · Relationship experience · Sexual well-being · Canada

According to the World Health Organization [1, 2], sexual health and well-being is best defined as “*physical, mental and social well-being with respect to sexuality that requires a positive and respectful approach to sexuality and sexual relations.*” As such, sexual health and well-being include not only the absence of negative aspects of sexuality such as sexual dysfunctions, diseases, coercion, and discrimination but also the presence of positive dimensions of sexuality including positive motivation, affect, cognitions, and experience. Although people with disabilities can achieve good sexual well-being [3, 4], they nonethe-

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less may be vulnerable to experiencing their sexuality more negatively and less positively than do neurotypical individuals due to existing barriers to accessing sexual health services and sexual health education, challenges presented by their disabilities, and experience of prejudice and discrimination [5–7]. In the current study, we focused on the sexual cognitions of autistic individuals¹.

Autism is characterized by deficits in social interactions and communication, deficits in the development, understanding and maintenance of relationships, and repetitive and stereotyped behaviors [8]. Although these deficits have been shown to affect the overt sexual behavior of autistic individuals [9–11], we have little information about their sexual cognitions (thoughts, images, fantasies), even though sexual cognitions are an important dimension of sexual well-being [12, 13]. Therefore, we examined the frequency, diversity, and content of the positive and negative cognitions of autistic individuals.

Sexual Cognitions in Typically Developing Individuals

According to Renaud and Byers [14] the term “sexual cognition” refers to “a wide range of thoughts, images and fantasies, including fleeting sexual thoughts or images, more elaborate and ongoing sexual fantasies, sexual thoughts that are experienced as intrusive, and sexual thoughts and fantasies that are engaged in deliberately” (p. 253). As such, their definition includes both purposeful and non-purposeful as well as positive and negative sexual cognitions. Most researchers studying sexual cognitions have only investigated purposeful sexual cognitions experienced as positive, often called sexual fantasies, typically viewing positive sexual cognitions as an aspect of sexual well-being [15, 16]. However, sexual thoughts, at times, can generate negative emotional responses, particularly sexual cognitions that the individual experiences as unacceptable, ego-dystonic, and unpleasant [17]. The discomfort associated with these negative sexual cognitions would detract from sexual well-being. Renaud and Byers [17] have argued that all sexual cognitions can be experienced positively (positive sexual cognitions, PSC) and negatively (negative sexual cognitions, NSC). As such, sexual health and well-being would be characterized by not only a high diversity and frequency of PSC but also a low diversity and frequency of NSC. This suggests that to fully understand an individual’s sexual cognitions it is important to assess the emotional valence of a range of sexual cognitions.

Research with neurotypical samples have shown that people report experiencing PSC more frequently than NSC [17–19]. For example, Renaud and Byers [17] explored the frequency with which 292 individuals aged 17 to 45 years experienced 56 sexual cognitions as positive and negative. They found that participants reported experiencing more frequent and more diverse PSC than NSC. The sexual cognitions that were most commonly reported as positive (97–100% of participants) were “having intercourse with a loved partner”, “making love elsewhere than the bedroom” or “kissing passionately”; the sexual cognitions that were most commonly experienced as negative (60 to 70% of participants) were “being embarrassed by failure of sexual performance”, “being forced to do something sexually”, and “having intercourse with someone I know but have not had sex with.” The sexual cognitions that were least common as both positive and negative cognitions were “having sex with an

¹ In keeping with the preferences of the autistic community, we use identify-first language rather than person-first language.

animal or non-human object”, “having incestuous sexual relations” or “being aroused by watching someone urinate.” Similarly, Moyano and Sierra [18] found that people were most likely to report PSC of intimacy, such as having intercourse with a loved partner, and NSC involving sexual exploration (e.g., participating in an orgy) and submission (e.g., being spanked or hit on the butt).

Researchers have consistently found differences in sexual cognitions between cis-gender men and women that are consistent with prescribed gender roles; roles that prescribe that men are more interested in sex than women [20, 21]. For example, Renaud and Byers [17] found that men report more frequent and diverse PSC and NSC overall compared to women. However, these male-female differences did not extend to all specific sexual cognitions assessed. That is, these authors found that women experience some PSC more frequently than men such as *kissing passionately*, *having my clothes taken off* and *exposing myself provocatively*, among others. In contrast, the PSC that men experience more frequently compared to women included *having intercourse with someone I know but have not had sex with*, *looking at obscene pictures or films*, and *having sex with an anonymous stranger*. Men also experienced some NSC more frequently than did women such as *having sex with someone much younger than myself*; *forcing someone to do something sexually*; *being sexually victimized*; and, *being pressured into engaging in sex*. There were also several sexual cognitions for which there were no male-female differences. Similarly, Moyano and Sierra [18] explored the frequency of PSC and NSC in 1332 self-identified men and women using a subset of the cognitions used by Renaud and Byers corresponding to five categories (intimate, exploratory, dominance, submission and impersonal). The results showed that men experienced PSC related to dominance, impersonal sex, and exploration more frequently than did women. However, the men and women did not differ in their frequency of PSC related to intimacy and women experienced slightly more PSC related to submission. Regarding NSC, women experienced NSC about submission more often than men, whereas men experienced more negative dominance cognitions. Moyano et al. [22] also found that men more frequently reported experiencing PSC related to exploratory and impersonal sex compared to women. However, these authors found no differences in the frequency of any of the NSC or PSC of intimacy, dominance, or submission.

In addition, some researchers have shown that relationship status is associated with positive and negative sexual cognitions. For example, Birnbaum [23] found that people who are in a stable romantic relationship report fewer sexual fantasies (i.e., PSC) than do single people. This may be because they engage in less frequent solitary sexual activity (particularly men) [24, 25] or are uncomfortable having sexual fantasies about people other than their partner because it can be seen as a form of infidelity [26, 27]. However, researchers have not investigated whether relationship status is associated with the likelihood of experiencing sexual cognitions as negative and/or with the diversity of positive or negative sexual cognitions.

