Asexuality : A possible background and how it relates to autism and neurodiversity

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Abstract

For typical people previous results have found that a few percent identify as asexual based on having no sexual attraction to anybody and this was confirmed for typical people in the study.

For neurodiverse people, it was hypothesized that the primary reason for self-identifying as asexual was dislike or disgust for typical relationship preferences, and in particular for sexual penetration. This was confirmed with correlations and mediation analysis in the study.

Neurodiverse females had the highest rates of identifying as asexual, with less than half of them answering “no” to a question about being asexual. Asexual self-identification didn't cluster with sexual orientation. Disgust for sexual intercourse and asexual self-identification as a teenager mediated problems with sexual intimacy later in life.

Introduction

Asexuality has been defined in terms of little or no sexual attraction (Bogaert, 2004; Storms, 1980), in terms of sexual preference (Nurius, 1983), and with self-identification (Prause&Graham, 2007). A national probability study in the United Kingdom suggested that approximately 1% of the population self-identify as asexual based on criteria of never being sexually attracted to anyone (Bogaert, 2004). Based on data from a nonrandom sample it was found that approximately 5% of the men and 10% of the women reported not feeling sexual attraction for neither men nor women (Nurius, 1983). If we assume that lack of sexual attraction means people won't reproduce, such high prevalence of asexuality is problematic from an evolutionary point of view. When autistic adults living in community settings were compared to the general population in an online survey, it was found that asexuality was more common in the autistic adults (Gilmour et al., 2012). A higher prevalence of asexuality in high-functioning autism is problematic as it has been suggested that high-functioning autism has a strong hereditary component (Rutter, 2005). Asexual people report significantly less desire for sex with a partner, lower sexual arousability, and lower sexual excitation but do not differ consistently from non-asexuals in their sexual inhibition scores or their desire to masturbate (Prause&Graham, 2007). The presence of some sexual desires but not others in some people identifying as asexual is problematic if asexuality is a general disinterest in sex. Asexual people sometimes report having a romantic orientation, and sometimes report being aromantic (Scherrer, 2008; Bogaert, 2015). This is problematic since there is compelling evidence that pair-bonding and romantic love evolved as an exaptation of the much older infant-caregiver attachment mechanism which lacks an intrinsic gender orientation (Diamond, 2003).

Neurodiversity and Aspie Quiz

Neurodiversity sees “atypical neurological development as a normal human difference”

(Jaarsma&Welin, 2012), and hence the right to be different but not treated as ill or needing a cure

(Jaarsma&Welin, 2012, Griffin&Pollak, 2009). Neurodiversity has been defined with factor

analysis using the Aspie Quiz online questionnaire (Ekblad, 2013). The primary factor in Aspie

Quiz was named neurodiversity factor while the secondary factor was named neurotypical factor.

In the construction phase, 1,800 items were evaluated using a population of 550,000 individuals.

Scores were calculated by using the factor loadings as weight factors. The difference between the

neurodiverse score and the neurotypical score was used to give classifications. A score difference

above or equal to 35 was classified as neurodiverse (ND), a score difference below or equal to

-35 was classified as neurotypical (NT), while scores in between were classified as mixed. The

score difference had a .83 correlation with the AQ test measuring autistic traits (Ekblad, 2013).

Aims and hypothesis

The first aim was to prove that females were more likely to self-identify as asexual and that

neurodiverse and diagnosed autistic people would also be more likely to self-identify asexual.

Next, since asexuality is a poorly defined trait, the aim was to show that finding sexual

intercourse disgusting would be highly correlated to asexual self-identification and show a

similar prevalence and answer distribution as asexual self-identification. Related traits and

possible causes would then be identified and used in a mediation model that would show the

casual relationships. To verify the stability of asexual self-identification, a longitudinal study was

performed. It was hypothesized based on experiences by autistic people that neurodiverse

asexuality was a misnomer for disliking the typical relationship phenotype and that it, in fact, was a specific disgust reaction to bonding with sexual intercourse..

