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Implicit and Explicit Attitudes Toward Sex and Romance in Asexuals

Abbreviated Title: Asexual Attitudes Toward Sex and Romance

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Key words: asexual; sex; romance; implicit attitudes; explicit attitudes

Abstract

Despite the recent surge of interest in sexuality, asexuality has remained relatively under researched. Distinct from abstinence or chastity, asexuality refers to a lack of sexual attraction toward others. Past research suggests asexuals have negative attitudes toward sex, though no research has examined implicit attitudes. While preliminary evidence suggests that many asexuals are interested in engaging in romantic relationships, these attitudes have yet to be examined thoroughly, implicitly, or compared with a control group. This study investigated explicit and implicit attitudes toward sex and romance in a group of asexuals ($N = 18$, age $M = 21.11$) and a group of controls ($N = 27$, age $M = 21.81$), using the Asexuality Identification Scale, the Triangular Love Scale, semantic differentials, an Implicit Association Task (IAT) and two Single Category IATs. It was found that asexuals exhibited more negative explicit and implicit attitudes toward sex, as well as more negative explicit attitudes toward romance relative to controls. There was no significant difference between groups on implicit romantic attitudes. Moreover, aromantic asexuals demonstrated significantly more negative explicit attitudes toward romance than romantic asexuals, though there was no significant difference between groups on implicit measures. Explanations and implications of these findings are discussed.

Introduction

Implicit and Explicit Attitudes Toward Sex and Romance in Asexuals

Though research into sexuality has seen a surge in recent years, the area of asexuality received relatively little attention (Przybylo, 2013) until recently. This may be due to a lack of overt norm-challenging behaviour (Bogaert, 2004), in contrast with behaviours such as homosexual sex, which has historically been perceived as deviant. There remain inconsistent operational definitions of asexuality within research, as will be discussed below, though it is commonly defined as a lack of sexual attraction toward others (Bogaert, 2004; Bogaert, 2006; Brotto, Knudson, Inskip, Rhodes, & Erskine, 2010). Studies have reported that a sizeable minority of the population lacks sexual attraction toward others. The prevalence of asexuality has been placed between 0.4% (Aicken, Mercer & Cassell, 2013) and 1% (Bogaert, 2004) of the population, with one study finding as high as 1.5% of men and 3.3% of women, though this only addressed sexual attraction experienced in the preceding 12 months (Höglund, Jern, Sandnabba & Santtila, 2014).

Asexuality lacks not only adequate study in academia, it remains widely unacknowledged in society. There have very recently been efforts to bring asexuality into cultural conversation (Parkin, 2016; Sweeney, 2016), although asexuals remain targets of non-hetero-normative discrimination (Chasin, 2011; MacInnis & Hodson, 2012), which may have negative psychological and health related outcomes (Waldo, 1999). Indeed, asexuals have higher instances of anxiety disorders and interpersonal problems than the sexual population (Yule, Brotto & Gorzalka, 2013). Asexuals also report reactions of pathologisation (Gupta, 2016), disbelief that asexuality exists, and being called unnatural

when coming out to friends and family (Robbins, Low, & Query, 2016). Heterosexuals have also reported seeing asexuals as ‘less human’ than other sexual minorities (MacInnis & Hodson, 2012). These factors may discourage asexuals from coming out, even to their romantic partners. Studies have also found that asexuals might engage in sexual acts with romantic partners, sometimes due to peer pressure and a desire to be normal (Carrigan, 2011; Dawson, McDonnell, & Scott, 2016), or to please (Carrigan, 2011) or show love for their partner (Van Houdenhove, Gijs, T’Sjoen & Enzlin, 2015b). Identifying with asexuality has been described as a relief and liberating (Carrigan, 2011; Robbins et al., 2016), resulting in these individuals feeling more comfortable with themselves, and their sexuality (Robbins et al., 2016). However, due to the lack of research and social awareness, asexuals may be unaware of the existence of asexuality or feel excluded from social norms in a highly sexualised world. Quantitative research finding that asexuals have different attitudes toward sex than the general population may go some way in discerning them as a distinct group. This, in turn, may encourage research, group cohesion, and a sense of belonging within the asexual community. This highlights the need to disseminate findings to a wider audience, with the aim of educating individuals, families, and the wider public.

Asexuality Defined

Complicating the study of this area, the operational definition of asexuality is not altogether agreed upon in the scientific community. Previous studies have considered asexuality to be a lack of sexual activity (Rothblum & Brehony, 1993), a lack of sexual attraction (Bogaert, 2004; Brotto et al., 2010), a lack of sexual desire (Prause & Graham, 2007), having little to no sexual attraction and/or self-identifying as asexual (Chasin,

2011), the opposite of bisexuality (Carrigan, 2011; Storms, 1980), or have combined measures of behaviour, desire, and self-identification (Poston Jr & Baumle, 2010).

Prior to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, American Psychiatric Association, 2013), there was no mention of asexuality to differentiate it from Hypoactive Sexual Desire Disorder (HSDD), which was characterized by a persistent lack of sexual fantasies and desire, and distress about these symptoms. However, the DSM-5 has stipulated that, in the case where a person experiencing symptoms otherwise associated with a sexual disorder identifies as asexual, a diagnosis of HSDD will not be made (APA, 2013). Even prior to the release of the DSM-5, research had largely been in favour of differentiating asexuality from HSDD, primarily as HSDD is marked by distress about one's condition (Bogaert, 2006), while asexuality is typically not associated with distress (Bogaert, 2006; Brotto, Yule, & Gorzalka, 2015; Van Houdenhove, Gijs, T'Sjoen, & Enzlin, 2014).

Within the asexual community itself, asexuality is largely defined as a lack of sexual attraction (The Asexual Visibility and Education Network [AVEN], n.d.), with 81% of asexuals marking this as an important feature of asexuality (Van Houdenhove et al., 2015a), although self-identification is also stressed as a defining factor (AVEN, n.d.). In contrast, only 34% of asexuals reported that not engaging in sexual activity is an important feature of asexuality (Van Houdenhove et al., 2015a), perhaps because, as previously mentioned, asexuals may engage in sex for a number of reasons.

While the importance of using a common definition for asexuality has been discussed in the literature (Van Houdenhove et al., 2014), a validated scale has only recently been introduced (Yule, Brotto, & Gorzalka, 2015) and used in few studies to date

(Brotto et al., 2015; Yule, Brotto, & Gorzalka, 2014). This scale identifies aspects that most reliably predict self-identified asexuality, with 93% of self-identified asexuals falling above the set threshold of the scale, and 95% of non-asexuals falling below the threshold (Yule et al., 2015). The scale consists largely of measures of sexual attraction, interest in sex, and self-perception, with no measure of behaviour, supporting the notion that a lack of sexual attraction and self-identification are the defining aspects of asexuality. The current study employs this measure, and defines asexuality as both a lack of sexual attraction and self-identification as asexual.