Sexual Cognitions in Autistic Individuals

Autistic individuals have been highly stigmatized, especially when it comes to their sexuality [28, 29]. That is, many people wrongly assume that autistic individuals are asexual, have little sexual desire, or are likely to engage in inappropriate and even violent sexual

behavior [11, 30–33]. However, autistic individuals show interest in sexuality and relationships similar to their peers and many have a partner and engage in regular sexual activity [34–39]. Nonetheless, there are several reasons to believe that the diversity, content, and frequency of PSC and NSC of autistic individuals may differ from that of neurotypical individuals. First, autistic individuals are more likely than their neurotypical peers to have had adverse sexual experiences such as being sexually victimized [40, 41]. This may be because autistic individuals have more difficulties discriminating between safe and unsafe sexual situations, understanding the harmful intentions of others, and communicating their sexual interests and desires [42, 43]. Second, autistic individuals tend to receive less sexual health education, have less social contact with others and relationship experience, and experience greater sexual anxiety than neurotypical individuals [9, 38, 44]. These differences likely are a result of the social skills and communication deficits associated with autism spectrum disorder (ASD), the lack of opportunities for social interactions, and the absence of sex education designed to meet their needs [29, 45–47]. Third, autistic individuals are more likely to engage in repetitive and stereotyped behaviors. In addition, some autistic individuals are hyposensitive, requiring more stimulation to achieve arousal causing them to engage in high frequency sexual behaviors whereas others are hypersensitive and can experience sexual contact as unpleasant or painful [48, 49]. These characteristics have been related to sexual development, especially in adolescents, due to compulsive performance of certain sexual practices (e.g., masturbation), sensory fascination with a sexual connotation (show a special interest/fascination for an object with sexual connotations without the need to use it for sexual purposes), and fears related to sex [10]. Furthermore, Schöttle et al. [50] argued that the presence of less typical sexual cognitions, especially paraphilic ones, among autistic individuals may be a response to problems of hyposensitivity that make autistic individuals need more stimulation to achieve arousal. Finally, some studies suggest that the imaginative and creative abilities of autistic people are more limited [51, 52], which could be extrapolated to their sexual imaginary.

There have been only a few studies examining the sexual cognitions of autistic individuals. Some researchers have found that sexual fantasies that could be considered paraphilic (e.g., involving a child, fetish, sadomasochism) are more frequent in autistic individuals [10, 37, 53]. However, the focus on paraphilic sexual fantasies pathologizes sexuality in autistic individuals instead of connecting cognitions to sexual health and well-being. In addition, these studies are single-case studies or have very small sample sizes, greatly limiting their generalizability. Byers et al. [35] found, using a subset of the current sample that only included single individuals, that women reported less frequent PSC than men. Another study with a related sample found that individuals without prior relationship experience reported less frequent PSC than those with relationship experience. However, these studies did not include NSC and did not examine the diversity or content of PSC.

Current Study

Although sexual cognitions are an important aspect of sexual well-being [14, 22, 54], little is known about the sexual cognitions of autistic individuals. Therefore, the overall aim of this study was to improve our understanding of the positive and negative sexual cognitions of autistic individuals by analyzing the diversity, content, and frequencies with which they

experience PSC and NSC. We also examined differences in sexual cognitions based on binary gender (male-female because the number of non-binary participants was too small to analyze separately) and relationship experience. First, we examined the diversity of positive and negative sexual cognitions. We predicted that men would report greater diversity of PSC and NSC compared to women (H1). We also predicted that individuals with relationship experience would report greater diversity of PSC and NSC than people without relationship experience (H2). Second, we examined the content of PSC and NSC and compared the frequency that each PSC and NSC was experienced by men and women. However, given the lack of research with autistic individuals, we did not make any predictions about the content and frequency of specific positive and negative sexual cognitions. Finally, we examine the overall frequency of the positive and negative sexual cognitions. We predicted that men would report experiencing more frequent PSC and NSC compared to women (H3). We also predicted that individuals with relationship experience would report greater frequency of PSC and NSC than would individuals without relationship experience (H4).

Method

Participants

Participants were recruited for an online study of *Sexual Well-Being of High-Functioning Adults with Autism Spectrum Disorders*. Inclusion criteria were being 21 years of age or older and scoring above the cutoff score (26 or greater) for ASD on the Autism Spectrum Quotient (AQ). A total of 765 people started the survey. However, 433 were dropped from the sample: 29 did not indicate their age or were under 21 years old; 8 did not identify as male or female (the number of nonbinary individuals was too small to analyze separately); 153 had a score of less than 26 on the AQ; and 243 did not complete the survey. Of the remaining 332 participants, 57.5% identified as female ($n=191$) and 42.5% identified as a male ($n=141$). The age range of the participants was from 21 to 73 years ($M=37.72$, $SD=11.15$). In terms of educational background, most had completed higher education (30.2% undergraduate and 27.2% graduate or professional degree), 20.5% had completed high school and 3.6% had less than high school. Regarding race/ethnicity, the vast majority (90.4%) identified as Caucasian/White/European but some identified as Biracial/Multiracial (3.0%), Hispanic/Latino (1.2%), Asian American/Asian/Pacific Islander (1.2%), Aboriginal/Native American/American Indian (0.3%), African American/Black (0.3%), or with another identity (3.7%). The most common places of residence were the U.S. (50.5%) and Australia/New Zealand (21.1%). Most participants (69.2%) identified as heterosexual, although 11.8% identified as bisexual, 7.8% as gay or lesbian, and 11.2% as unlabeled or unsure. Finally, 80.7% reported having relationship experience (i.e., currently, or previously being in a relationship of 3 months or longer). In terms of autism spectrum symptoms, scores on the AQ (used to evaluate autistic symptoms) were high ($M=37.52$, $SD=5.79$) and 53% had received a professional diagnosis.