Experiment 1

This part of the study checked how asexual self-identification related to autism and neurodiversity, and the possible existence of a gender bias.

Method

The standard Aspie Quiz item “Are you asexual?” was analyzed to check the prevalence of asexuality per gender and Aspie Quiz classification (ND, mixed and NT). Participants self-reported professional AS/HFA/PDD diagnosis was used to check how the results related to a professional autism diagnosis.

Data collection

The final version 4 Aspie Quiz (L4) that run periodically between March 14, 2015, and December 24, 2016, was used. The asexual item was a standard item and was presented in random order with other items. The item was rated on a 3-point Likert scale (“no”, “a little” and “yes”), and with an “? - I don't know” alternative that was checked by default.

Participants

A total of 123,834 responses from mostly English-speaking countries (52% from the US, 15% from the UK and 7% from Australia) were collected. 48% of the participants were male, and 52% were female. The age of participants was ($M = 30$, $SD = 15$) years for males, and ($M = 32$, $SD = 14$) years for females. 6.5% of the participants had a professional AS/HFA/PDD diagnosis.

Results

About 10% of the diagnosed and neurodiverse males and 20% of the diagnosed and neurodiverse females selected “yes”, and a similar amount selected “a little”. Only about half of the diagnosed and neurodiverse females selected “no”. Detailed results are presented in Table 1.

Table 1. Prevalence of asexual self-identification per gender, Aspie Quiz classification and diagnostic status.

	Male				Female			
	ASD	ND	Mixed	NT	ASD	ND	Mixed	NT
N	3987	17399	16355	23031	3675	29270	16930	15590
?	7.1%	8.8%	6.1%	4.2%	8.4%	10.5%	7.9%	5.0%
No	68.2%	62.7%	76.4%	87.8%	50.3%	48.0%	63.3%	80.9%
A little	14.7%	18.2%	12.9%	5.8%	21.2%	21.8%	17.4%	9.4%
Yes	10.0%	10.3%	4.7%	2.1%	20.0%	19.7%	11.3%	4.7%

Population sizes and percentage of asexual self-identification per answer alternative in different groups. ASD is based on diagnosed AS/HFA/PDD. ND, mixed and NT are based on Aspie Quiz classifications. Only people between 15 and 69 years of age were included in the analysis.

Discussion

People that got the neurotypical judgment, who form the majority of a typical population, had 2.2% of the males and 4.8% of the females selecting “yes” to being asexual, which was lower than in one study (Nurius, 1983) and higher than in another (Bogaert, 2004). The prevalence in the neurodiverse population was more than four times higher than in the neurotypical population. The prevalence for females was twice as high as for males, something that was consistent with previous research (Bogaert, 2015). The results for diagnosed ASD was similar to the results for the neurodiverse group, which provides evidence that findings can be extrapolated from the neurodiverse group to the ASD group for other measures in the study that required more participants than were part of the ASD group.

Experiment 2

This part of the study checked if finding sexual intercourse disgusting was related to autism and neurodiversity, and if there was a similar gender bias as for asexuality. The study also checked other traits that could be related to asexuality to get a candidate list of traits for mediation analysis.

Method

A new experimental item, “Do you think sexual intercourse is disgusting?” was added as it was suspected that it possibly related to asexual self-identification. Possible causes (low sex drive, lack of sexual attraction and depression) were added as experimental items. A standard neurodiverse relationship item (unusual sexual preferences) was examined, and some new suspected items on the neurodiverse relationship factor were added as experimental (homo- and bisexuality and fetishes). Three standard items in Aspie Quiz that were on the same factor as asexuality, the neurotypical relationship factor, were also examined (enjoying traditional dating, enjoying romantic situations and liking tongue kissing), and a new possible experimental item (liking oral sex) was added as experimental. Experimental items were presented in random order with standard items. The same Likert scale as in Experiment 1 was used.

