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Ace and Aro: Understanding Differences in Romantic Attractions Among Persons Identifying as Asexual

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Abstract
First characterized by Kinsey in 1948, asexuality can be broadly defined as an absence of sexual attraction, with approximately 1% of the population identifying as asexual. While asexuality research has flourished recently, very few papers have investigated the unique mechanism of romantic attraction in asexual people, notably that some experience romantic attraction (romantic asexual) while others do not (aromantic asexual). This study compared romantic and aromantic asexual individuals through secondary data analysis on demographic, behavioral, psychological, and physiological measures as the primary objective and compared asexual people to allosexual people on some measures as a secondary aim. After combining data from seven previous asexuality studies ($n=4032$ total), we found that 74.0% of asexual people reported experiencing romantic attraction. No significant difference was found in distribution of men and women between the aromantic and romantic asexual groups, though the asexual group showed higher proportions of women and non-binary genders compared to the allosexual comparison group. Romantic asexual participants reported a diverse range of romantic orientations, with only 36.0% reporting a heteroromantic orientation, compared to 76.2% of allosexual participants. As predicted, romantic asexual individuals were more likely to have been in a relationship when completing the survey, reported more past romantic and sexual partners and more frequent kissing than aromantic asexual people, and experienced more partner-oriented sexual desire than the aromantic asexual group. There were also differences in personality as romantic asexual people were less cold, more nurturant, and more intrusive than the aromantic asexual group. No difference was seen between romantic and aromantic asexual individuals in demographic characteristics, likelihood of having children, solitary sexual desire, physiological sexual functioning, frequencies of masturbation and sexual fantasy, or depression. These similarities and differences between romantic and aromantic asexual people highlight the diversity within the asexual community.

Keywords Asexuality · Aromantic · Romantic attraction · Aro/ace · Sexual attraction

Introduction

Asexuality is broadly defined as a lack of sexual attraction to anyone or a disinterest of being sexual with others (Bogaert, 2004, 2006; Brotto, Yule, & Gorzalka, 2015; Decker, 2015). First characterized by Kinsey, Pomeroy, and Martin (1948) as "group X," it garnered little academic attention until Bogaert's (2004) analysis within a national probability sample. Estimates for prevalence in the general population now range from 0.4% in the British population to 3.3% in Finnish women (Aicken, Mercer, & Cassell, 2013; Bogaert, 2004, 2013; Höglund, Jern, Sandnabba, & Santtila, 2014). It should be noted that a prominent online asexual community exists through the Asexuality Visibility and Education Network (AVEN, http://www.asexuality.org), developed to raise awareness around the experience of asexuality, provide education to those seeking to understand asexuality, and reduce public stigma associated with asexuality.

AVEN's overview page says this about asexuality: "There is considerable diversity among the asexual community in the needs and experiences often associated with sexuality including relationships, attraction, and arousal." This phrase captures the rich heterogeneity among those identifying as asexual, and this broad definition invites researchers to appreciate the diversity, including one's wish to self-identify as asexual even without fully identifying with a certain description of what it means to be

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asexual (Scherrer, 2008). Further, vocabulary used to describe various identities (e.g., demisexual, gray-asexual, or gray-A, etc.) within the asexual community is unfixed, evolving, and highly personal. Though this poses challenges when trying to carry out research on a group's experiences, it also suggests the need for broader approaches when attempting to study the experiences of a relatively understudied group.

Asexuality research has traditionally focused on differences between asexual and allosexual (non-asexual) populations. Bogaert's (2004) survey found asexual individuals to be of shorter stature, lighter weight, and poorer health status than allosexual people, that asexual, people were less likely to be Caucasian, reported lower levels of education and socioeconomic status compared to allosexual individuals, and that asexual people reported a later age of menarche. Many studies have reported that women were more likely to identify as asexual than men (e.g., Bogaert, 2004; Zheng & Su, 2018), and trans and non-binary genders have also been observed to be more prevalent in asexual people, with up to 24.6% of asexual individuals reporting a gender other than what they were assigned at birth (Brotto, Knudson, Inskip, Rhodes, & Erskine, 2010; Gazzola & Morrison, 2012; Ginoza, Miller, & AVEN Survey Team, 2014). Unsurprisingly, asexual people have also reported fewer sexual partners and less frequent sexual activity than allosexual people (Bogaert, 2004). Masturbation rates among asexual individuals have been found to be at similar rates to national statistics for allosexual persons in some studies (Brotto et al., 2010; Poston & Baumle, 2010) and lower in others (Bogaert, 2013; Yule, Brotto, & Gorzalka, 2014a), and in one study asexual women were less likely to masturbate than asexual men and allosexual men and women (Yule, Brotto, & Gorzalka, 2017).

Other comparisons of asexual versus allosexual participants have found the former group to fantasize about sex less often than allosexual people (Yule et al., 2014a) even though the magnitude of their genital arousal response to erotic stimuli did not differ from allosexual groups among female participants (Brotto & Yule, 2011). Among psychological measures, asexual people may be more likely to report mood and anxiety disorders than allosexual people, as well as higher levels of suicidality (Yule, Brotto, & Gorzalka, 2013), though this study did not account for potentially confounding variables such as higher rates of these traits among trans and non-binary individuals, who are prevalent among the asexual population, or discrimination experience. Interpersonal functioning has been found to have elevated scores in the cold, socially avoidant, and non-assertive zones among asexual people over allosexual people (Yule et al., 2013). Despite the breadth of research that has sought to characterize asexuality, the purely scientific and perhaps pathologizing approach has not been welcomed by all asexual people. Few studies have sought to explore and quantify the diversity within asexuality from a non-medical, non-pathologizing, person-centered perspective, an area of research called for by the asexual community (Decker, 2015). This study aimed to quantify diversity within asexuality, specifically focused on experiences of romantic and non-romantic (or aromantic) attractions.