Attitudes Toward Sex

Asexuals have reported varying attitudes toward sex, ranging from simply lacking an interest in sex, to being utterly disgusted by it (Carrigan, 2011; Van Houdenhove et al., 2015b). Sexual experience also appears to vary considerably within the asexual community. Some studies report similar levels of sexual experience in asexuals as in the general population (Prause & Graham, 2007), while others report lower levels of sexual experience or activity (Bogaert, 2004; Brotto et al., 2010). In a large scale survey of asexuals conducted online, 45% reported a willingness to compromise with partners and engage in either regular or occasional sex while only 25% reported an unwillingness to have sex (Miller, 2011). As discussed, sexual activity on the part of asexuals may be due to feeling pressured to engage in sex (Carrigan, 2011; Dawson et al., 2016), or please a partner (Carrigan, 2011; Van Houdenhove et al., 2015b), though it may also be the case that an asexual individual experiences sexual desire and arousal, as opposed to sexual attraction, prompting them to engage in sexual activities (Bogaert, 2006).

To explore this further, Brotto and Yule (2011) used vaginal pulse amplitude to measure genital response to erotic stimuli. They found that asexual women (n = 7) and a control group showed similarly increased genital response when viewing an erotic film, as compared with viewing a neutral film. Although these findings are based on a small sample size, they provide support for Bogaert's (2006) argument that asexuality should be defined by a lack of attraction rather than desire or arousal. This evidence further supports the differentiation between asexuality and HSDD, as asexuals did not report marked distress at their lack of attraction toward others.

Brotto and colleagues (2010) suggested that the lack of interest in sex might instead be due to emotional associations with sex, reporting that asexuals who did engage in sexual activities did not connect the activity to emotional intimacy in the same way that their sexual partners did. However, these participants also reported needing to focus on something other than sex while engaging in the activity, suggesting some negative associations beyond pure disinterest.

As the focused study of asexuality is relatively recent, findings from these studies have rarely been replicated. A significant portion of previous research was qualitative (Carrigan, 2011; Dawson et al., 2016; Gupta, 2016; Robbins et al., 2016) or examined only self-reported attitudes (Bogaert, 2004; Brotto et al., 2010; Poston Jr & Baumle, 2010; Prause & Graham, 2007; Van Houdenhove et al., 2015b), with little research quantitatively examining differences in specific attitudes between asexuals and the general population.

Attitudes Toward Romance

One theme emphasised in much asexuality research, and within the community itself, is the differentiation between sexual attraction and romantic attraction (AVEN, n.d.; Van Houdenhove et al., 2015a). While research has often noted that asexuals may experience romantic attraction, few studies have examined romantic attitudes specifically.

Romantic asexuals (who experience romantic attraction) and aromantic asexuals (who do not experience romantic attraction) are subgroups within asexuality. Romantic asexuals, who make up the majority (Miller, 2011; Scherrer, 2008), experience similar romantic desires and needs as romantic sexual individuals, with many describing their ideal relationship as being similar to a 'typical' sexual relationship, though without sex (Scherrer, 2008; Van Houdenhove et al., 2015b). Reports suggest that the majority of asexual participants experience romantic attraction (Gupta, 2016; Van Houdenhove et al., 2015a), with up to 79% reporting that they had experienced romantic attraction to others (Van Houdenhove et al., 2015a), and 44% reporting having been in long-term cohabiting or marital relationships (Bogaert, 2004). Furthermore, Brotto and colleagues (2010) found that asexuals reported desiring emotional closeness and companionship, and enjoyed romantic contact, with many desiring marriage. Some asexuals also reported enjoying physically intimate activities such as kissing and cuddling, though they did not interpret these to be sexual (Van Houdenhove et al., 2015b). AVEN (n.d.) specifies that asexual individuals are able to form intimate relationships, although it avoids direct mention of romance, possibly in deference to the aromantic asexual subgroup.

The subgroup of asexuals identifying as aromantic describe no drive for romance, or desire to find a romantic partner (Scherrer, 2008; Van Houdenhove et al., 2015b). While aromantic asexuals are in the minority, they are still a clear presence, with studies

reporting between 16% (Miller, 2011) and 26% (Siggy, 2014) of asexuals identifying as such.

While these studies provide a solid foundation, few studies have compared asexual and control groups on romantic attitudes. In addition, as discussed, most research has been qualitative (Gupta, 2016; Scherrer, 2008) or brief reports from studies focused on other aspects of asexuality (Bogaert, 2004; Miller, 2011; Van Houdenhove et al., 2015a). Further research is therefore necessary to provide a valid comparison between asexuals and the general population.

Current Study

An inconsistent operational definition of asexuality within the research community has led to findings that are not widely generalisable. As such, the current study used a recently validated measure of asexuality (Asexuality Identification Scale [AIS]; (Yule et al., 2015), which has been shown to identify 93% of self-identifying asexuals. It predominantly examines interest in sex and sexual attraction, as well as taking into account how participants self-identify. Both characteristics are considered the primary defining features of asexuality within the asexual community (AVEN, n.d.; Van Houdenhove et al., 2015a).

Self-reported attitudes may be subject to social desirability bias, particularly regarding more sensitive topics such as sex (Meston, Heiman, Trapnell, & Paulhus, 1998). In order to address the shortcomings in previous research and extend the literature, this study examined differences in explicit and implicit romantic and sexual attitudes between a control group and a group of asexuals. An Implicit Associations Test (IAT; Greenwald, McGhee, & Schwartz, 1998) was employed to implicitly measure relative

attitudes toward sex compared to romance, and two Single Category Implicit Attitudes Tests (SC-IATs; Karpinski & Steinman, 2006) examined implicit attitudes toward sex and romance, respectively. Both implicit and explicit attitudes were tested, as these may not be congruent due to findings suggesting that implicit attitudes are automatic reactions to stimuli, whilst explicit attitudes may be more deliberately reported (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997). It is also possible that these attitudes may differ due to the tests examining dual attitudes toward the same objects (Wilson, Lindsey, & Schooler, 2000). To examine explicit attitudes toward romance, this study employed a widely used and validated measurement of passion, intimacy, and love (Sternberg's Triangular Love Scale [STLS]; (Sternberg, 1997), and used a semantic differential to measure explicit attitudes toward both romance and sex.

The primary research questions were: (1) Do asexual individuals have different explicit and implicit attitudes toward sex than a control group?; and (2) Do asexual individuals have different explicit and implicit attitudes toward romance than a control group? Additional analyses were also conducted between romantic asexuals and aromantic asexuals. As research has previously found demographic predictors of asexuality (Bogaert, 2004), and some gender differences on attitudes toward sex (Petersen & Hyde, 2010) and romance (Schmitt, 2003), the asexual group and control group were matched on age, gender and education.