Data collection

The final version 4 Aspie Quiz (L5) that run between June 2, 2015, and June 27, 2015, was used.

Participants

A total of 6,963 responses from mostly English-speaking countries (54% from the US, 14% from the UK and 6% from Australia) were collected. 51% of the participants were male, and 49% were female. The age of participants was ($M = 30$, $SD = 14$) years for males, and ($M = 32$, $SD = 14$) years for females. 7.3% of the participants had a professional AS/HFA/PDD diagnosis. The experimental items were only given to people that indicated they were at least 15 years old.

Results

The item “Do you think sexual intercourse is disgusting?” generated fewer “I don't know” responses than the asexual item, the frequency of “no” was similar, and so was the gender bias and the higher scores in the diagnosed ASD and neurodiverse population. Detailed results are presented in Table 2.

Table 2. Prevalence of finding sexual intercourse disgusting per gender, Aspie Quiz classification and diagnostic status.

	Male				Female			
	ASD	ND	Mixed	NT	ASD	ND	Mixed	NT
N	277	975	916	1469	198	1554	805	868
?	3.2%	6.1%	3.2%	3.2%	5.6%	5.3%	5.1%	2.1%
No	69.3%	62.3%	77.8%	90.6%	50.5%	49.6%	66.8%	84.7%
A little	16.2%	22.0%	15.1%	4.6%	22.7%	28.1%	21.7%	9.8%
Yes	11.1%	9.6%	3.9%	1.6%	21.2%	17.0%	6.3%	3.5%

Population sizes and percentage of finding sexual intercourse disgusting per answer alternative in different groups. ASD is based on diagnosed AS/HFA/PDD. ND, mixed and NT are based on Aspie Quiz classifications. Only people between 15 and 69 years old were analyzed.

The standard neurotypical relationship traits, as well as the suspected neurotypical relationship trait (oral sex), correlated significantly with asexuality, but for many of these items, the correlation was much higher in the diagnosed and neurodiverse population than in the neurotypical. The highest correlations were in the diagnosed ASD population. Detailed results are presented in Table 3. Additional analysis found a gender bias in how asexuality correlated to finding sexual intercourse disgusting. The correlation was .59 for neurodiverse females, .44 for neurodiverse males, and .36 for neurotypical people of both genders. The item about low sex drive had more similar responses between neurotypes than for instance tongue kissing, oral sex

and sexual attraction, and also had a significant negative correlation to fetishes (-.17 for NTs and -.21 for NDs).

Table 3. Items used in the mediation model.

Item	No answer	Aspie Quiz correlation		Asexual correlation		
		Male	Female	ASD	ND	NT
Do you have unusual sexual preferences?	9.4%	.33	.39	(.18)	(.07)	(.04)
Do you enjoy traditional dating?	13.8%	-.41	-.47	-.21	-.11	-.15
Do you find yourself at ease in romantic situations?	6.6%	-.46	-.49	-.27	-.18	-.14
Are you asexual?	7.7%	.27	.32			
Do you like tongue-kissing?	13.3%	-.33	-.34	-.43	-.35	-.23
Do you have a low sex drive?	7.0%	.26	.21	.53	.47	.34
Do you think sexual intercourse is disgusting?	4.3%	.31	.34	.66	.55	.36
Are you homo- or bisexual?	6.0%	.18	.26	(.07)	(.05)	(.07)
Do you enjoy (or think you would enjoy) oral sex?	8.0%	-.22	-.23	-.47	-.38	-.23
Do you have fetishes?	8.0%	.20	.30	(-.07)	-.10	(-.05)
Do you experience sexual attraction?	4.2%	-.25	-.27	-.66	-.64	-.37
Are you depressed?	4.4%	.38	.41	(.08)	(.06)	(.05)

Properties of items used in the mediation model, including the proportion of non-answers, Aspie Quiz score difference correlation and correlation to the asexual item. All correlations except those in parenthesis have $p < .0001$. Only people over 15 years of age were included in the analysis.