Some asexual people describe their romantic orientations as heteroromantic, homoromantic, aromantic, or biromantic (Brotto et al., 2010), suggesting that the development of sexual and romantic attractions may be independent processes. Asexual people who experience romantic desire are generally termed "romantic asexual" and include a variety of romantic orientations (e.g., heteroromantic, panromantic), reflecting the gender of the persons to whom they experience romantic attraction. Those who do not experience romantic attraction may self-identify as "aromantic asexual." AVEN's 2014 census found that 22% of asexual people identified as heteroromantic, 5.1% homoromantic, 32.2% bi- or panromantic, 19% aromantic, and 21.7% selected other options (Ginoza et al., 2014). A recent study conducted in China found a similarly broad distribution with 31.7% of asexual people identifying as heteroromantic, 14.1% homoromantic, 26.0% biromantic, and 28.2% aromantic (Zheng & Su, 2018). Another study found that among asexual people who reported queer, gay, lesbian, bisexual, bi-, bicurious, and/or pansexual identities, 48% reported bi, bisexual, or bicurious identities, with one respondent expressing: "Since sexual attraction is not a factor, then it doesn't make sense that gender would play that much of a role in who I am attracted to" (Scherrer, 2008, p. 635).

Diamond's (2003) biobehavioral model of love and sexual desire posits that sexual desire and romantic love are functionally and developmentally independent, where sexual attraction is governed by reproduction and romantic attraction is governed by attachment and pair bonding. Diamond further theorizes that romantic love evolved from infant–caregiver attachment and not from sexual desire, to keep both parents present to raise highly dependent offspring. The theory's second premise states that romantic love is not inherently oriented to same-gender or other-gender partners, as its evolutionary origin in attachment was surely not founded in gender as caregivers bond equivalently with both their male and female offspring. The third premise of this theory links romantic love and sexual desire bidirectionally, where feelings toward a certain partner facilitate development of the other (Diamond, 2003). This explains why many people tend to fall in love with the same people to whom they are sexually attracted, despite Diamond's idea that romantic love is not intrinsically oriented by gender. Diamond's theory supports the understanding of asexual persons given that they exemplify the separation of romantic and sexual attraction; namely, they experience a lack of sexual attraction and a sizable proportion of them experience robust romantic attractions. The present study examines gender and romantic orientation among asexual and allosexual samples to address the question: What happens to romantic attraction when sexual desire is absent?

Only two studies have explored the prevalence of romantic versus aromantic attractions among asexual persons (Ginoza et al., 2014; Zheng & Su, 2018), and neither sought

to compare the two groups on personal characteristics. The goal of the present study was to compare romantic to aromantic asexual people on a variety of demographic and self-reported characteristics to identify similarities and differences between these groups and to further understand the diversity among the asexuality experience. An additional secondary goal is pursued here to examine and potentially replicate previously reported findings (Bogaert, 2004) on demographic and physical characteristics of asexual people as compared to allosexual people as this study provides a unique and robust, due to a large number of participants, opportunity to do so.

Method

Participants

Data from seven completed asexuality studies (Study 1: Yule, Brotto, & Gorzalka, 2015, $n=1025$; Study 2: Brotto et al., 2015, $n=668$; Study 3: Yule et al., 2014a, $n=739$; Study 4: Yule, Brotto, & Gorzalka, 2014b, $n=1299$; Study 5: Brotto et al., 2010, $n=187$; Study 6: Yule, Skorska, Bogaert, & Brotto, 2019, $n=73$; Study 7: Brotto & Yule, 2011, $n=38$) were amalgamated into one large dataset. Only variables that had data from at least two of the seven studies were included, with the exception of data on frequency of kissing, masturbation, and sexual fantasy that were present only in Study 2 but retained as it was seen as a critical variable to the study. Limitations related to analyzing these three sexual behavior variables from only one study are discussed in the Results section. Initially, there were 4462 participants in total, and after 424 were excluded due to incomplete data, and 6 were excluded because they did not report a sexual orientation; the final sample size for the present analyses was $n=4032$ (Fig. 1).

In Study 1, participants were recruited from AVEN and included if they responded "yes" to: "Do you identify as asexual?". In Study 2, we included those who scored > 40 on the Asexuality Identification Scale (Yule et al., 2015). In Studies 3 and 4, we recruited individuals from AVEN, social media, and posted ads in the community, and during a subsequent telephone screen, individuals were asked to select which option of four sexual orientation types best described them: heterosexual, homosexual, bisexual, or asexual. Anyone not identifying with one of these groupings was excluded. Study 5 advertised in the same locations as Studies 3 and 4, but asked participants during a telephone screen if they identified as asexual. Study 6 advertised in the same locations as studies 3–5, but also on Craigslist. Cisgender men responding to this ad were asked "How would you describe your sexual orientation" and those who identified as asexual were included.

Asexual status (dichotomous as *yes* or *no*) was based on self-identification. Given the options "asexual," "bisexual," "homosexual," "heterosexual," and "other" to describe their sexual orientation, those who selected "asexual" were classified as asexual and those who selected one of the other options were classified as allosexual. Studies 3, 5, and 6 offered participants who selected the "other" option to input an open-ended description of their sexual orientation, and those who described themselves as graysexual, gray-A, demisexual, or any other term associated with the ace umbrella were classified as asexual, while all other open-ended answers were classified as allosexual. This yielded $n=1475$ asexual and $n=2557$ allosexual participants.

Self-identified asexual participants were separated into those who experienced romantic attraction (romantic asexual) and those who did not (aromantic asexual), based on their answers to one of three possible questions (Table 1). Those who answered "sometimes," "often," "always," "neither true nor false," "somewhat true," or "completely true," in response to "I experience romantic attraction in the absence of sexual attraction" were placed in the romantic group ($n=647$), while those who answered "rarely," "never," "somewhat false," or "completely false" to the same statement were placed in the aromantic group ($n=236$). If responses for that question were not available, asexual participants who responded to a different question indicating that they were not romantically attracted to anyone, neither men nor women, when asked to whom they were most romantically attracted, were placed in the aromantic group ($n=96$), while those who selected romantic attractions to men, women, or a combination of both were placed in the romantic category ($n=289$). Finally, if data were not available for either of those two questions, asexual participants who indicated that they had ever had a romantic partner were categorized as romantic ($n=7$). Asexual participants without responses to any of these questions ($n=191$, including all asexual participants from Study 5) about romantic attraction were excluded from comparisons between romantic and aromantic asexual groups but included when comparing allosexual people to the asexual group. We categorized all allosexual participants as having a romantic orientation based on to whom they reported they were most romantically attracted but did not separate allosexual participants into romantic and aromantic for analyses.

Nine asexual participants were not categorized as romantic or aromantic because they reported that they were "not romantically attracted to anyone, neither men nor women" but also that they experienced romantic attraction without sexual attraction at least sometimes. These asexual participants were included in comparisons between allosexual and asexual people but excluded from comparisons between romantic and aromantic asexual groups.