Based on previous research, it was predicted that asexuals would have more negative explicit attitudes toward sex (Brotto et al., 2010; Carrigan, 2011; Prause & Graham, 2007) than the control group. We further tested whether the same group difference would be observed with an implicit measure. Attitudes toward romance have

not been studied extensively, and were also primarily exploratory. Lastly, attitudes reported by aromantic asexuals and romantic asexuals were compared on both measures of sex and romance.

Method

Pilot Study

Romantic and sexual words used in the IAT and SC-IATs were selected based on a pilot study conducted on 23 undergraduate and postgraduate Psychology students at the University of York. One participant was excluded from the analysis for failing to complete the questionnaire, giving a total of 22 participants. The questionnaires asked participants to rate 36 words (13 sexual, 16 romantic, 7 neutral) on a 7-point Likert scale from 1 (not at all romantic) to 7 (very romantic), followed by the same 36 words from 1 (not at all sexual) to 7 (very sexual). The pilot word list included synonyms of “sex” and “romance” as generated by Google, as well as words believed by the authors to hold strong sexual or romantic connotations. Final word lists for IAT use were chosen based on the highest romantic and sexual ratings, respectively. Paired-samples t-tests were conducted to include only words that were significantly different from the rating for the same word on the opposing scale. High scoring words with mean scores above 4 on the opposing scale were also excluded to ensure the chosen words were not generally viewed as both romantic and sexual. There was no significant difference in word length between word groups ($t(12)=-1.741, p=.107$). The final word lists and statistical results are displayed in Table 1.

----- Insert Table 1 -----

Participants

There were 49 participants in total; 22 asexuals and 27 controls, none of whom had participated in the pilot study. Participants recruited for the asexual group that did not self-identify as asexual in the forced choice sexual orientation measure, or who scored below the threshold of 40 (identified by Yule et al., 2015) on the AIS were excluded. Using these criteria, 4 asexual participants were excluded (two with AIS scores of 25 and 30, respectively, both of whom self-identified as asexual; one with an AIS score of 38 who self-identified as bisexual; and one with an AIS score of 48 who self-identified as bisexual). This left 45 participants in total; 18 asexuals (age $M = 21.11$, $SD = 2.27$; 14 female, 3 male, 1 other) and 27 controls (age $M = 21.81$, $SD = 3.40$; 23 female, 4 male). There were no significant differences between groups on age ($t(43) = 0.77$, $p = .445$) or education level ($t(43) = 1.35$, $p = .186$); a Fisher's exact test revealing no significant differences in gender ($df = 1$, $p = .694$). One asexual participant who marked gender as "other" was not included in this particular analysis. Of the asexual participants, 12 identified as being romantic, and 6 identified as aromantic. Demographic characteristics are displayed in Table 2.

Participants in the control group were recruited across all departments at the University of York, including undergraduates and postgraduates, using University of York Facebook groups. In addition, an electronic version of the AIS was distributed to all undergraduates in several departments at the university, with the option of leaving an email address to be contacted by the researcher. Asexual participants were recruited using the same AIS sent across departments (9 participants), through existing contacts within the Psychology department (4 participants), and through forms of focused social media (9 participants) including the University of York LGBT Facebook group, the AVEN forums,

and the AVEN Tumblr page. Participants who completed the AIS as a form of recruitment were asked to fill in the same questionnaire again during the experiment itself, to ensure a uniform experience for all participants. This study was approved by the Psychology ethics committee in the Psychology department at the University of York, and all participants provided written consent before participating.

----- Insert Table 2 -----

Measures

Asexuality Identification Scale (AIS). The Asexuality Identification Scale (Yule et al., 2015) is a 12-question scale measuring asexuality. Questions examine sexual attraction, interest in sex, sexual identity, disgust, inability to relate, sexual avoidance, and sex in relationships (e.g. “I experience sexual attraction toward other people”; “I lack interest in sexual activity”). Questions are answered on a 5-point Likert scale. A score above 40 on the scale captures 93% of self-identifying asexuals, while a score below 40 captures 95% of self-identifying non-asexuals (Yule et al., 2015); this score was used as a cut-off point for the asexual group. Cronbach's α for the AIS was 0.98, 95% CI [0.97, 0.99].

Sternberg Triangular Love Scale (STLS). The revised Sternberg Triangular Love Scale (STLS) (Sternberg, 1997) is a 45-item questionnaire; participants use a 9-point Likert scale to report agreement with each sentence, from 1 (Not at all) to 9 (Extremely). Fifteen questions examine attitudes toward commitment (example: “I expect my love for _____ to last for the rest of my life”), 15 examine attitudes toward intimacy (“I share deeply personal information about myself with _____”), and 15 examine attitudes toward passion (“I find myself thinking about _____ frequently during the

day”). The scale has previously been used to measure attitudes toward romantic partners, family members, friends, and ideal partners (Sternberg, 1997). Participants in the current study were asked to respond to each sentence by answering with regards to their “ideal partner,” to account for differing relationship status and history between participants. Scores were averaged within category, producing separate scores for commitment, intimacy, and passion for each participant. Cronbach's α for these measures were high; intimacy 0.83, 95% CI [0.74, 0.89]; passion 0.93, 95% CI [0.90, 0.96]; and commitment 0.93, 95% CI [0.89, 0.95].

Semantic differentials. Participants completed two semantic differential questionnaires, one examining attitudes toward sex, and one toward romance. Participants indicated where they would place “sex” and “romance” between pairs of opposing words, by placing an ‘X’ on an unnumbered 7-point scale. Word pairs were: bad/good, ugly/beautiful, boring/interesting, meaningless/meaningful, unimportant/important, difficult/easy, cruel/kind, aggressive/peaceful, impersonal/personal, fun/serious, and disgusting/attractive. The scales were recoded such that higher scores on the semantic differential signified more positive attitudes. Cronbach's α were 0.93, 95% CI [0.89, 0.96] for the sex semantic differential and 0.92, 95% CI [0.87, 0.95] for the romance semantic differential.

Implicit Associations Test (sex/romance). The Implicit Associations Test is designed to capture implicit attitudes by measuring reaction times (Greenwald et al., 1998) by comparing two concepts. The IAT and SC-IATs were created using Psychtoolbox 3 (<http://psychtoolbox.org/>) with Matlab, and presented to participants on a computer screen, using white text on a black background. The sex/romance IAT

consisted of seven blocks. Blocks 1 and 2 were used to familiarise participants with “sex” and “romance” and “good” and “bad,” respectively, and Blocks 3 and 4 paired “sex/good” and “romance/bad.” Block 5 reversed the keys associated with “romance” and “sex.” Blocks 6 and 7 paired the reversed “romance/good” and “sex/bad.” “Good” words were: peace, glorious, joy, sunshine, smile, happy, wonderful. “Bad” words were: evil, failure, awful, horrible, terrible, agony, nasty. Word stimuli for the Sex and Romance categories were selected based on the pilot study (see Table 1). Categories (good, bad, sex, romance) were displayed in the top corners of the screen, while words from each category appeared in the middle of the screen. Participants pressed “e” or “i” on the keyboard to sort words into the displayed categories on the left or right, respectively.