Measures

The *Background Information Form* was used to collect sociodemographic data. This information included: gender; age; race/ethnicity (Aboriginal/Native American/American Indian; African American/Black; Asian American/Asian/Pacific Islander; Caucasian/White/European; Hispanic/Latino/Latina; Biracial/Multiracial; other; don't know); the academic level achieved (less than high school; high school; college/trade/junior college/2 year college or technical school; undergraduate degree; graduate degree); country of residence; sexual identity (heterosexual, bisexual, homosexual², unlabeled, not sure); currently in a relationship (no/yes); and, relationship experience (been in a relationship of three months or longer no/yes).

The *Autism Spectrum Quotient* (AQ) [55] is a self-report instrument used to evaluate autism symptoms in adults with average intelligence. It consists of 50 items that are divided into five 10-item scales: social skill, attention to detail, communication, imagination, and attention. Responses are on a 4-point Likert scale (definitely agree to definitely disagree) that is dichotomized to determine the presence or absence of that specific symptom. Higher scores indicate greater symptoms, with scores equal to or greater than 26 being the cut-off point indicated by various authors to discriminate people with autism [55]. Both in this version and in other validations carried out in England, Japan and the Netherlands, the internal consistency of the full scale is acceptable ($\alpha=0.63$ to 0.78) [56–58]. In the current study, the internal consistency for the total scale was 0.74 .

The *Sexual Cognitions Checklist* (SCC) [14, 17] was used to explore the experience of 56 sexual cognitions. Participants rated the frequency with which they had each cognition as positive and as negative, respectively, on a 7-point frequency scale ranging from never (0) to frequently during the day (6). To examine the content of PSC and NSC, we examined each item individually. Diversity of PSC and NSC was defined as the number of different PSC and NSC experienced. Finally, we summed, for PSC and NSC separately, the scores for each of the 56 items to calculate total frequency scores (range 0 to 336). Renaud and Byers report high internal consistency for men and women for both the positive cognitions subscale and the negative cognitions subscale. The internal consistencies in the current study were high ($\alpha=0.97$ for both the PSC and NSC subscales).

Procedure

Approximately 190 national and international organizations that provided services or resources both online and in person to autistic adults were contacted and provided with informational flyers about the study to give to potential participants. Potential participants could access the study website (described in the informative flyer) where the purpose of the study was explained in a more extensive way, including the contact information for the researchers, the approximate duration of the study, confidentiality and anonymity of the responses, and the voluntary nature of the study. Participants who gave their consent to participate were automatically assigned an identification code and could initiate the survey. Once finished, participants viewed a debriefing page which outlined the objectives of the

² The term “homosexual” is used to refer to the sexual attraction towards people of the same sex with the aim of unifying concepts since the word homosexual is used in the instrument used to explore sexual cognitions. However, the authors acknowledge with respect for the sensitivity and revised terms of Gay, Lesbian.

study and were provided resources on sexuality in people with ASD. This study was conducted following institutional ethical review in both Canada and the United States.

Data Analysis

As a first step, we performed Exploratory Factor Analyses (EFA) on PSC and NSC separately using FACTOR software (version 9.2) with the aim of grouping the 56 sexual cognitions according to their content and facilitating their analysis. Although the values resulting from these analyses were acceptable ($\chi^2=567.42$; $g.l.=344$; $RMSEA=0.046$ [90% ic= $0.04-0.053$]), the extracted factorial structure yielded a total of 10 factors that were not interpretable and did not match the factor structure found in previous research [18, 22, 59]. Therefore, we did not pursue analysis of the extracted factors further. Next, we examined whether the severity of ASD symptoms as assessed by the AQ was associated with the diversity and/or frequency of positive and/or negative sexual cognitions by examining the zero-order correlations. The results indicated that ASD severity was not associated with the diversity of PSC ($r=-.058$, $p=.338$) or NSC ($r=.081$, $p=.191$) nor frequency of PSC ($r=-.029$, $p=.636$) or NSC ($r=.091$, $p=.139$). Therefore, ASD severity was not considered further.

We used 2 (gender; male/female) \times 2 (relationship experience; no/yes) MANOVAs to test our hypotheses with diversity (H1 and H2) and frequency (H3 and H4) of PSC and NSC as the dependent measures. We used a series of *t*-tests to examine male-female differences in each specific PSC and NSC, adopting a conservative alpha to protect against Type 1 error ($p<.001$).

Results

Almost all participants reported having experienced both positive and negative sexual cognitions. That is, of the total sample, only 3.2% had not experienced any of the sexual cognitions as positive (0.8% of men; 5.1% of women), and only 9.1% had not experienced any of them as negative (7.8% of men; 10% of women).

Diversity of Positive and Negative Sexual Cognitions

On average, participants reported 25.95 ($SD=13.79$) PSC and 14.31 ($SD=13.09$) NSC. The diversity of PSC was significantly greater than the diversity of NSC, $t(229)=11.98$; $p<.001$. The results of the MANOVA examining male-female and relationship experience difference in the diversity of sexual cognitions revealed a significant multivariate effect for gender ($F(2,225)=8.574$, $p<.001$, $\eta_p^2=0.071$), and relationship experience ($F(2,225)=6.553$, $p=.002$, $\eta_p^2=0.055$). The interaction between these two variables was not significant. Follow-up ANOVAs revealed the gender and relationship experience effects were significant for PSC ($F(1, 226)=16.291$, $p<.001$, $\eta_p^2=0.067$ and $F(1, 226)=11.143$, $p=.001$, $\eta_p^2=0.047$, respectively) but not for NSC. As predicted, men reported experiencing a significantly greater diversity of positive sexual cognitions ($M=30.01$, $SD=13.38$) than did women ($M=22.45$, $SD=13.39$). Also as predicted, individuals with relationship experience reported experiencing significantly more diverse PSC ($M=26.82$, $SD=13.99$) than did those without relationship experience ($M=21.63$, $SD=12.73$).

Content of Positive and Negative Sexual Cognitions

To explore the content of sexual cognitions experienced by autistic individuals, we examined the percentage of participants who had experienced each of the sexual cognitions as positive, negative, or both at least once. Of note, all cognitions were experienced as both positive and negative by at least some participants.