Measures

Demographic and Physical Characteristics

Information on age, income, education, and ethnicity was collected as standard demographics, and height, weight, and medical

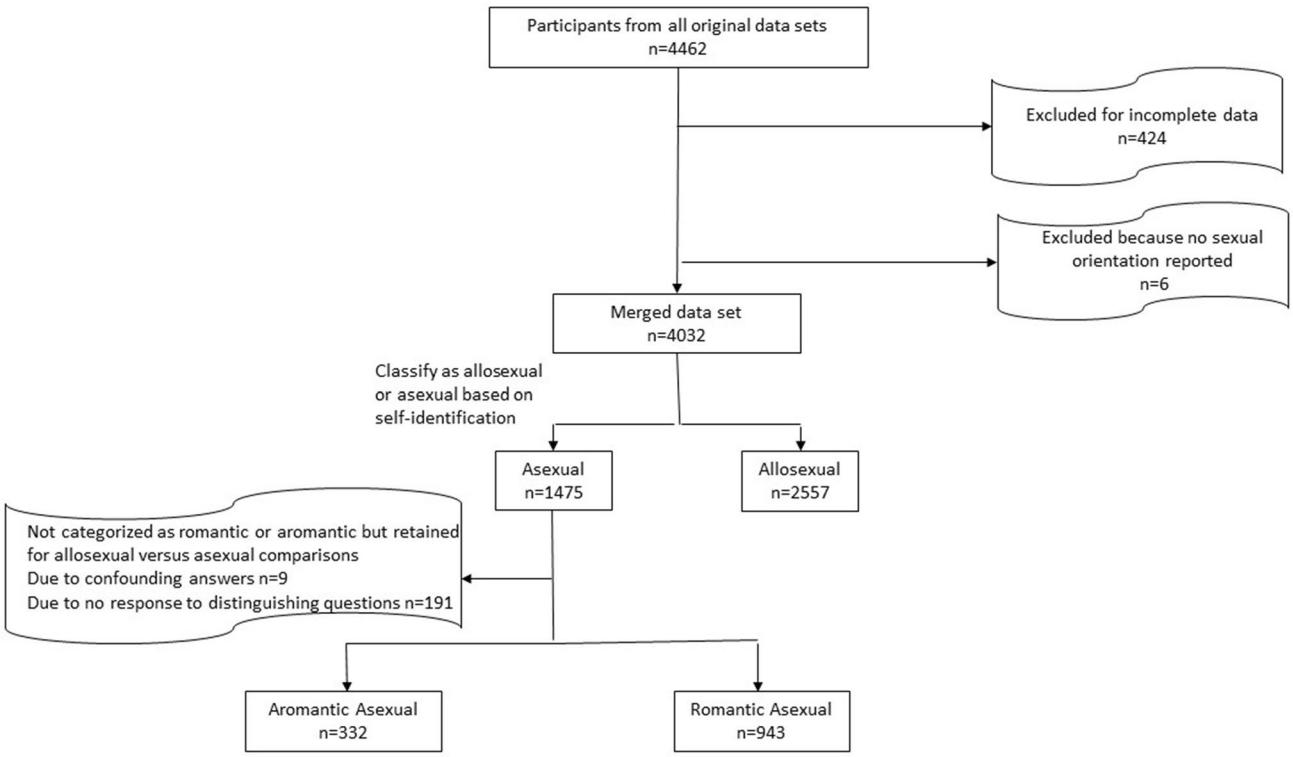

Fig. 1 Classification of participants as allosexual, romantic asexual, and aromantic asexual

Table 1 Classification of asexual participants as romantic or aromantic

Question	Responses categorized as romantic asexual	*n*	Responses categorized as aromantic asexual	*n*
I experience romantic attraction in the absence of sexual attraction.	Sometimes Often Always Neither true nor false Somewhat true Completely true	647	Rarely Never Somewhat false Completely false	236
Whom are you most romantically attracted to?	Exclusively romantically attracted to women, not at all to men Predominantly attracted to women, with only occasional attraction to men Predominantly attracted to women, with more than occasional attraction to men Equally romantically attracted to men and women Predominantly attracted to men, with more than occasional attraction to women Predominantly attracted to men, with only occasional attraction to women Exclusively attracted to men, not at all to women	289	Not romantically attracted to anyone, neither men nor women	96
How many romantic partners have you had in your lifetime? (i.e., individuals with whom you have had a close, committed relationship, regardless of sexual activity)	All numerical answers equal to or exceeding one	7		0
Total		943		332

conditions were included due to Bogaert's (2004) finding of differences in these measures between asexual and allosexual groups. Participants from all studies entered a numerical age and chose from ordinal categories for education and income. Ethnic options given were Caucasian/White, East Asian, South Asian, African American, First Nations, and Hispanic. All studies except Study 7 offered an "other" option with an opportunity to enter an open-ended description. Study 7 also gave the option "Mixed." Study 6 asked participants to enter their height and weight numerically in centimeters and kilograms, while studies 4 and 7 asked first for height and weight, then in a separate field asked in which unit measurements were entered. Medical condition was reported dichotomously as whether or not the participant had a medical condition. Age, income, education, and ethnicity were compared both between romantic and aromantic asexual groups, as well as between asexual and allosexual groups to replicate previous findings and provide context.

Gender

Participants were asked to report an open-ended description of their gender, allowing investigation across a more robust gender spectrum than only males and females. Responses were grouped into nine gender categories based on participants' open-ended answers: agender/non-gendered/genderless/NA/gender neutral/neutral/neutrois; androgynous; intersex; genderqueer/genderfluid; pangender; transgender; man; woman; and other. "Other" gender identities included "currently identifying as gender ambiguous—mainly female, also slightly male/androgynous/gen neutral," "female bodied non-woman," "semi-androgynous genderweird bio-fem," as well as comments such as "I play male in life but feel female and hide it due to fear." Categorization was based entirely on open-ended self-reporting, and therefore, it is possible participants could fit in multiple categories or have existed across various categories throughout their life. It is also possible that some binary-identified participants could have had transgender experiences but did not identify as trans at the time of completing the survey. Analyses on gender were performed with these categories condensed to "Men," "Women," and "Non-Binary." These responses were then collapsed into two dichotomous variables: men versus women (excluding participants in all other categories) and binary (men or women) versus non-binary.