Single-Category Implicit Associations Tests (SC-IAT) for sex. One limitation of the conventional IAT is that it can only measure *relative* attitudes toward two concepts (e.g., sex relative to romance). To circumvent this problem, we used the SC-IAT, which can capture negative or positive associations with a single concept, rather than comparing two concepts (Karpinski & Steinman, 2006). For example, rather than testing “sex” and “romance” as “good” and “bad,” as in the IAT, the SC-IAT for sex tests “sex” as “good” or “bad.” Similar instructions were given to participants in the SC-IAT for sex as were given in the IAT for sex/romance. This task used the same words (good, bad, sex) used in the IAT for sex/romance. The SC-IAT consisted of four blocks. Blocks 1 and 2 paired “sex/good” and “bad,” while Blocks 3 and 4 paired “good” and “sex/bad.”

SC-IAT for romance. The structure of the SC-IAT for romance was similar to the SC-IAT for sex, with the replacement of sex words with romance words, therefore measuring “romance” as “good” or “bad.”

Demographic information. Participants completed measures of age, sex, ethnic origin, level of education, romantic orientation (choice of heteroromantic, biromantic, homoromantic, aromantic, other, prefer not to say), and sexual orientation (heterosexual, homosexual, bisexual, asexual; as part of the AIS). In order to compare aromantic and romantic subgroups of asexuals, the asexual group was divided into “Aromantic” (n = 6) and “Romantic” (n = 12) based on answers to the romantic orientation question. All romantic orientations apart from “aromantic” were classed as “romantic,” as they all allowed for some measure of romantic attraction.

Procedure

Participants first completed a demographic questionnaire, followed by the AIS, the STLS, the sex semantic differential, and the romance semantic differential. All measures were conducted on paper, apart from the IAT and SC-IAT. Following completion of the questionnaires, participants completed the conventional romance/sex IAT, then the SC-IATs. The order of the SC-IATs was counterbalanced between participants. All words used in the task were shown to participants before the task began in order to familiarise them.

After completing all tasks and questionnaires, participants were fully debriefed on the nature of the study and were offered the opportunity to ask questions regarding the nature of the study before leaving. Participants received £3 for participation. A random ID number was assigned to each participant before the experiment by an experimenter. Participants were told that, following complete data collection, different random ID numbers would be reassigned again by a different experimenter before any data analysis took place, thereby ensuring their anonymity.

Statistical Analysis

Scores for the IAT and SC-IATs and data from paper questionnaires were analysed using IBM SPSS Statistics Version 22. We computed D scores for IATs following the standard IAT scoring algorithm (Greenwald, Nosek, & Banaji, 2003). Scores were calculated by finding the standard deviations of combined Blocks 3 and 6, and Blocks 4 and 7. The mean response times for Blocks 3, 4, 6, and 7 were then calculated. The mean for Stage 3 was subtracted from the mean for Stage 6, then divided by the standard deviation of combined Blocks 3 and 6. The same calculation took place for Blocks 4 and 7. The resulting two values were then averaged, leaving a value of D, the participant's score for the IAT. SC-IAT scores were calculated using the same formula as for the IAT, though Blocks 1 and 3 replaced Blocks 3 and 6, respectively. Blocks 2 and 4 also replaced Blocks 4 and 7, respectively.

For the two SC-IATs, higher D scores indicate more positive implicit attitude toward sex or romance. For the conventional sex/romance IAT, higher D scores indicate more positive implicit attitude toward sex relative to romance

Results

Explicit Attitudes

The groups scored significantly differently on the overall AIS score ($t(43) = -24.84, p < .001, d = 7.99$), with asexuals scoring higher ($M = 52.5, SD = 5.25$) than controls ($M = 18.74, SD = 2.87$; see Table 3 for correlation results).

There were significant differences between groups on the measures of STLS-passion ($t(43) = 6.33, p < .001, d = 1.91$) and STLS-commitment ($t(43) = 2.06, p = .045, d = 0.60$), with the control group demonstrating more positive attitudes on both passion

(Control: $M = 7.40$, $SD = 1.03$; Asexual: $M = 5.32$, $SD = 1.15$) and commitment (Control: $M = 8.09$, $SD = 0.78$; Asexual: $M = 7.50$, $SD = 1.15$). There was no significant difference between groups on the measure of STLS-intimacy ($t(43) = 1.88$, $p = .067$, $d = 0.54$).

---- Insert Table 3 ----

A 2 (attitude target; sex or romance) x 2 (group; asexual or control) mixed ANOVA was conducted to measure differences between groups on explicit attitudes, as measured by the semantic differentials (see Figure 1A). There was a main effect of attitude target ($F(1,43) = 83.52$, $p < .001$, $\eta^2 = .660$), with participants scoring more positively on romance than sex. There was also a main effect of group ($F(1,43) = 59.54$, $p < .001$, $\eta^2 = .581$), with asexuals scoring lower than controls overall. Lastly, there was a significant interaction of group and attitude target ($F(1,43) = 7.72$, $p < .001$, $\eta^2 = .415$) indicating that the difference in explicit attitude between the two groups was more pronounced for attitude toward sex than romance. A two-sample t-test revealed significant differences between asexuals and controls on the romance semantic differential ($t(43) = 3.60$, $p = .001$, $d = 1.07$), with asexuals ($M = 4.91$, $SD = 0.98$) rating romance more negatively than controls ($M = 5.84$, $SD = 0.74$). There were also differences between the asexual group and the control group on the sex semantic differential. Asexuals ($M = 3.33$, $SD = .70$) rated the concept of sex significantly more negatively than controls ($M = 5.45$, $SD = 0.56$; $t(43) = 11.30$, $p < .001$, $d = 3.34$).

---- Insert Figure 1 ----

Implicit Attitudes

The asexual group and control group did not have significantly different scores on the sex/romance IAT ($t(43) = 1.92$, $p = .061$), with both groups showing a preference for

romance over sex (asexual mean D score = -0.87, $SD = 0.29$; control mean D score = -0.70, $SD = 0.30$).

To further compare both groups' implicit attitude toward each of sex and romance concepts, a 2 (attitude target; sex or romance) x 2 (group; asexual or control) mixed ANOVA on the SC-IAT scores was conducted (see Figure 1B). It revealed a significant main effect of target, ($F(1,43) = 182.35, p < .001, \eta^2 = .809$), with participants scoring more positively on the romance SC-IAT than on the sex SC-IAT. There was also a main effect of group ($F(1,43) = 20.66, p < .001, \eta^2 = .325$), and a significant interaction effect ($F(1,43) = 19.99, p < .001, \eta^2 = .317$), indicating that the two tasks had different effects on the control group and the asexual group. Follow up two-sample t-tests revealed no significant differences between asexuals ($M = 0.69, SD = 0.26$) and controls ($M = 0.70, SD = 0.23$) on the romance SC-IAT ($t(43) = 0.17, p = .869$). However, the groups scored significantly differently on the sex SC-IAT ($t(43) = 5.70, p < .001, d = 1.72$), with the control group ($M = 0.17, SD = 0.31$) demonstrating positive implicit attitudes toward sex and the asexual group ($M = -0.38, SD = 0.33$) demonstrating negative implicit attitudes toward sex¹.