As shown in Table 1, the three most common PSC reported by the men were *having intercourse with someone I know but have not had sex with*, *having intercourse with a loved partner*, and *kissing passionately* (reported by between 90.6% and 92.2%). For women, *having intercourse with a loved partner*, *kissing passionately*, and *being masturbated to orgasm by a partner* were the three most commonly reported PSC (reported by between 77.7% and 90.6%). The PSC that were least commonly reported by the men were *hurting a partner*, *engaging in a sexual act which I would not want to do because it violates my religious principles* and, *while engaging in a sexual act with my partner I have had sexual thoughts of doing something to my partner that I know would upset him/her* (reported by between 16.4% and 20.7%). Among women, the least commonly reported PSC were *having incestuous sexual relations (sexual relations with a family member)*, *engaging in a sexual act which I would not want to do because it violates my religious principles*, and *being aroused by watching someone urinate* (reported by between 7.4% and 10.1%).

In men, the three most common NSC were *being embarrassed by failure of sexual performance*, *engaging in sexual activity opposite to my sexual orientation (e.g., homosexual or heterosexual)*, and *having sex with someone much younger than myself* (reported by between 40.3% and 66.4%). In women, the three most common NSC were *being forced to do something sexually*, *being pressured into engaging in sex*, and *being sexually victimized* (reported by between 50% and 53.2%). The three NSC that men were least likely to report as negative were *throwing my arms around and kissing an authority figure*, *engaging in a sexual act which I would not want to do because it violates my religious principles*, and *being aroused by watching someone urinate* (reported by between 15.8% and 16.5%). Among women, the least common NSC were *wearing clothes of the opposite sex*; *having sex with someone of a different race* and *being aroused by watching someone urinate*; (reported by between 4.3% and 9.2%).

Frequency of Positive and Negative Sexual Cognitions

Participants' mean overall frequency of PSC and NSC were low, 72.26 ($SD=49.96$) and 29.27 ($SD=35.28$), respectively corresponding to between never and one or twice ever. They reported having PSC significantly more frequently than NSC ($t(229)=13.22$; $p<.001$). The MANOVA revealed a significant multivariate effect for gender, $F(2,225)=13.171$, $p<.001$, $\eta_p^2=0.105$, and relationship experience, $F(2,225)=6.426$, $\eta_p^2=0.054$. However, the interaction between gender and relationship experience was not significant, $F(2,225)=0.834$, $p=.435$, $\eta_p^2=0.007$. Follow-up ANOVAs revealed that both gender and relationship experience were significant for PSC ($F=25.233$, $p<.001$, $\eta_p^2=0.100$) and ($F=12.327$, $p=.001$, $\eta_p^2=0.052$) respectively but not for NSC. Men reported more frequent PSC than did women ($M_s=91.93$ and 56.92 , respectively) and participants with relationship experience reported more frequent PSC than participants without relationship experience ($M_s=75.93$ and 57.77 , respectively).

Table 1 Percentage of men and women reporting each sexual cognition as positive, negative, or both

	Positive		Negative		Positive and negative	
	Men (%)	Women (%)	Men (%)	Women (%)	Men (%)	Women (%)
Having intercourse with someone I know but have not had sex with.	92.2	71.2	37.1	42.3	35.0	34.9
Having intercourse with a loved partner.	90.8	90.6	25.7	28.2	23.6	27.7
Kissing passionately.	90.6	80.3	22.1	17.8	18.8	13.6
Receiving or giving genital stimulation.	89.3	77.1	23.7	27.8	21.0	22.6
Taking someone's clothes off.	88.6	62.8	25.2	11.8	23.2	9.7
Receiving oral sex (mouth-genital stimulation).	87.1	71.6	28.1	27.8	23.2	19.8
Giving oral sex (mouth-genital stimulation).	86.4	69.5	29.0	29.9	27.0	19.8
Being masturbated to orgasm by a partner.	83.6	77.7	21.4	13.4	19.4	12.4
Making love elsewhere than the bedroom (e.g. kitchen or bathroom).	81.4	76.2	19.3	15.6	18.0	11.3
Having my clothes taken off.	80.6	70.4	29.5	25.1	24.8	17.1
Looking at obscene pictures or films.	80.0	57.1	36.4	27.8	33.1	20.3
Watching others have sex.	79.1	53.7	36.2	25.8	31.6	17.8
Making love out of doors in a romantic setting (e.g. field of flowers; beach at night).	77.9	71.2	17.3	14.8	14.5	10.1
Being much sought after by the opposite sex.	77.0	56.1	25.0	19.9	22.5	15.6
Having sex with someone of a different race.	76.4	51.9	21.6	9.1	18.1	6.5
Having sex with an anonymous stranger.	75.7	49.5	34.3	36.5	25.9	21.3
Having sex with two other people at the same time.	73.0	57.4	28.3	26.9	23.2	16.1
Having sex with someone much younger than myself.	69.8	33.0	40.3	21.4	32.8	12.4
Being promiscuous (having many casual sex relationships).	67.9	38.6	29.5	27.3	25.4	19.3
People I come in contact with being naked.	65.5	24.9	33.1	18.7	29.2	8.6
Having sex in a public place.	62.9	50.0	23.6	21.1	18.7	13.6
Using objects for stimulation (e.g. vibrator, candles).	62.1	65.1	29.5	19.8	25.4	16.0
Participating in an orgy (group sex party).	61.0	39.2	29.7	24.3	23.2	12.5
Having sex with someone much older than myself.	56.5	41.0	38.4	28.0	29.6	17.3
Seducing an 'innocent'.	56.4	28.0	28.8	13.5	25.4	6.5
Partner-swapping (Having sex with someone else's partner with their permission).	54.3	24.5	23.7	19.4	16.9	8.6
Being excited by material or clothing (e.g. rubber, leather, underwear).	52.5	46.0	20.1	12.4	13.1	7.7
Being seduced as an 'innocent'.	51.4	44.4	19.6	15.1	16.8	9.1
Being overwhelmed by a stranger's sexual advances.	48.6	31.9	36.0	33.3	21.7	14.6
Engaging in a sexual act with someone who has authority over me.	43.3	45.0	23.0	30.3	16.5	16.5
Engaging in sexual activity opposite to my sexual orientation (e.g. homosexual or heterosexual).	43.2	51.3	45.7	32.6	27.5	19.9
Tying someone up.	43.2	32.4	21.6	11.3	16.8	5.5
Engaging in a sexual act with someone who is 'taboo' (family member, religious figure).	41.1	22.6	38.8	30.7	23.7	12.2
Whipping or spanking someone.	40.7	32.8	23.7	14.1	17.4	7.1
Masturbating in a public place.	37.1	22.9	26.6	13.9	16.7	7.0
Being forced to do something sexually.	36.4	33.9	36.2	53.2	19.7	20.5
Forcing someone to do something sexually.	35.7	22.6	38.8	24.3	21.7	10.3
Being tied up.	35.5	50.8	24.5	23.0	16.9	14.1