Sexual Orientation

Participants from all studies were given the options asexual, heterosexual, bisexual, and homosexual to self-report a sexual orientation. Participants in Studies 3, 5, and 6 were also given an "other" option with the opportunity to enter an open-ended description of their sexual orientation. "Asexual" was intended to include all identities under the asexual umbrella, including gray-asexual, demisexual, etc., though this was not indicated on the survey. Open-ended "other" responses such as graysexual, gray-A, or demisexual that are commonly associated with the ace umbrella were not recoded into the asexual category in our report of sexual orientation, though these participants were included in the asexual category for comparisons between romantic and aromantic asexual and asexual and allosexual groups. We recognize that the term "homosexual" is obsolete and offensive to some; however, data collection for some of the studies included occurred in the past and thus the term was used. In the present study, the term is used only to denote the category name, never a person or group of people.

Romantic Orientation

Allosexual participants and romantic asexual participants were assigned a romantic orientation of heteroromantic, biromantic, homoromantic, or other based on their sex and the target of their romantic attraction. For example, if a participant's sex was male and they reported a romantic attraction to men, they would be placed in the homoromantic category. This variable was then dichotomized into a new variable for comparing prevalence of biromanticism to all other orientations among asexual and allosexual participants. We also investigated the prevalence of divergent orientations, where the target sex of sexual attraction was different than the target sex of romantic attraction. For example, an aromantic asexual person (whose target of romantic and sexual attraction are identical—no one) would have convergent orientations, while a heteroromantic bisexual person (who is romantically attracted only to the opposite sex but sexually attracted to both men and women) would have divergent orientations. We acknowledge that the term "divergent" may imply negative connotation, which we do not intend to apply; we use this word for lack of a better term. We conceptualized aromanticism and asexuality as orientations in and of themselves, not as a lack of orientation (Brotto & Yule, 2017). The proportion of participants whose romantic and sexual orientations were convergent was compared between allosexual and asexual groups.

Relationship Status

Options to describe participant's current romantic relationship status varied across studies. All studies asked: "What is your current relationship status?", and gave a combination of the following options: single; dating one person; dating more than one person; in a long-term relationship with one person; in a long-term relationship with more than one person; married or common-law; divorced/separated; widowed; and others. Due to the variation in options, responses were recoded to a dichotomous variable assessing whether or not they were in a relationship, where all options except single, and divorced/separated and widowed (unless another option was also selected), were coded as "in a relationship."

Number of Past Partners

Reports of past sexual partners and romantic partners were collected as two separate numerical variables. Studies 1 ($n = 694$), 2 ($n = 654$), 3 ($n = 729$), 4 ($n = 1171$), and 6 ($n = 72$) defined a sexual partner as an individual "with whom you have had any sort of sexual contact." Study 7 ($n = 36$) defined a sexual partner as an individual "with whom you have had sexual intercourse." Romantic partners were defined as "individuals with whom you have had a close, committed relationship, regardless of sexual activity" in Studies 1 ($n = 763$), 2 ($n = 659$), 3 ($n = 733$), 4 ($n = 1204$) and 7 ($n = 37$). Study 6 ($n = 72$) defined a romantic partner as someone "with whom you've had any sort of romantic contact."

Sexual Desire

Sexual desire was measured using the validated Sexual Desire Inventory (SDI; Spector, Carey, & Steinberg, 1996). The SDI included a subscale to measure solitary sexual desire, defined as the desire to behave sexually by oneself, and a subscale to measure dyadic sexual desire, the desire to behave sexually with a partner. Each item asked the participant to rank their level of sexual desire in a particular situation, or how often they experience or would like to experience a certain type of sexual activity on an 8-point Likert scale (scored 0–7). Possible scores ranged from 0 to 28 on the solitary desire subscale and 0 to 63 on the dyadic subscale. Higher scores indicated higher levels of sexual desire. Internal reliability was good on both SDI subscales, with Cronbach's $\alpha = .94$ for the solitary subscale and .97 for the dyadic subscale. SDI scores were compared both between romantic and aromantic asexual groups, as well as between asexual and allosexual groups to provide context for any differences found between the two asexual groups.

Sexual Function

Overall sexual functioning was measured using the international index of erectile function for males (IIEF; Rosen et al., 1997) and the female sexual function index for females (FSFI; Rosen et al., 2000). The IIEF is a 15-item questionnaire that included subscales for erectile function, orgasmic function, sexual desire, intercourse satisfaction, and overall satisfaction. A total score was obtained by summing subscale scores. The FSFI is a 19-item questionnaire that included subscales for sexual desire, arousal, lubrication, orgasm, satisfaction, and pain. A total score was obtained by summing subscale scores after scaling each by a specified factor. Both the IIEF and the FSFI required the participant to have engaged in sexual activity, by themselves or with a partner, in the 4 weeks prior to completing the questionnaire for a score to be computed. Higher scores on both the IIEF and FSFI denoted better overall sexual functioning. Both scales showed good internal reliability with Cronbach's α at least .80 on all subscales of both the FSFI and IIEF with sufficient sample size.

Sexual and Romantic Behavior

Sexual and romantic activity were evaluated using part III of the Derogatis Sexual Functioning Inventory (DSFI; Derogatis & Melisaratos, 1979), which asked participants how often they kiss, fantasize about sex, and masturbate. Responses were given on a Likert scale ranging from 1 (Not at all) to 9 (4 or more per day).

Self-Report of Sexual Difficulties

Participants were asked if they had any sexual concerns or difficulties and if they had ever been treated by a professional for a sexual difficulty or dysfunction. "Yes" or "No" responses were collected for both questions.

Interpersonal Problems

Interpersonal problems were measured using the Inventory of Interpersonal Problems circumplex short-form (IIP-SC; Soldz, Budman, Demby, & Merry, 1995), which measured distress due to interpersonal sources. It included eight subscales measuring the personality descriptors domineering, vindictive, cold, socially avoidant, non-assertive, exploitable, overly nurturant, and intrusive. Questions asked the participant to rank how true a statement is for them on a 5-point scale valued zero through four. Each subscale consisted of four questions, therefore giving a minimum score of zero and a maximum score of sixteen for each subscale, and a maximum score of 128 overall. Higher scores indicated higher levels of interpersonal distress. Good internal reliability was seen in the IIP with Cronbach's $\alpha > .75$ on all subscales.