Direct Comparison Between Explicit vs. Implicit Attitudes

A 2 (group; asexual or control) x 2 (measure; implicit or explicit) x 2 (target; sex or romance) mixed ANOVA was conducted to measure differences between groups on

¹ One-sample t-tests were conducted on each group, to test whether SC-IAT scores for sex differed significantly from 0 in either direction. The asexual group was found to have significantly negative attitudes toward sex ($t(17) = -4.95, p < .001$), while the control group showed significantly positive attitudes toward sex ($t(26) = 2.80, p = .010$). SC-IAT scores for romance were significantly positive for both groups ($p < .001$).

implicit and explicit attitudes toward sex and romance (see Figure 1)². Scores were standardized to adjust for different scales between implicit and explicit measures. There was a main effect of target ($F(1,43) = 215.68, p < .001, \eta^2 = .834$), with participants scoring more positively toward romance than sex. There was also a main effect of group ($F(1,43) = 68.18, p < .001, \eta^2 = .613$), with asexuals scoring lower than controls. Not surprisingly, there was a significant interaction between target and group ($F(1,43) = 39.17, p < .001, \eta^2 = .477$). There was a significant interaction of measure and group ($F(1,43) = 15.59, p < .001, \eta^2 = .266$), indicating that the difference between the two groups was larger for the explicit measure compared to the implicit measure regardless of attitude target. There was also a significant interaction between measure and target ($F(1,43) = 32.06, p < .001, \eta^2 = .427$), indicating that regardless of group, the difference between sex vs. romance was larger for the implicit measure compared to the explicit measure. Importantly, the three way interaction was not significant ($F(1,43) = .01, p = .905, \eta^2 = .000$), suggesting that the 2 (attitude target) x 2 (group) interaction pattern seen with each measure (see Figure 1) was similar across implicit vs. explicit measures³.

Aromantics, Romantics, and Controls

As the subgroup of aromantic asexuals is small ($n = 6$), results should be considered cautiously.

² We also conducted a 2 (group) x 2 (measure) x 2 (target) x 2 (gender) ANOVA to examine whether women and men responded differently on any measures. This test revealed no significant main or interaction effects of gender, although the small number of men in the analysis ($n = 7$) must be noted.

³ Although they showed similar patterns of results, explicit attitudes (semantic differential scores) and implicit attitudes (SC-IAT scores) were not significantly correlated with each other within each of the two groups ($-.175 < r_s < .258$).

There was no significant difference in AIS scores between aromantics and romantics ($t(16) = -0.66, p = .522$).

Explicit attitudes. To compare STLS between groups, a one way ANOVA was conducted for each of the three measures on the scale. On the STLS-intimacy measure, there was a significant difference between groups ($F(2,44) = 3.40, p = .026, \eta^2 = 0.16$), with Bonferroni post hoc tests revealing that aromantics ($M = 7.92, SD = 0.62$) scored significantly lower than controls ($M = 8.46, SD = 0.33$). Romantics did not differ significantly from either group. On the STLS-passion measure, there were significant differences between groups ($F(2,44) = 28.48, p < .001, \eta^2 = 0.58$). Bonferroni post hoc tests revealed significant differences between all groups, with romantics ($M = 5.82, SD = 0.96$) and aromantics ($M = 4.32, SD = 0.83$) scoring more negatively than controls ($M = 7.40, SD = 1.03$), and romantics scoring more positively than aromantics. Lastly, on the measure for STLS-commitment ($F(2,44) = 4.18, p = .022, \eta^2 = 0.17$) aromantics ($M = 6.91, SD = 1.64$) scored significantly more negatively than controls ($M = 8.09, SD = 0.78$). Romantics did not differ significantly from either group.

A 2 (attitude target; sex or romance) x 3 (groups; aromantic, romantic, or control) ANOVA was conducted to examine differences on explicit attitudes, as measured by the semantic differentials (see Figure 2A). There was a main effect of attitude target ($F(1,42) = 90.79, p < .001, \eta^2 = 0.68$), with participants scoring lower on explicit attitudes toward sex than attitudes toward romance. There was also a main effect of group ($F(2,42) = 38.30, p < .001, \eta^2 = 0.65$) and a significant interaction effect ($F(2,42) = 27.14, p < .001, \eta^2 = 0.56$). To examine the main effect of group, and the interaction effect, one-way ANOVAs were conducted. There were significant differences between at least two

groups on sex attitudes ($F(2,44) = 63.62, p < .001, \eta^2 = 0.75$). Follow up Bonferroni post hoc tests revealed that both romantic ($M = 3.42, SD = 0.75$) and aromantic asexuals ($M = 3.17, SD = 0.62$) rated the concept of sex significantly more negatively than did controls ($M = 5.45, SD = 0.56$). There was no significant difference between romantic and aromantic asexuals on the sex semantic differential. A one-way ANOVA also showed differences between at least two groups on explicit romance measures ($F(2,42) = 16.17, p < .001, \eta^2 = 0.44$). Bonferroni post hoc tests also showed that aromantic asexuals ($M = 3.97, SD = 0.70$) rated the concept of romance significantly more negatively than both romantic asexuals ($M = 5.39, SD = 0.73$) and controls ($M = 5.84, SD = 0.74$), while there was no difference between romantic asexuals and controls.

---- Insert Figure 2 ----

Implicit attitudes. A one-way ANOVA was conducted to evaluate possible differences between groups on the conventional sex/romance IAT score. There were no significant differences on IAT scores ($F(2,44) = 2.36, p = .107$).

A 2 (attitude target; sex or romance) x 3 (groups; aromantic, romantic, or control) mixed ANOVA was conducted to examine differences on the sex and romance SC-IATs (see Figure 2B). A main effect of attitude target was found, with participants scoring more positively toward romance than sex ($F(1,42) = 156.12, p < .001, \eta^2 = 0.79$). There was also a main effect of group ($F(1,42) = 11.24, p < .001, \eta^2 = 0.35$). A Bonferroni post-hoc test revealed that controls scored more positively than the romantic asexual group. No other significant differences were found between groups. There was also a significant interaction between attitude target and group, ($F(2,42) = 10.01, p < .001, \eta^2 = 0.32$). To examine the interaction, a one-way ANOVA was conducted investigating the

differences between controls, aromantic asexuals, and romantic asexuals for both SC-IATs. There were significant differences between groups on the SC-IAT for sex ($F(2,44) = 17.04, p < .001, \eta^2 = 0.45$). Bonferroni post hoc tests revealed that the control group ($M = 0.17, SD = 0.31$) had significantly more positive attitudes toward sex than both the aromantic asexual group ($M = -0.26, SD = 0.42$) and the romantic asexual group ($M = -0.44, SD = 0.27$). No difference was detected between the aromantic and romantic asexual groups. There were also no significant differences between the aromantic ($M = 0.74, SD = 0.21$), romantic ($M = 0.67, SD = 0.29$), or control groups ($M = 0.70, SD = 0.23$) on the SC-IAT for romance ($F(2,44) = 0.16, p = .849$).