Table 1 (continued)

	Positive		Negative		Positive and negative	
	Men (%)	Women (%)	Men (%)	Women (%)	Men (%)	Women (%)
Exposing myself provocatively (in order to sexually arouse other people).	35.0	36.0	19.3	18.7	12.2	9.6
Being whipped or spanked.	33.3	38.8	25.4	17.7	14.8	10.3
Being pressured into engaging in sex.	32.1	30.4	35.3	50.3	15.8	19
Having incestuous sexual relations (sexual relations with a family member).	30.4	7.4	33.8	20.3	19.1	4.8
Forcing another adult to engage in a sexual act with me.	29.0	13.9	32.4	13.9	18.4	3.8
Being aroused by watching someone urinate.	28.6	10.1	16.5	9.2	8.7	2.7
Being embarrassed by failure of sexual performance.	27.5	13.2	66.4	40.8	22.5	9.8
Throwing my arms around and kissing an authority figure.	25.7	27.5	15.8	15.0	8.0	9.0
Having sex with an animal or non-human object.	25.0	20.0	30.9	24.3	13.8	9.7
While engaging in a sexual act with my partner I have had sexual thoughts of saying something to my partner that I know would upset him/her.	22.9	16.6	29.3	25.9	15.1	12.6
Authority figures (minister, boss) being naked.	22.1	17.6	21.2	15.0	12.5	7.0
Lifting my skirt or dropping my pants, and indecently exposing myself in public.	21.6	20.5	26.8	15.6	11.8	5.9
Being sexually victimized.	21.4	17.6	33.1	50.0	12.9	10.8
Wearing clothes of the opposite sex.	21.4	20.3	17.3	4.3	8.0	3.3
Being hurt by a partner.	20.9	24.3	34.5	37.1	13.9	11.3
While engaging in a sexual act with my partner I have had sexual thoughts of doing something to my partner that I know would upset him/her.	20.7	14.3	28.8	18.4	13.0	9.2
Hurting a partner.	18.6	12.8	29.7	16.8	13.1	4.4
Engaging in a sexual act which I would not want to do because it violates my religious principles.	16.4	9.0	16.1	19.3	8.8	4.8
Any	99.2	94.9	92.2	90.0	86.5	75.9

We also examined gender differences in the frequency of each of the 56 different PSC and NSC using a series of *t*-tests (see Table 2). The men experienced 22 of the 56 PSC significantly more frequently than did the women. Most of these differences had a medium effect size ($d = .406$ to $.764$). However, four of these cognitions (*People I come in contact with being naked, having sex with someone much younger than myself, looking at obscene pictures or films, and having intercourse with someone I know but have not had sex with*) had a large effect size ($d \geq 0.8$). As for the NSC, there were significant gender differences in 3 of the 56 cognitions. Men experience the negative sexual cognitions *having sex with someone much younger than myself; seducing an 'innocent'* and *being embarrassed by failure of sexual performance* more often than did women. These differences had medium effect sizes ($d = .448$ to $.511$).

Table 2 Gender differences in the frequency with which PSC and NSC are experienced

	PSC				NSC			
	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>
Having intercourse with a loved partner.	3.77 (1.77)	3.37 (1.69)	-2.12	0.231	0.69 (1.39)	0.56 (1.05)	-0.96	0.105
Kissing passionately.	3.50 (1.65)	2.73 (1.84)	-3.96***	0.441	0.76 (1.63)	0.36 (0.88)	-2.59	0.305
Receiving or giving genital stimulation.	3.49 (1.71)	2.49 (1.78)	-5.15***	0.573	0.68 (1.46)	0.52 (0.98)	-1.10	0.129
Having intercourse with someone I know but have not had sex with.	3.32 (1.73)	1.92 (1.67)	-7.45***	0.823	0.91 (1.46)	0.83 (1.17)	-0.56	0.060
Giving oral sex (mouth-genital stimulation).	3.29 (1.70)	2.07 (1.73)	-6.38***	0.711	0.69 (1.36)	0.59 (1.04)	-0.75	0.083
Receiving oral sex (mouth-genital stimulation).	3.28 (1.81)	2.12 (1.67)	-5.96***	0.667	0.71 (1.37)	0.56 (1.05)	-1.12	0.122
Taking someone's clothes off.	3.19 (1.71)	1.86 (1.77)	-6.84***	0.764	0.71 (1.49)	0.23 (0.72)	-3.46	0.410
Looking at obscene pictures or films.	2.99 (1.93)	1.43 (1.52)	-7.93***	0.898	0.93 (1.49)	0.52 (0.94)	-2.81	0.329
Being masturbated to orgasm by a partner.	2.77 (1.62)	2.27 (1.62)	-2.79	0.309	0.59 (1.29)	0.29 (0.85)	-2.36	0.275
Making love elsewhere than the bedroom (e.g. kitchen or bathroom).	2.69 (1.74)	2.26 (1.67)	-2.26	0.252	0.51 (1.26)	0.29 (0.77)	-1.86	0.211
Having my clothes taken off.	2.62 (1.82)	2.05 (1.69)	-2.93	0.325	0.77 (1.46)	0.62 (1.27)	-0.98	0.109
Being much sought after by the opposite sex.	2.60 (1.91)	1.42 (1.61)	-5.90***	0.668	0.61 (1.31)	0.49 (1.14)	-0.88	0.098
Having sex with an anonymous stranger.	2.44 (1.89)	1.19 (1.48)	-6.50***	0.736	0.77 (1.34)	0.68 (1.06)	-0.67	0.074
Watching others have sex.	2.32 (1.76)	1.32 (1.49)	-5.44***	0.613	0.72 (1.19)	0.42 (0.84)	-2.47	0.291
Having sex with two other people at the same time.	2.25 (1.79)	1.26 (1.39)	-5.47***	0.618	0.57 (1.06)	0.42 (0.84)	-1.34	0.157
Having sex with someone of a different race.	2.24 (1.78)	1.10 (1.35)	-6.36***	0.722	0.42 (1.08)	0.13 (0.49)	-2.94	0.346
Having sex with someone much younger than myself.	2.16 (1.84)	0.69 (1.18)	-8.24***	0.951	0.92 (1.45)	0.33 (0.75)	-4.41***	0.511
People I come in contact with being naked.	2.08 (1.97)	0.54 (1.17)	-8.19***	0.950	0.72 (1.23)	0.35 (0.83)	-3.08	0.353
Making love out of doors in a romantic setting (e.g. field of flowers; beach at night).	2.07 (1.53)	1.64 (1.33)	-2.74	0.299	0.32 (0.83)	0.23 (0.64)	-1.03	0.121