Depression

Depression was measured using the Beck Depression Inventory-II (BDI-II; Beck, Steer, Ball, & Ranieri, 1996), which included 21 items, with each item scored from 0 to 3. For each, the participant selected the phrase that best described them for each item and their score was summed to a maximum of 63 and a minimum of zero. Scores ranging from zero to 13 denoted minimal depression; scores between 14 and 19 indicated mild depression; scores between 20 and 28 showed moderate depression; and scores between 29 and 63 suggested severe depression (Beck et al., 1996). Internal reliability of this inventory was good with Cronbach's $\alpha = .91$.

Procedure

Asexual participants were separated into a romantic asexual group ($n = 943$; those who feel romantic attraction but not sexual attraction) and an aromantic asexual group ($n = 332$; those who feel neither romantic nor sexual attraction). Statistical comparisons were primarily focused on differences between the romantic and aromantic asexual groups. Some of the studies analyzed here also recruited allosexual participants. Comparisons of asexual to allosexual persons are still scarce in research literature, and those that have been published need to be replicated. Therefore, even though the main focus of our study was to compare romantic and aromantic asexual people, we also included comparisons of asexual to allosexual participants ($n = 2557$) for gender distribution, prevalence of nonbinary genders and divergent romantic and sexual orientations, other demographics and physical characteristics, and sexual desire as measured by the Sexual Desire Inventory. Those variables were selected because they were available and provided important opportunity to replicate previous findings, as well as provide context for the results among the asexual group.

Following the recommendations from the medical literature (D'Agostino, 2000; Schulz & Grimes, 2005; Turk et al., 2008), we decided not to control for multiple comparisons. Our analyses are to a great degree novel and exploratory and are unlikely to directly affect clinical decisions. Therefore, maximizing the opportunity for exploration and discovery of potential effects (avoiding Type II error) was seen as more important than controlling for Type I error. All statistical analyses were performed using IBM's Statistical Package for the Social Sciences (SPSS; V24.0) software.

Significant differences were detected between studies on many major outcomes, as well as on demographic variables of age, income, education and ethnicity of participants. In order to properly account for those differences, we present results of comparing romantic and aromantic asexual participants (and comparing asexual and allosexual participants) on four demographics (age, income, education, and ethnicity) while controlling for the study.

In addition to the direct comparisons of aromantic and romantic groups, demographic characteristics were also used in models comparing the two groups on other outcomes to statistically minimize the potential confounding impact of the differences among the study samples. Thus, all four demographics in addition to dummy-coded study variables were included as control variables. For ethnicity, since its main effect was no longer of interest, only the categories on which the study samples differed were retained as dummy variables while others were collapsed into an Other category. This approach reduced the number of dummy variables in the model (preserving degrees of freedom) while strengthening the control for the study differences on ethnicity.

All continuous and dichotomous outcomes were analyzed using regression (either ordinary least squares or logistic) that included age, income, and education as well as dummy-coded variables for study and ethnicity (Study 4 and White/Caucasian were used as the reference groups) in addition to the dichotomous romantic-aromantic predictor. Categorical outcomes with more than two categories were analyzed using multinomial logistic regression with those same control predictors as described above.

Results

Of the asexual participants who provided information regarding their romantic orientation, 332 (26.0%) were classified as aromantic and 943 (74.0%) as romantic. This proportion did not vary significantly across the studies ($\chi^2(5) = 9.11$, $p > .05$, $n = 1275$).

Demographics

Aromantic and romantic asexual participants reported comparable demographic characteristics, with similar age, income, education, and ethnicity. Aromantic asexual participants reported an average age of 25.1 years (SD = 7.6), and romantic asexual participants reported a similar average age of 25.3 years (SD = 8.6).

Table 2 presents the distribution of income, education and ethnicity across aromantic and romantic asexual and allosexual participants. The average income reported among both asexual groups was between $10,000 and $20,000 per year, while the average level of education achieved by romantic and aromantic asexual groups was similar ($Mdn = 5$—some college—for both groups). Romantic orientation was not a significant predictor of any of these three demographics in analyses including Study as a control variable. Our study did not replicate Bogaert (2004) reported differences—there were no significant differences between asexual and allosexual participants on any of the demographic characteristics.

Physical Characteristics

Height and Weight

No significant differences in height or weight were found between romantic and aromantic asexual participants ($B = 1.22$, $t = .83$, $p > .05$ for height; $B = .01$, $t = .003$, $p > .05$ for weight). In terms of control variables, older age predicted higher weight ($B = .43$, $t = 3.05$, $p < .05$) and Study 6 participants showed higher height ($B = 8.47$, $t = 3.10$, $p < .01$) and weight ($B = 9.85$, $t = 2.04$, $p < .05$) than the reference study group (Study 2) likely because Study 6 contained only male participants. No difference was seen between asexual and allosexual groups in weight ($B = -.03$, $t = -.02$, $p > 0.05$), but asexual participants were seen to be slightly shorter in height than allosexual participants ($B = 2.96$, $t = 4.47$, $p < .001$).

Table 2 Income, education, and ethnicity of aromantic and romantic asexual and allosexual participants