Discussion

This study examined differences in explicit and implicit attitudes toward sex and romance between asexuals and controls. Asexuals showed more negative explicit attitudes toward both sex and romance than controls. Asexuals also showed more negative implicit attitudes toward sex, though implicit romance attitudes were not significantly different between groups. Direct comparison between implicit vs. explicit measures showed that the patterns of the results were generally similar across the two measures, highlighting the robustness of our findings regardless of measure. Further analyses revealed that romantic asexuals held more favourable explicit romantic attitudes than did aromantic asexuals.

Explicit Attitudes

In this study, the AIS successfully captured 90% of self-identifying asexuals, as compared with 93% in the study carried out by Yule et al. (2015), lending support for the accuracy and validity of the scale. This study was also the first to use the AIS since its

development (Yule et al., 2015), and showed that the scale is largely able to differentiate asexuals from a control group in a U.K. population, thus providing further support for its validity.

On the explicit measure of sex attitudes, the semantic differential, asexuals scored significantly more negatively than did controls, lending support to the notion that asexuals do not hold as positive a view of sex as the general population. While controls were largely sex-positive, there was substantially more variation in the asexual group, with some showing sex-positive attitudes and others showing sex-negative attitudes (i.e., average score of less than 4 [midpoint]). This generally supports past research, which found that asexuals tend to have neutral or negative attitudes toward sex (Carrigan, 2011), although the notion that some asexuals may hold sex-positive explicit attitudes warrants further study.

Asexuals and controls differed on several measures of explicit attitudes toward romance, including scores on STLS-passion, STLS-intimacy, and the semantic differential. While previous studies suggested that asexuals have generally positive attitudes toward romance (Scherrer, 2008; Van Houdenhove et al., 2015b), they did not compare attitudes held by asexual individuals with those of a control group. This may have resulted in the unsubstantiated assumption that asexuals hold similarly positive attitudes toward romance as the general population, when in fact, this study suggests they do hold positive attitudes, though not to the same extent as the general population. Thus, the present study provides the first evidence that asexuals have less positive explicit attitudes toward romance than normal controls, although the difference is smaller than in attitudes toward sex. This difference may be reflective of a divide between the groups in

the way they perceive romance and relationships that is not being captured by the tests used in this study. To gain a broader understanding of these attitudes, future qualitative research could examine the attitudes asexuals hold toward romantic relationships and romance more generally, in terms of intimacy, passion, and commitment.

However, the difference between asexuals and controls on explicit romantic attitudes may also relate to the joint consideration of romantic and aromantic asexuals. The comparison between all asexuals and the control group on all measures of romance must be considered cautiously, with the knowledge that these results describe both subgroups. This is particularly relevant given the somewhat high proportion of aromantics in this study (33% compared to 16% in Miller [2011] and 26% in Siggy [2014]). For this reason, subsequent analyses were conducted, separating the asexual group into aromantic asexuals and romantic asexuals. There were significant differences between aromantic asexuals and romantic asexuals on some explicit romantic attitude measures. Romantic asexuals scored more positively on both the measure for passion, and the semantic differential for romance. This is in line with previous research, which suggests that aromantic asexuals have more negative attitudes toward romance than do romantic asexuals (Scherrer, 2008; Van Houdenhove et al., 2015b).

Taking these differences into account, one explanation for the unexpected difference in explicit attitudes toward romance between asexuals and controls is that the romance scores in the asexual group were skewed by the inclusion of aromantic asexuals. However, when directly comparing romantic asexuals and controls on explicit romantic attitudes, romantic asexuals still demonstrated lower scores for passion. This suggests the

difference between asexuals and controls in explicit romance scores was not entirely due to aromantics skewing results.

Implicit Attitudes

The SC-IATs were performed to independently examine the strength of implicit associations with sex and romance. On the SC-IAT for sex, the asexual group exhibited more negative implicit attitudes toward sex than the control group. As this study was the first to examine these implicit attitudes, there is little context in which to place these findings, although differences between groups do correspond with the difference in explicit attitudes toward sex.

It is worth noting that not only were the implicit attitudes toward sex different between groups, the control group scored positively while the asexual group demonstrated negative implicit attitudes toward sex. This finding corresponds with findings from the semantic differential for sex, in which asexuals rated sex more negatively (i.e., lower than the midpoint in a 7-point scale) than positively. These findings add weight to the explicit negative attitudes toward sex exhibited by asexuals, as these are not self-reported attitudes, and even at the implicit level, differences still exist between groups.

Since implicit measures are less susceptible to a variety of biases (e.g., social desirability bias and self-presentation bias) than explicit measures, they provide evidence that asexuals do indeed have significantly different attitudes toward sex than the general population. These findings have important practical implications, in that they lend support to the claim that asexuals are a distinct group. This finding, alongside previous research suggesting that asexuals make up a sizeable minority of the population and are

often targets of discrimination, suggest that this group is worthy of further study directed at promoting understanding and acceptance.

Implicit attitudes tend to be partially shaped by cultural attitudes (Rudman, 2004), which, given the scores of the control group, are likely neutral to positive with regards to sex. Asexuals, then, have formed counter-culture implicit attitudes toward sex which suggests they are robust in the face of cultural conditioning, and may have been formed through negative personal experiences, or a lack of positive experience with sex. This theory is in line with a hypothesis proposed by Bogaert (2004), which suggests that asexuality may be influenced by a lack of conditioning in sexual development. The difference in implicit attitudes between groups might also point to a more profound difference in the way asexuals and sexuals perceive and interact with sex, particularly as asexuality is likely influenced by biological factors as well (Bogaert, 2004; Yule, Brotto, & Gorzalka, 2014; Yule et al., 2014). Future research should consider that asexuals' past experiences with sex may have an impact on their attitudes toward sex and romance, beyond what is able to be explicitly self-reported.

Unlike with explicit attitudes toward romance, there were no significant differences in implicit romantic attitudes between groups, either when comparing asexuals with controls, or comparing the subgroups of romantics, aromantics, and controls. As the sample sizes in the aromantic and romantic subgroups were limited, it is possible that any differences that exist between groups could not be captured due to a lack of statistical power. However, it is also possible that no significant differences would emerge with sufficient power, as there was no trend suggesting any of the groups had more negative attitudes. Another possible explanation for this finding is that participants

may have viewed certain “romance” words as generically positive, though lacking a romantic connotation, resulting in more positive scores not being reflective of more positive attitudes toward romance. Some words may also be descriptive of non-romantic relationships, such as “affection” and “commitment,” which could be linked to relationships with family or friends. This possible confound could account for the lack of variability in implicit romance attitudes between groups.