Table 2 (continued)

	PSC				NSC			
	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>
Being promiscuous (having many casual sex relationships).	2.01 (1.81)	0.87 (1.31)	-6.36***	0.722	0.65 (1.26)	0.48 (0.91)	-1.43	0.154
Being excited by material or clothing (e.g. rubber, leather, underwear).	1.64 (1.89)	1.23 (1.61)	-2.06	0.233	0.48 (1.12)	0.24 (0.74)	-2.18	0.253
Having sex in a public place.	1.64 (1.67)	1.03 (1.27)	-3.65***	0.411	0.45 (0.99)	0.29 (0.65)	-1.63	0.191
Participating in an orgy (group sex party).	1.62 (1.71)	0.78 (1.19)	-5.03***	0.570	0.57 (1.03)	0.39 (0.81)	-1.73	0.194
Being seduced as an 'innocent'.	1.51 (1.79)	0.98 (1.39)	-2.91	0.331	0.45 (1.11)	0.30 (0.84)	-1.31	0.152
Seducing an 'innocent'.	1.49 (1.65)	0.49 (0.91)	-6.48***	0.750	0.60 (1.17)	0.19 (0.55)	-3.82***	0.448
Having sex with someone much older than myself.	1.43 (1.60)	0.84 (1.29)	-3.54***	0.406	0.74 (1.23)	0.55 (1.07)	-1.42	0.165
Partner-swapping (Having sex with someone else's partner with their permission).	1.33 (1.55)	0.52 (1.06)	-5.34***	0.610	0.48 (1.11)	0.30 (0.75)	-1.71	0.190
Being overwhelmed by a stranger's sexual advances.	1.21 (1.53)	0.69 (1.25)	-3.25	0.372	0.71 (1.17)	0.62 (1.14)	-0.71	0.078
Tying someone up.	1.12 (1.54)	0.69 (1.19)	-2.73	0.312	0.47 (0.99)	0.15 (0.45)	-3.35	0.416
Whipping or spanking someone.	1.04 (1.58)	0.66 (1.15)	-2.45	0.275	0.53 (1.19)	0.22 (0.62)	-2.78	0.327
Engaging in a sexual act with someone who is 'taboo' (family member, religious figure).	0.94 (1.47)	0.44 (0.97)	-3.48	0.401	0.68 (1.07)	0.58 (1.07)	-0.83	0.093
Forcing someone to do something sexually.	0.86 (1.43)	0.47 (1.04)	-2.74	0.312	0.80 (1.27)	0.61 (1.09)	-2.97	0.161
Masturbating in a public place.	0.77 (1.25)	0.46 (0.98)	-2.57	0.276	0.47 (0.89)	0.21 (0.61)	-2.89	0.341
Being aroused by watching someone urinate.	0.69 (1.37)	0.19 (0.71)	-3.89***	0.458	0.29 (0.76)	0.16 (0.64)	-1.57	0.185
Having incestuous sexual relations (sexual relations with a family member).	0.63 (1.22)	0.14 (0.57)	-4.40***	0.515	0.55 (1.04)	0.40 (0.94)	-1.39	0.151
Being embarrassed by failure of sexual performance.	0.62 (1.29)	0.22 (0.63)	-3.43	0.394	1.62 (1.55)	0.90 (1.32)	-4.44***	0.500
Forcing another adult to engage in a sexual act with me.	0.62 (1.23)	0.26 (0.76)	-3.03	0.352	0.58 (1.02)	0.23 (0.73)	-3.39	0.395

Table 2 (continued)