Variable	Categories	Aromantic asexual *n* (% of aromantic asexual participants)	Romantic asexual *n* (% of romantic asexual participants)	Asexual total (aromantic and romantic) *n* (%)	Allosexual *n* (%)
Income category (annual)	< $5,000	97 (35.4%)	277 (34.0%)	374 (34.3%)	342 (14.5%)
	$5000–$10,000	45 (16.4%)	97 (11.9%)	142 (13.0%)	625 (26.6%)
	$10,000–$15,000	27 (9.8%)	108 (13.3%)	135 (12.4%)	173 (7.3%)
	$15,000–$20,000	18 (6.5%)	53 (6.5%)	71 (6.5%)	207 (8.8%)
	$20,000–$25,000	19 (6.9%)	64 (7.9%)	83 (7.6%)	143 (6.1%)
	$25,000–$30,000	10 (3.6%)	27 (3.3%)	37 (3.4%)	123 (5.2%)
	$30,000–$40,000	22 (8.0%)	57 (7.0%)	79 (7.3%)	194 (8.2%)
	$40,000–$50,000	16 (5.8%)	39 (4.8%)	55 (5.1%)	170 (7.2%)
	$50,000–$75,000	13 (4.7%)	55 (6.7%)	68 (6.2%)	220 (9.3%)
	> $75,000	7 (2.6%)	38 (4.7%)	45 (4.1%)	157 (6.7%)
	Total	274	815	1089	2354
Highest Level of Education	Less than high school	7 (2.2%)	17 (1.9%)	24 (1.9%)	53 (2.1%)
	High school diploma	38 (11.9%)	110 (12.0%)	148 (12.0%)	323 (12.8%)
	Some college	64 (20.1%)	232 (25.3%)	296 (24.0%)	360 (14.3%)
	College diploma/certificate	24 (7.5%)	47 (5.1%)	71 (5.7%)	209 (8.3%)
	Some undergraduate studies	69 (21.6%)	177 (19.3%)	246 (19.9%)	770 (30.5%)
	Bachelor's degree	65 (20.4%)	181 (19.8%)	246 (19.9%)	476 (18.9%)
	Some graduate studies	20 (6.3%)	61 (6.7%)	81 (6.6%)	113 (4.5%)
	Graduate degree	32 (10.0%)	91 (9.9%)	123 (10.0%)	219 (8.7%)
	Total	319	916	1235	2523
Ethnicity	White/Caucasian	279 (84.3%)	781 (83.3%)	1060 (83.6%)	1507 (60.1%)
	East Asian	16 (4.8%)	25 (2.7%)	41 (3.2%)	516 (20.6%)
	South Asian	2 (0.6%)	14 (1.5%)	16 (1.3%)	136 (5.4%)
	African American	2 (0.6%)	17 (1.8%)	19 (1.5%)	51 (2.0%)
	First Nation	1 (0.3%)	1 (0.1%)	2 (0.2%)	12 (0.4%)
	Hispanic	9 (2.7%)	28 (3.0%)	37 (2.9%)	74 (2.9%)
	Other	22 (6.6%)	72 (7.7%)	94 (7.4%)	213 (8.5%)
	Total	331	938	1269	2509

Medical Conditions

No significant difference was seen in medical condition between romantic and aromantic asexual participants. The binomial logistic regression model ($\chi^2[8] = 6.61, p > .05$) correctly predicted 75.1% of cases and did not show romantic orientation among the asexual group to significantly predict whether an individual had a medical condition or not ($\exp(B) = .94, p > .05$). We did, however, observe that asexual participants were 1.8 times more likely to have a medical condition than allosexual participants (the logistic regression model ($\chi^2[8] = 4.95, p > .05$) correctly predicted 82.4% of cases, with $\exp(B) = .553, p < .001$).

Gender

A diverse range of gender identities was reported by all groups, with similar responses between romantic and aromantic asexual participants, but significant differences between the asexual and allosexual groups. A chi-squared analysis showed no significant difference between romantic and aromantic asexual participants in their distribution across the nine gender categories (Pearson $\chi^2[9] = 11.07, p > .05$), but the second chi-squared analysis comparing the allosexual to the asexual group (romantic and aromantic combined) indicated that asexual participants differed significantly from allosexual participants in their endorsement of

gender categories (Pearson $\chi^2[9] = 364.94, p < .001$) with asexual participants reporting more non-binary (other than woman/man) gender identities than allosexual participants. The percentages from these two chi-squared analyses are combined in Table 3.

To further probe this finding, we investigated two aspects of gender: prevalence of men compared to women (excluding non-binary participants) and prevalence of non-binary genders compared to binary genders ("man" or "woman") (Table 4). Romantic and aromantic asexual groups were similar in their distribution between men and women, and between binary and non-binary genders. However, asexual participants were more likely than allosexual participants to identify as a woman instead of a man, and asexual participants were more likely to identify as a non-binary gender than allosexual participants (Table 4). We used binary logistic regressions and included the study and demographics as control variables. The model using romantic orientation of asexual participants as a predictor of the likelihood of participants identifying as men or women was not significant ($\chi^2[8] = 4.06, p > .05$), correctly predicted 79.6% of cases and did not show asexual group's romantic orientation to predict gender, classified as men versus women ($\exp(B) = 1.24$, $p > .05$). Similarly, no significant results were found for asexual participants' romantic orientation in the model predicting binary versus non-binary gender ($\chi^2[8] = 12.58, p > .05$; 84.1% of cases correct; $\exp(B) = .81$, $p > .05$). The model predicting likelihood of participants identifying as men or women ($\chi^2[8] = 14.24, p > .05$) predicted 71.1% of cases correctly, and asexual versus sexual orientation was a significant predictor ($\exp(B) = .60, p < .001$), showing that among binary-identifying individuals, allosexual participants were 0.6 times as likely (or 1.7 times less likely) to identify as a woman instead of a man compared to asexual participants. The model predicting binary versus non-binary genders ($\chi^2[8] = 5.66, p > .05$) correctly predicted 94.0% of cases and showed that allosexual participants were 0.08 times as likely (or 12.7 times less likely) to identify as a non-binary gender compared to asexual participants ($\exp(B) = .08, p < .001$).

Romantic and Sexual Attraction, Activity, and Desire

Romantic Orientation

Among asexual participants, 25.3% were aromantic, 26.4% were heteroromantic, 38.3% were biromantic, 4.9% were homoromantic, and 5.1% reported an "other" romantic orientation, and this distribution revealed significantly higher prevalence of biromanticism among asexual participants compared to allosexual participants. The binary logistic regression model predicting biromanticism ($\chi^2[8] = 6.45, p > .05$) correctly predicted 77.9% of cases and showed significant prediction by the asexual versus allosexual category ($\exp(B) = .48, p < .001$). This indicates that asexual participants were 2.1 times more likely to report romantic attraction to both men and women compared to the allosexual group. Because the term "biromantic" assumes a gender binary and therefore may not fit well for non-binary participants, we also tested biromantic prevalence among binary-identified participants only and found that the asexual participants were 2.0 times more likely to be biromantic than the allosexual group (model $\chi^2[8] = 6.41, p > .05$; asexual vs. allosexual predictor $\exp(B) = 0.50, p < .001$).