Discussion

The item about finding sexual intercourse disgusting showed a very similar pattern as the asexual item. The responses had higher quality (fewer non-answers), and the neurotypical population had less “yes” answers compared to the asexual item. Since the item was a lot more specific than the item about being asexual, yet gave similar results, it is a promising candidate for understanding the actual reason why some people dislike sex.

The neurodiverse sexual traits (unusual sexual preferences, homo- and bisexuality and fetishes) had very small or non-significant correlations to asexuality, which was contrary to what we would expect if asexuality is a general dislike for sex. However, this is consistent with previous findings that asexual people masturbate just as much as sexual people do (Prause&Graham, 2007). The lack of a connection to sexual orientation traits (homo- and bisexuality) puts doubt on the claims that asexuality can be considered as part of a sexual orientation model. Since multiple traits are clustered, correlation analysis cannot distinguish cause from effect, so another method is needed to place asexuality in a cause-effect framework.

Experiment 3

This part of the study used mediation analysis to put asexuality in a cause-effect framework.

Method

The R mediation package was used for mediation analysis (Tingley et al 2014). A single experiment design was used. For covariates, gender, Aspie Quiz classification and “Are you depressed?” were used. Depression was used as a covariate to remove the effect of depression on sex drive. The treatment variable was created by using the age of participants. Initially, all items

from Experiment 2 were tested in all combinations as both mediators and outcomes to identify relevant mediators and outcomes. Ages 15 to 19 were considered as untreated while ages 20 to 29 were considered as treated, and only participants between 15 and 29 years old were used in the analysis. Missing data were pairwise deleted. The resulting five relevant mediators and three relevant outcomes were then used in new mediation analyses that attempted to maximize average causal mediation effects (ACME) by selecting optimal age ranges for the treated variable.

Data collection

Data from Experiment 2 was used.

Participants

Participants were selected based on age, but the ranges differed between runs. 3,674 of the participants were between 15 and 29 years old.

Results

The relevant outcomes were liking tongue kissing and oral sex and feeling sexual attraction. All three outcomes also worked as mediators. Two additional mediators that didn't work as outcomes were found and these were asexual self-identification and finding sexual intercourse disgusting. Table 4 shows the ACME and mediated proportion for all significant mediator – outcome combinations. Finding sexual intercourse disgusting had the largest mediation effect. The two mediators that didn't work as outcomes both mediated all outcomes and the effect was additive as can be seen when several outcomes were used.

Table 4. Significant results from the mediation model.

Mediator	Outcome	Untreated age	Treated age	ACME	Proportion n mediated
Asexual	Dislike tongue kissing	15-18	19-39	.095	.639
Asexual	Dislike oral sex	15-18	19-39	.071	.730
Asexual	Lack of sexual attraction	15-18	19-39	.117	.695
Dislike tongue kissing	Dislike oral sex	15-18	19-34	.064	.671
Dislike tongue kissing	Lack of sexual attraction	15-18	19-34	.051	.251
Sexual intercourse disgusting	Dislike tongue kissing	15-18	19-49	.125	.800
Sexual intercourse disgusting	Dislike oral sex	15-18	19-49	.122	1.256
Sexual intercourse disgusting	Lack of sexual attraction	15-18	19-49	.115	.626
Dislike oral sex	Dislike tongue kissing	15-18	19-49	.045	.314
Dislike oral sex	Lack of sexual attraction	15-19	20-44	.032	.215
Lack of sexual attraction	Dislike tongue kissing	15-17	18-34	.108	.887
Lack of sexual attraction	Dislike oral sex	15-18	19-34	.076	.845
Asexual	Dislike kissing and oral sex	15-18	19-39	.184	.743
Sexual intercourse disgusting	Dislike kissing and oral sex	15-18	19-49	.268	1.072
Lack of sexual attraction	Dislike kissing and oral	15-18	19-34	.188	.783

sex					
Dislike kissing and oral					
Asexual	sex + lack of sexual	15-18	19-39	.321	.773
attraction					
Dislike kissing and oral					
Sexual intercourse	sex + lack of sexual	15-18	19-49	.395	.911
disgusting	attraction				

Shows all mediator – outcome combinations with statistical significance. The treated / untreated ages listed are those that generated the highest ACME.