Strengths and Limitations

A particular strength of this study was that it closely adhered to both the most commonly used operational definition of asexuality in current research, as well as taking into account the definition of asexuality observed in the asexual community. However, by operationally defining asexuals as those who already self-identify as such, the study excluded those who may otherwise identify as asexual but have not previously been exposed to the term. Given the above speculation that identifying as asexual, and being subject to the associated stigma, could influence explicit attitudes toward romance, a particularly interesting area for future research would be to investigate romantic attitudes in non-self-identifying individuals who score above the AIS threshold. Individuals who may otherwise identify as asexual, though unaware of the term, may not have experienced the same level of discrimination, and may therefore have different explicit attitudes toward romance than self-identifying asexuals.

A second strength of the study was the method by which asexual participants were recruited. Several past studies have recruited from asexual groups online (e.g. Brotto & Yule, 2009; Chasin, 2011; Hinderliter, 2009) which would only capture asexuals who had sought out a community which shared their sexuality. This may result in a

disproportionate representation of those who place a high importance on their sexuality. This might have particular implications in the recruitment of asexuals, some of whom, research has suggested, do not consider their sexuality to be particularly important (Scherrer, 2008). This study recruited not only from asexual communities, but also from a general university population, in an attempt to curtail these possible biases.

While the recruitment method of asexuals was an improvement on some methods used by previous studies, there remain drawbacks. As much of the recruitment took place by distributing the AIS, participants were aware of the sexual nature of the study before participating. Previous studies have shown a volunteer bias in participation in sexuality-related studies, with volunteers having more experience with sex (Bogaert, 1996; Strassberg & Lowe, 1995; Wiederman, 1999), and less traditional attitudes toward sex (Dunne et al., 1997; Wiederman, 1999) than non-volunteers. Consequently, it is possible that the control group had different attitudes toward sex than the general population, which may have exaggerated differences between groups. It is possible that the same bias would occur within the asexual group, causing more sexually experienced and less traditional asexuals to participate, though it is also possible that asexuals are generally eager to partake in research specific to their community, to garner attention and awareness for their under-acknowledged sexual identity.

A further limitation concerning the sample is that romantic and aromantic asexual sample sizes were both limited, due to the splitting of the asexual group. It is possible that effects went undetected due to a lack of power. There was also a small number of males in both the asexual group ($n = 3$) and the control group ($n = 4$). While gender was matched between the groups, this study may not have captured existing gender

differences in sexual and romantic attitudes. These limitations in the sample must be taken into account when considering the findings, and future research should ensure a thorough examination of aromantic asexuals as well as male asexuals.

Conclusions

This study provides support for the notion that asexuals differ significantly from the general population on both explicit and implicit attitudes toward sex. Furthermore, asexuals differed from a control group on explicit attitudes toward romance, yet exhibited similar implicit romantic attitudes to the general population. These findings have several implications, including speculations of why asexuals may self-report different attitudes toward romance than the general population. This may accurately reflect a difference between groups, though it may also be a result of skewed self-perceptions due to the stigma and lack of understanding about asexuality in the public.

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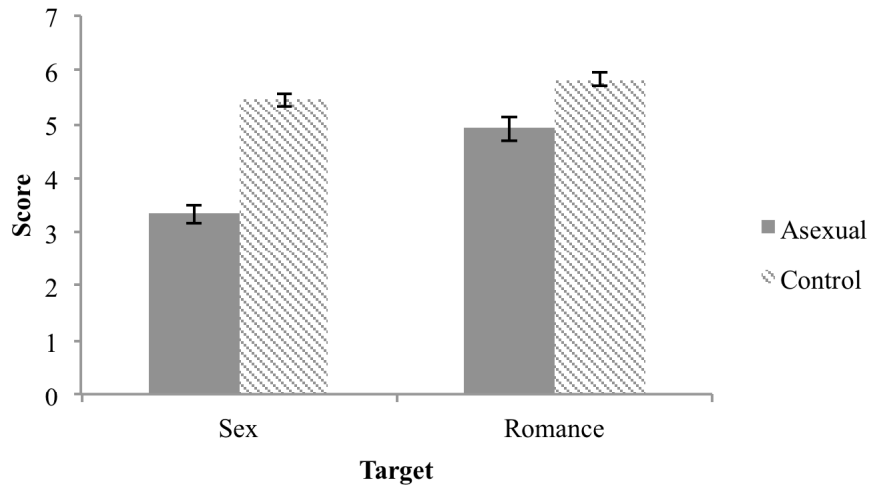
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FIGURES