Convergence of romantic and sexual orientation was also examined. Participants' orientations were considered convergent if the target of their sexual attraction was the same as the target of their romantic attraction (e.g., aromantic asexual, heteroromantic heterosexual, etc.). Asexual participants were significantly more likely to have divergent romantic and sexual orientations than allosexual participants ($\exp(B) = .05, p < .001$) according to the regression model ($\chi^2[8] = 8.30, p > .05$) which predicted 83.8% of cases correctly. All romantic asexual participants (74.0% of the asexual group) were considered divergent (sexually attracted to no one versus romantically attracted to the same, opposite or both

Table 3 Gender categorization among aromantic ($n = 332$) and romantic ($n = 936$) asexual and allosexual participants ($n = 2491$)

Gender category	Aromantic asexual	Romantic asexual	Asexual total (aromantic and romantic)	Allosexual
	n (%)	*n* (%)	*n* (%)	*n* (%)
Agender, non-gendered, genderless, N/A, gender neutral, neutrois, neutral	28 (8.4%)	54 (5.7%)	82 (6.5%)	4 (0.2%)
Androgynous	1 (0.3%)	11 (1.2%)	12 (0.9%)	2 (0.1%)
Intersex	0 (0.0%)	1 (0.1%)	1 (0.1%)	0 (0.0%)
Genderqueer, genderfluid	8 (2.4%)	30 (3.2%)	38 (3.0%)	10 (0.4%)
Pangender	1 (0.3%)	2 (0.2%)	3 (0.2%)	0 (0.0%)
Transgender	15 (4.5%)	25 (2.7%)	40 (3.2%)	11 (0.4%)
Man	66 (19.9%)	170 (18.2%)	236 (18.6%)	826 (33.2%)
Woman	203 (61.1%)	624 (66.7%)	827 (65.2%)	1632 (65.5%)
Other	10 (3.0%)	19 (2.0%)	29 (2.3%)	6 (0.2%)

Table 4 Collapsed gender categories among aromantic ($n = 332$) and romantic ($n = 936$) asexual and allosexual participants ($n = 2491$)

Collapsed gender category	Aromantic asexual	Romantic asexual	Total asexual (aromantic and romantic)	Allosexual
	n (%)	*n* (%)	*n* (%)	*n* (%)
Men	66 (19.9%)	170 (18.2%)	236 (18.6%)	826 (33.1%)
Women	203 (61.1%)	624 (66.7%)	827 (65.2%)	1632 (65.5%)
Non-binary	63 (19.0%)	142 (15.2%)	205 (16.2%)	33 (1.3%)

genders). Among allosexual participants only, 13.3% reported divergent orientations.

Relationship Status

More romantic than aromantic asexual participants reported being in a relationship, with 20.4% of romantic asexual and 3.6% of aromantic asexual participants reporting a current relationship. The binary logistic regression model ($\chi^2[8] = 1.66, p > .05$) correctly predicted 83.1% of cases with a significant effect of romantic versus aromantic category ($\exp(B) = 6.74, p < .001$), indicating that romantic asexual participants were 6.7 times more likely to be in a relationship than those in the aromantic asexual group.

Number of Past Partners

Romantic asexual participants reported significantly more past romantic and sexual partners compared to those in the aromantic asexual group. Romantic participants reported an average of 1.7 romantic partners (SD = 2.2, $n = 748$) and 2.2 sexual partners (SD = 7.2, $n = 846$), and aromantic asexual participants reported on average 0.7 romantic partners (SD = 1.8, $n = 294$) and 0.8 sexual partners (SD = 1.9, $n = 292$). The regression model for past romantic partners ($R^2 = .09, F(12, 933) = 8.01, p < .001$) was significantly predicted by asexual grouping ($B = .82, t = 5.02, p < .001$). The model for past sexual partners ($R^2 = .10, F(12, 922) = 8.08, p < .001$) also showed a significant effect of the aromantic versus romantic asexual predictor ($B = 1.44, t = 3.22, p < .001$).

Children

No significant difference was seen in the proportion of romantic and aromantic asexual participants who had children, at 3.6% of romantic and 3.7% of aromantic participants. In the binary logistic regression model ($\chi^2[8] = 9.59, p > .05$), which predicted 95.6% of cases correctly, the aromantic versus romantic predictor was not significant ($\exp(B) = .84, p > .05$).

Sexual Desire

Means for this measure are presented in Table 5. Both romantic and aromantic asexual participants scored low on the solitary as well as dyadic subscales of the SDI, though romantic asexual participants scored significantly higher on the dyadic subscale than aromantic asexual participants. However, asexual participants (romantic and aromantic) scored significantly lower than allosexual participants on both subscales. In the regression model for solitary desire ($R^2 = .04, F(11, 633) = 2.23, p < .05$), aromantic versus romantic predictor was not significant ($B = -.23, t = -.39, p > .05$). In the model for dyadic desire ($R^2 = .10, F(11, 633) = 6.19, p < .001$), the asexual grouping effect was significant ($B = 2.60, t = 4.81, p < .001$), with romantic asexual participants reporting higher levels of dyadic sexual desire compared to the aromantic asexual group. Regression models comparing asexual participants to allosexual participants on both solitary ($R^2 = .19, F(11, 2414) = 52.07, p < .001$) and dyadic ($R^2 = .63, F(11, 2416) = 377.76, p < .001$) subscales of the SDI showed a significant effect of the asexual versus allosexual predictor ($B = 7.40, t = 21.07, p < .001$ for solitary; $B = 35.28, t = 61.03, p < .001$ for dyadic) indicating higher scores for allosexual participants on both scales.

Sexual Function

Given that the IIEF and FSFI require that a participant has engaged in sexual activity, defined as caressing, foreplay, masturbation, or vaginal intercourse, in the preceding 4 weeks in order for questions to be answered, questions about sexual function had a much smaller sample size than other analyses. Means are presented in Table 6.

For males, no significant difference was observed between romantic and aromantic asexual participants on the overall function (OF) ($B = -1.32, t = -1.86, p > .05, R^2 = .22, F(10, 88) = 2.48, p < .05$), sexual desire (SD),($B = -.27, t = -.78, p > .05, R^2 = .07, F(10, 152) = 1.19, p > .05$), or overall satisfaction (OS) ($B = -.64, t = -1.65, p > .05, R^2 = .28, F(10, 150) = 5.68, p < .001$) subscales of the IIEF. Due to incomplete data, subscale scores on the erectile function (EF) and intercourse satisfaction (IS) subscales and the total IIEF score could not be computed.

For females, no significant difference was seen between romantic and aromantic asexual participants on the desire (D) ($B = .04, t = .60, p > .05, R^2 = .04, F(10, 663) = 2.66, p < .01$), arousal (A) ($B = -.26, t = -1.50, p > .05, R^2 = .06, F(10, 341)$, lubrication (L) ($B = -.12, t = -.58, p > .05, R^2 = .01, F(10, 315) = .40, p > .05$),

orgasm (O) ($B = -.23$, $t = -1.23$, $p > .05$, $R^2 = .03$, $F(10, 329)$, satisfaction (S) ($B = .01$, $t = .02$, $p > .05$, $R^2 = .10$, $F(10, 98) = 1.08$, $p > .05$), or pain (P) ($B = -.08$, $t = -.15$, $p > .05$, $R^2 = .31$, $F(9, 89) = 4.38$, $p < .001$) subscales, or in the overall FSFI scores ($B = -.93$, $t = -.57$, $p > .05$, $R^2 = .06$, $F(9, 126) = .83$, $p > .05$).