Discussion

Low sex drive worked as neither a mediator nor an outcome, which means it is not part of the developmental process related to asexuality or intimacy problems. Asexuality and feeling disgust for sexual intercourse only worked as mediators, not as outcomes, and thus were developmental causes for later intimacy problems in adulthood.

Experiment 4

This part of the study checked how asexual self-identification changed over time.

Method

User registration in Aspie Quiz was exploited to follow up how consistent asexual self-identification was. Responses from registered users were extracted from the database tables and then merged into a single table. Registered users were checked for consistency and the given birth year, month and gender between first and last response had to match.

Data collection

Data from all Aspie Quiz versions that had user registration and the asexual item was used.

Participants

Participants that had answered the asexual item multiple times a minimum of six months apart between 2008 and 2016 were used ($N = 216$). The age of participants on first response was ($M = 37$, $SD = 14$) years for males, and ($M = 34$, $SD = 13$) years for females. The time difference between first and last response was ($M = 16$, $SD = 11$) months.

Results

14,899 responses by registered users had the asexual item. 947 registered users had responded more than once, but of these, only 216 had responded a minimum of six months apart.

Correlation between responses was .67 (.75 for all multiple responses). How the classifications changed are presented in Table 5. Only the diagnosed AS/HFA/PDD group and the neurodiverse group had a sufficient number of responses.

Table 5. Change in asexual self-identification per gender, Aspie Quiz classification and diagnostic status.

	Male		Female	
	ASD	ND	ASD	ND
N	21	59	38	97
Asexual → not asexual	0%	2%	3%	2%
Less asexual	0%	14%	8%	8%
No change	86%	69%	71%	69%
More asexual	10%	14%	18%	20%
Not asexual → asexual	5%	2%	0%	1%

Population sizes and change in asexual self-identification between first and last response in different groups. ASD is based on diagnosed AS/HFA/PDD and ND is based on Aspie Quiz classification. Only people that responded a minimum of six months apart were included.

Discussion

A majority of the participants answered the asexual item the same, and for those that didn't a majority tended to answer more towards asexuality. Only 5% or less of the responses changed from not asexual (no) to asexual (yes) or the reverse, which confirms the finding from the mediation analysis that asexual self-identification was not an outcome, rather is a fairly stable trait.

General discussion

Mediation analysis ruled out any role for lack of sex drive as a developmental cause for asexual self-identification. Lack of sex drive worked neither as a mediator nor as an outcome, and thus

neurotypical asexuality, which might be defined based on a low sex drive, wasn't related to the developmental process. Asexual self-identification worked as a mediator, but not as an outcome, which showed that asexual self-identification was an important contributing cause of intimacy problems. In the longitudinal study of asexuality, only a small minority of the participants changed their responses, and even fewer changed between yes and no or the reverse, confirming that asexual self-identification was fairly stable. Even if sexual attraction worked as both a mediator and an outcome, it had the wrong causal direction in regards to asexuality. The lack of sexual attraction in the 20s and later was caused by identifying as asexual as a teenager. The more well-defined trait to find sexual intercourse disgusting showed the same profile as asexual, but had a stronger mediating role. Given the similar profile of these two traits, and the high correlation between them, they probably are different aspects of the same phenotype. Because feeling disgusted by sexual intercourse is a more well-defined trait, it appears that neurodiverse asexuality should be defined in terms of disgust for neurotypical relationship preferences (bonding with sex), and not as a lack of a sex drive. Even if there appears to be little direct research on disgust for sexual intercourse, both vaginismus and dyspareunia in females might be conditions based on disgust for sexual intercourse (Borg & Jong, 2010), and these and related female sexual disorders exist at similar prevalences as asexuality (Anastasiadis et al., 2002). More general evidence for the importance of disgust for sexual functioning, even if complex, has been presented (Andrews et al., 2015).