A



B

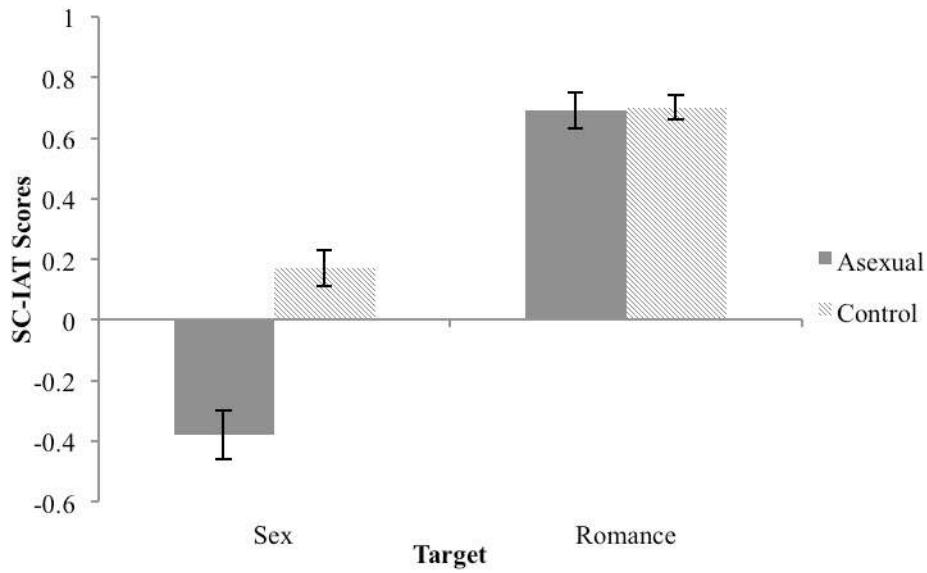
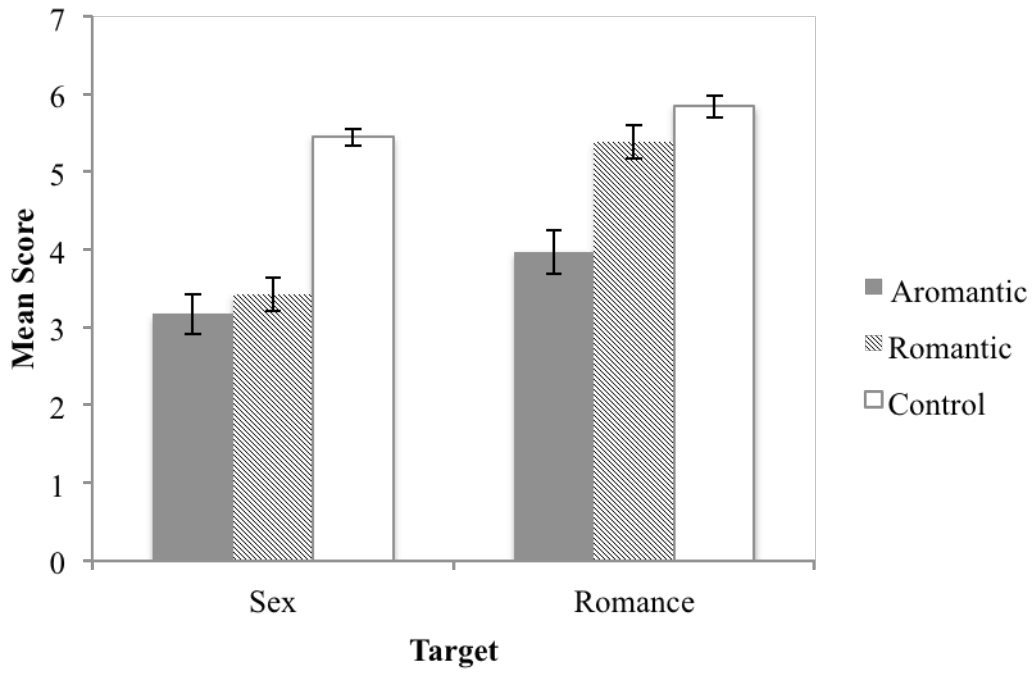


Figure 1. Explicit (A) and implicit (B) attitudes toward sex and romance in asexuals ($n = 18$) and controls ($n = 27$). Error bars denote Standard Error of Mean (SEM).

A



B

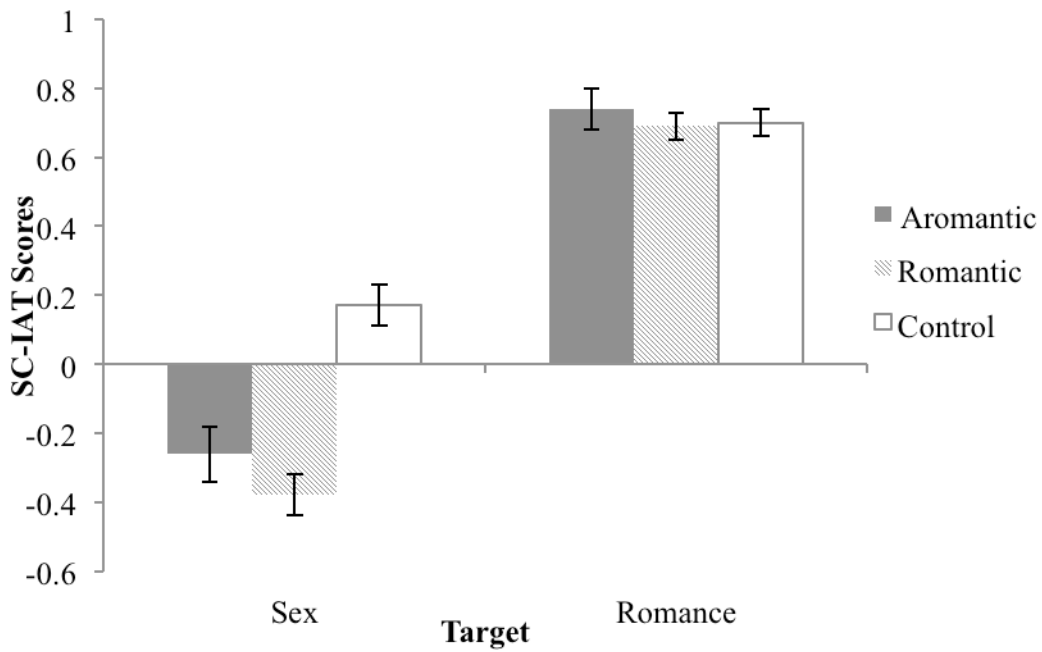


Figure 2. Semantic differential scores (A) and SC-IAT scores (B) for sex and romance between aromantics ($n = 6$), romantics ($n = 12$), and controls ($n = 27$). Error bars denote SEM.

TABLES

Table 1
Pilot Data for IAT and SC-IAT Words

	Mean Rating (Standard Deviation)		T-values (Paired-Samples T-Test; n = 22)
	Sex	Romance	
Sex Words			
Oral Sex	6.61 (0.58)	3.35 (1.40)	11.00***
Penetration	6.52 (0.66)	3.04 (1.49)	12.11***
Erection	6.35 (0.78)	3.22 (1.48)	11.64***
Erotic	6.13 (0.87)	3.70 (1.64)	7.34***
Foreplay	5.83 (0.89)	3.83 (1.37)	5.62***
Climax	5.52 (1.31)	3.83 (1.64)	4.41***
Fondle	5.22 (1.31)	3.04 (1.64)	5.12***
Romance Words			
Adore	3.26 (1.29)	5.96 (1.02)	-9.73***
Affection	3.57 (1.04)	5.91(1.24)	-8.90***
Relationship	3.30 (1.61)	5.83 (1.07)	-7.47***
Sweetheart	3.45 (1.30)	5.70 (0.97)	-8.59***
Holding hands	3.35 (1.03)	5.57 (1.27)	-8.57***
Commitment	3.04 (1.19)	5.52 (1.59)	-7.75***
Fondness	3.09 (1.37)	5.35 (1.37)	-9.89***

*** $p < .001$

Table 2
Descriptive Statistics of Demographic Variables

	Control Group	Asexual Group
	n	n
Gender		
Male	4	3
Female	23	14
Other	0	1
Sexual Orientation		
Heterosexual	24	0
Homosexual	3	0
Bisexual	0	0
Asexual	0	18
Romantic Orientation		
Heteroromantic	23	3
Bioromantic	4	5
Homoromantic	0	1
Aromantic	0	6
Other	0	3

Table 3

Explicit Measures: Pearson's Correlations with Scores on Asexuality Identification Scale

	Controls	Asexuals
STLS		
Intimacy	-.25	.05
Passion	-.31	.15
Commitment	.02	.66**
Semantic Differential: Sex	-.61**	-.42
Semantic Differential: Romance	-.50**	-.15

** $p < .01$