	PSC				NSC			
	Men <i>M</i> (<i>SD</i>)	Women <i>M</i> (<i>SD</i>)	<i>t</i>	<i>d</i>	Men <i>M</i> (<i>SD</i>)	Women <i>M</i> (<i>SD</i>)	<i>t</i>	<i>d</i>
Engaging in a sexual act which I would not want to do because it violates my religious principles.	0.52 (1.34)	0.20 (0.78)	-2.56	0.292	0.37 (1.04)	0.41 (1.05)	0.34	0.038
While engaging in a sexual act with my partner I have had sexual thoughts of doing something to my partner that I know would upset him/her.	0.43 (0.94)	0.24 (0.65)	-2.06	0.235	0.59 (1.18)	0.35 (0.84)	-2.08	0.234
Being pressured into engaging in sex.	0.78 (1.38)	0.67 (1.19)	-0.76	0.085	0.76 (1.31)	1.18 (1.47)	2.71	0.302
Being forced to do something sexually.	0.92 (1.53)	0.80 (1.34)	-0.74	0.084	0.73 (1.21)	1.11 (1.35)	2.59	0.296
Being sexually victimized.	0.48 (1.20)	0.41 (1.07)	-0.51	0.049	0.63 (1.13)	1.11 (1.39)	3.39	0.379
Hurting a partner.	0.34 (0.89)	0.25 (0.78)	-0.91	0.107	0.61 (1.21)	0.33 (0.89)	-2.26	0.264
Being whipped or spanked.	0.80 (1.45)	0.97 (1.46)	1.04	0.116	0.57 (1.20)	0.33 (0.89)	-2.01	0.227
Lifting my skirt or dropping my pants, and indecently exposing myself in public.	0.50 (1.16)	0.32 (0.75)	-1.73	0.184	0.46 (0.91)	0.26 (0.69)	-2.23	0.248
Wearing clothes of the opposite sex.	0.39 (1.02)	0.45 (1.05)	0.53	0.058	0.24 (0.65)	0.05 (0.27)	-3.27	0.382
Engaging in a sexual act with someone who has authority over me.	1.09 (1.58)	1.15 (1.59)	0.31	0.038	0.53 (1.18)	0.67 (1.22)	1.02	0.116
Engaging in sexual activity opposite to my sexual orientation (e.g. homosexual or heterosexual).	1.01 (1.49)	1.13 (1.37)	0.76	0.083	0.83 (1.09)	0.61 (1.09)	-1.79	0.202
Throwing my arms around and kissing an authority figure.	0.52 (1.12)	0.56 (1.13)	0.31	0.036	0.29 (0.80)	0.32 (0.91)	0.29	0.035
Having sex with an animal or non-human object.	0.54 (1.21)	0.38 (0.90)	-1.36	0.150	0.48 (0.85)	0.37 (0.79)	-1.19	0.134
Being hurt by a partner.	0.53 (1.28)	0.58 (1.23)	0.32	0.039	0.78 (1.37)	0.87 (1.35)	0.53	0.066
Being tied up.	0.90 (1.49)	1.13 (1.39)	1.46	0.159	0.53 (1.14)	0.38 (0.80)	-1.35	0.152
Authority figures (minister, boss) being naked.	0.51 (1.17)	0.37 (0.96)	-1.13	0.130	0.39 (0.92)	0.27 (0.74)	-1.33	0.143

Table 2 (continued)

	PSC				NSC			
	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>	Men <i>M(SD)</i>	Women <i>M(SD)</i>	<i>t</i>	<i>d</i>
Exposing myself provocatively (in order to sexually arouse other people).	0.88 (1.43)	0.83 (1.32)	-0.35	0.036	0.36 (0.89)	0.29 (0.67)	-0.79	0.089
Using objects for stimulation (e.g. vibrator, candles).	1.61 (1.63)	1.71 (1.65)	0.59	0.061	0.58 (1.13)	0.42 (0.98)	-1.37	0.151
While engaging in a sexual act with my partner I have had sexual thoughts of saying something to my partner that I know would upset him/her.	0.46 (0.99)	0.30 (0.77)	-1.61	0.180	0.59 (1.16)	0.48 (0.94)	-0.90	0.104

Note: *** $p < .001$

Discussion

Sexual cognitions are composed of thoughts, images, and fantasies that can be experienced positively or negatively and are a fundamental aspect of sexual well-being [14–16, 60]. The main purpose of the current study was to add to our limited understanding of the sexual cognitions of autistic men and women with and without relationship experience. The results demonstrate that both autistic men and autistic women experience a great diversity of PSC and NSC. This coupled with the finding that they report significantly more diverse and frequent PSC than NSC provides a positive view of the inner sexual life of autistic individuals. The results also demonstrate the importance of gender and relationship experience with respect to the diversity, frequency, and content of positive, but not negative, sexual cognitions among autistic individuals.

Diversity and Frequency of Positive and Negative Sexual Cognitions

Our results demonstrate that autistic individuals are diverse in their sexual cognitions. That is, in line with findings from neurotypical samples [17], all of the sexual cognitions assessed were experienced as positive and/or negative by at least some participants. In addition, almost all participants had experienced at least one PSC and at least one NSC, and most had experienced several different PSC and NSC. Nonetheless, the sexual cognitions of autistic individuals appear to be less diverse than those of neurotypical individuals. That is, we found that, compared to Renaud and Byers [17] who used the same measure in a sample of neurotypical individuals, on average our participants reporter fewer different PSC and NSC (25.95 vs. 32.65 PSC and 14.31 versus 24.2 NSC on average). Similarly, we found participants reported having PSC and NSC less frequent than in the Renaud and Byers sample (PSC: 91.93 versus 116.9 PSC for men and 56.92 versus 78.1 for women; NSC: 32.89 versus 54.0 for men and 25.97 versus 39.7 for women).

There are a number of possible explanations for the lower diversity and frequency of PSC and NSC among autistic individuals than neurotypical individuals. One possible expla-

nation for the lower diversity and frequency of PSC may be related to the fact that autistic individuals, or at least a subset of autistic individuals, experience lower sexual desire or lower arousability than their neurotypical peers and/or experience sensory or other difficulties that make sexual activity unpleasant [35, 61]. Another explanation for this finding is related to autistic individuals' preference for familiarity and sameness [62, 63] as well as for adopting an actor's perspective even after they have viewed specific activities. For these individuals, once they have established a familiar routine that feels comfortable and arousing, they would be less inclined to explore new and different experiences and difficulty imagining themselves in a scenario they have not personally experienced. Getting out of this routine, moreover, can lead to anxiety [64, 65], which can also contribute to less motivation to seek out new sexual experiences and fantasies. Our finding that the autistic individuals in our sample reported fewer and less frequency NSC than in the neurotypical sample given their higher risk for and higher prevalence of sexual abuse or trauma [43, 66], and high negative sensitivity to some bodily sensations [67]. This may reflect the low awareness of internal body states and emotions [68] of autistic individuals, which may make it difficult for them to imagine and/or identify sexual situations that they may experience negatively.