Adding to the evidence that neurotypical and neurodiverse asexuality have different causes and developmental pathways were that the cluster of neurotypical relationship traits (tongue kissing, oral sex and feeling sexual attraction) had a much higher dependence in the neurodiverse population than in the neurotypical. Neurotypical asexuality was more distantly related to those

traits, and instead had a weaker correlation to many different sexual traits, including neurodiverse sexual traits. The correlation between asexual self-identification and feeling disgusted by sexual intercourse was highest in neurodiverse females, intermediate in neurodiverse males, and lowest in neurotypical people of both genders, which confirms the role disgust for sexual intercourse plays for neurodiverse asexuality, but not for neurotypical. The higher rates of asexual neurodiverse females probably are related to the larger risk for females to become pregnant by sexual intercourse in the evolutionary past without contraceptives.

The existence of two distinct reasons for identifying as asexual poses challenges to both the asexual community and the medical community. In *Diagnostic and Statistical Manual of Mental Disorders* (5th ed., text rev.; DSM-V; American Psychiatric Association, 2013), *Hypoactive Sexual Desire Disorder* (HSDD) is defined in terms of being distressed about lacking sexual fantasies and desire. This disorder may make sense for neurotypical asexuality, but it is unlikely to be relevant for neurodiverse asexuality that is based on disgust for regular sexual penetration. Similarly, for neurotypical asexuality, it may make sense to define asexuality based on the sexual orientation model, while this fails to capture the background for neurodiverse asexuality. The presence of both aromantic and romantic asexuals, which is problematic in relation to romantic love lacking an intrinsic gender orientation (Diamond, 2003), can be better understood if it is assumed that neurotypical asexuals are aromantic and neurodiverse asexuals have a romantic orientation. In the latter case, these people might be reporting their sexual orientation instead of their romantic orientation. This could be because asexuals are assumed to be disinterested in sex, and thus assumed to lack a sexual orientation, so instead reports their sexual orientation as their romantic orientation. Since neurodiverse asexuals only find regular sexual penetration disgusting and not neurodiverse sexual preferences, they may have a sexual orientation, and may also find

reproductive sex enjoyable. This could also be applied to the finding that some asexual people masturbate while others don't (Brotto et al., 2010). Adding to the evidence of a sexual orientation in neurodiverse asexuality is the finding that the physiological arousal patterns of asexual men (Rosen et al., 1997) and women (Brotto & Yule, 2011) seem to be intact and similar to those of sexual people.

Conclusion

Asexual self-identification appears to have two different causes. The usual meaning of asexuality as a lack of sexual interest or desire dominated in the neurotypical population, while in the neurodiverse population, a phenotype based on disgust for the typical sexual behavior dominated. For the neurodiverse phenotype, finding sexual intercourse disgusting in the late teens mediated lack of sexual attraction, disliking tongue kissing and oral sex in the 20s and beyond. Future research should pay attention to the two different causes for asexual self-identification rather than bundling them together into a single entity.

Implications

The high prevalence of asexuality, and especially the high prevalence for finding sexual intercourse disgusting, has important implications for possible treatments and advice to autistic and neurodiverse people. Since asexuality doesn't appear to change much over time, treatments that attempt to eradicate asexuality will be less successful and possibly only lead to more suffering because of unwanted sex in casual encounters and relationships. Since asexuality doesn't appear to be related to the neurodiverse relationship or sexual traits, a more promising approach is to explore how these preferences can be used as substitutes for sexual intercourse.

Compliance with Ethical Standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Aspie Quiz survey was constructed in such a way that participants could not be identified. Informed consent was obtained from all individual participants included in the study. Research items in Aspie Quiz could be skipped by selecting the “?” alternative (checked by default), and skipping them had no effect on scores. Participants were informed that some items might be for research only.

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