Finally, as predicted, men and people who have had a relationship experience present more diverse and more frequent PSC but not NSC. These findings suggest that the PSC of autistic individuals reflect their prior sexual experience. That is, previous research has found that autistic men report a wider range of sexual experiences and stronger sexual desire than do autistic women and individuals with relationship experience report less sexual anxiety, more sexual arousability and more dyadic desire compared to those without relationship experience [35, 69, 70]. The current research extends these findings by showing that on average autistic individuals may experience a range of different types of cognitions more frequently than do autistic women. Indeed, there were no sexual cognitions that the women experienced more frequently than did the men.

We did not find differences in the diversity or frequency of NSC based on gender or relationship experience. This may reflect the small number of and very low frequency of NSC reported by our participants. The lack of gender differences in the overall diversity and frequency of NSC extends to individual NSC. That is, we found that the men reported experiencing only three of the NSC more frequently than did the women.

Content of Positive and Negative Sexual Cognitions

Factor analyses of the frequency of sexual cognitions in previous research with neurotypical populations has identified four factors characterizing these cognitions including cognitions related to intimacy, exploration, impersonality and sadomasochistic (for Moyano and Sierra [18] it would be divided in two: domination and submission) [18, 59]. However, we failed to identify conceptual factors related to the sexual cognitions of the current sample of autistic individuals. This suggests that autistic individuals who experience one sexual cognition more frequently are not likely to also experience other conceptually related sexual cognitions more frequently. This may mean autistic individuals tend to think about sexual experiences less conceptually, focusing on isolated and more concrete thoughts/desires rather than having sexual cognitions that reflect variations on particular themes or constructs. Alternately, because the Sexual Cognition Checklist that we used to assess sexual cognitions, was not developed based on the cognitions of autistic individuals, it may be that the measure

does not have content validity for this population and thus failed to include items that represent the factors that characterize their sexual cognitions. Qualitative research would help to shed light on these explanations.

Nonetheless, the results of the factor analyses conducted on data from neurotypical individuals [18, 59] are useful in characterizing the content of the individual PSC and NSCs of the autistic individuals in our sample. Our findings provide evidence that sexual experience and social norms are linked to most and least common PSC and NSC content. That is, consistent with previous research with neurotypical individuals and consistent with social norms [17, 18], we found that the most common PSC experienced by both autistic men and women and reported by the vast majority of respondents were intimacy-related (e.g., having intercourse with a loved partner, kissing passionately, etc.). Consistent with the role of sexual experience, cognitions about specific dyadic sexual activities (e.g., kissing passionately) were also among the most common PSC. Intimacy fantasies have been shown to be related to higher sexual arousal, dyadic desire, as well as other factors that are related to better sexual well-being [71, 72]. PSC about intimacy-related and specific sexual activities attest to the sexual interest and desire of our participants. Thus, these findings are other indications of the sexual well-being of autistic individual.

Conversely, the least common PSC experienced by our participants (e.g., hurting a partner or being aroused by watching someone urinate) are also consistent with previous research with neurotypical individuals [17, 18, 22] and tend to represent a violation of social norms. Of note, contrary to the proposal by some authors that a large number of autistic people show paraphilic interests [50, 73], we found that few participants reported paraphilic cognitions (e.g., being excited by material or clothing, forcing another adult to engage in a sexual act with me or having sex with an animal or non-human object, between others). This finding is important because it can contribute to the depathologization of autistic sexuality.

The sexual cognitions that autistic people most experience as negative, especially among women where sexual coercion content predominates, may be related to the high rates of sexual victimization in this group in addition to the high rates in women in the general population [40, 41, 74, 75]. These data place special emphasis on the need to work preventively on the sexual victimization of autistic individuals in order to avoid possible consequences in their experience of sexuality. On the contrary, the least common NSC appear to reflect uncommon thoughts generally rather than uncommon NSC since they are also uncommon PSC.

Conclusion

The results of this study provide insight into the sexual cognitions of autistic individuals. However, it is not without limitations. Although there is evidence for the reliability and validity of the SCC (Sexual Cognitions Checklist) in neurotypical populations, it has not been validated for use with autistic individuals. Thus, the extent to which the items have content validity for autistic individuals is unknown. Qualitative research is needed to determine whether the measure captures the most common sexual cognitions of individuals with autism as well as whether different wording is needed for specific items. Other limitations have to do with the sample. Because we dichotomized gender into male or female, we cannot draw conclusions about the sexual cognitions of individuals who identify as gender

diverse. Also, although all participants scored above cut off on the AQ and so certainly had significant autism symptoms, many of them do not have a clinical diagnosis of autism. On the other hand, we included both individuals who had and who had not received a professional diagnosis because many autistic adults with have never received a professional diagnosis [76]. Diagnosis has traditionally focused on children and only recently have professionals become more inclusive in diagnosing ASD to include individuals who are highly verbal and bright. Finally, more than half of our participants were women even though autism is much more common in men [77, 78].

Despite these limitations, enhances our understanding of the sexual cognitions of autistic individuals. They also have implications for researchers and educators. Our finding that men report significantly more diverse and frequent PSC suggests that autistic women may need validation of the normalcy of a range of PSC. Our finding that individuals with relationship experience reported significantly more PSC suggests that past experiences influence sexual cognitions. As such, it is important to determine the types of sexual experiences that are associated with having more frequent PSC as well as whether negative sexual experiences, such as experiences of sexual abuse, are associated with the frequency or diversity of PSC or NSC. Finally, our finding that our participants reported significantly more diverse and frequent PSC than NSC contributes additional evidence to a small body of research (4, 10, 34) that counters stereotypes about the sexuality of autistic individuals by providing evidence of positive sexuality among autistic individuals. As such, it to the results can be used to depathologize the sexuality of autistic individuals. Educators and clinicians must be aware that autistic people can have a healthy and satisfying internal sexual life and reflect this information in sexual health education as well as in treatment of sexual problems and concerns. That is, education and treatment need to reflect the actual experiences and needs of autistic individuals rather than being based on biases or erroneous stereotypes that continue to pathologize their sexuality.

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Declarations

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Informed consent was obtained from all individual participants included in the study.

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