Sex-Related Activities and Behavior

These measures were only collected in Study 2; therefore, controlling for study was not possible and generalizing from these findings should be done with caution (for the sample characteristics please refer to Brotto et al., 2015). Romantic asexual participants kissed more often than aromantic asexual participants, but no difference was seen in frequency of fantasy and masturbation. The regression model for kissing ($R^2 = .08$, $F(7, 359) = 4.22$, $p < .001$) showed a significant effect of the aromantic versus romantic predictor ($B = 1.04$, $t = 4.67$, $p < .001$). In the models for frequency of sexual fantasy ($R^2 = .02$, $F(7, 356) = .89$, $p > .05$) and masturbation ($R^2 = .02$, $F(7, 359) = .76$, $p > .05$), asexual grouping was not a significant predictor ($B = .13$, $t = .58$, $p > .05$ for fantasy; $B = -.22$, $t = -.96$, $p > .05$ for masturbation). Data for this measure were provided only by Study 2.

Report of Sexual Difficulties

In response to a dichotomous yes/no question, 11.6% of romantic asexual participants reported having sexual concerns, compared to 6.7% in the aromantic asexual group, a difference which did not reach significance. There was also no significant difference between romantic and aromantic asexual participants in reporting having been treated by a professional for a sexual difficulty. The binary logistic regression model for endorsement of sexual concerns ($\chi^2[8] = 7.56$, $p > .05$) predicted 89.5% of cases correctly, but the aromantic versus romantic predictor was not significant ($\exp(B) = 1.49$, $p > .05$). Among romantic asexual participants, 2.7% reported having been treated by a professional for a sexual difficulty, compared to 0.9% in the aromantic asexual group. This model ($\chi^2[8] = 7.14$, $p > .05$) correctly predicted 97.5% of cases, and asexual grouping was not significant ($\exp(B) = 6.44$, $p = .072$).

Table 5 Sexual desire inventory (SDI) scores among aromantic and romantic asexual and allosexual participants

	Aromantic asexual			Romantic asexual			Allosexual		
	n	M	SD	*n*	M	SD	*n*	M	SD
SDI—Solitary	209	5.6	6.3	589	6.0	6.7	1948	11.8	7.8
SDI—Dyadic	206	1.1	3.2	590	3.8	6.8	1951	36.2	13.9

Ranges SDI-Solitary: 0–28, SDI-Dyadic: 0–63

Table 6 Scores on the international index of erectile function (IIEF) and female sexual function index (FSFI) of aromantic and romantic asexual participants

	Aromantic asexual			Romantic asexual		
	n	M	SD	*n*	M	SD
IIEF—EF	0	*	*	4	23.8	7.3
IIEF—OF	34	8.1	2.6	89	7.0	3.3
IIEF—SD	49	3.6	1.9	150	3.4	1.8
IIEF—IS	1	12.0	*	6	6.5	3.3
IIEF—OS	48	8.9	2.0	148	8.2	2.2
IIEF—total	*	*	*	5	46.0	10.8
FSFI—D	208	1.5	0.7	603	1.5	0.8
FSFI—A	92	3.6	1.3	317	3.4	1.4
FSFI—L	86	4.5	1.6	290	4.4	1.4
FSFI—O	93	4.3	1.3	309	4.2	1.5
FSFI—S	8	4.2	1.6	112	4.3	1.3
FSFI—P	18	3.6	2.1	97	3.9	1.9
FSFI—total	20	21.8	5.5	132	21.5	5.7

EF erectile function, *OF* overall function, *SD* sexual desire, *IS* intercourse satisfaction, *OS* overall satisfaction, *D* desire, *A* arousal, *L* lubrication, *O* orgasm, *S* satisfaction, *P* pain

*Insufficient sample size

IIEF-EF: 1–30, IIEF-OF: 0–10, IIEF-SD: 2–10, IIEF-IS: 0–15, IIEF:OS: 2–10, IIEF-total: 3–75, FSFI-D: 1.2–6, FSFI-A: 1.2–6, FSFI-L: 1.2–6, FSFI-O: 1.2–6, FSFI-S: 1.2–6, FSFI-P: 1.2–6, FSFI-total: 7.2–36

Personality and Depression

Interpersonal Problems

On the Inventory of Interpersonal Problems circumplex short-form (IIP-SC; Soldz et al., 1995) (means presented in Table 7), aromantic asexual participants scored significantly higher on the cold subscale ($B = -1.80$, $t = 3.06$, $p < .01$, $R^2 = .09$, $F(8, 316) = 3.98$, $p < .001$) and lower on the overly nurturant ($B = 1.74$, $t = 3.05$, $p < .01$, $R^2 = .078$, $F(8, 316) = 3.35$, $p < .01$) and intrusive ($B = .95$, $t = 2.06$, $p < .05$, $R^2 = .04$, $F(8, 316) = 1.63$, $p > .05$) subscales compared to romantic asexual participants. No significant difference was found between romantic and aromantic asexual participants on the domineering ($B = -.35$, $t = -1.03$, $p > .05$, $R^2 = .07$, $F(8, 317) = 3.03$, $p < .01$), vindictive ($B = -.28$, $t = -.77$, $p > .05$, $R^2 = .09$, $F(8, 317) = 3.78$, $p < .001$), avoidant ($B = -.30$, $t = -.46$, $p > .05$, $R^2 = .05$, $F(8, 316) = 2.25$, $p < .05$), assertive ($B = .71$, $t = 1.10$, $p > .05$, $R^2 = .04$, $F(8, 316) = 1.48$, $p > .05$), or exploitable ($B = .84$, $t = 1.54$, $p > .05$, $R^2 = .04$, $F(8, 316) = 1.72$, $p > .05$) subscales, or in total scores ($B = 1.59$, $t = .63$, $p > .05$, $R^2 = .09$, $F(8, 314) = 4.05$, $p < .001$),

Depression

Romantic asexual participants scored an average of 10.4 (SD = 9.8) on the Beck Depression Inventory, similarly to aromantic asexual participants' average score of 9.6 (SD = 10.9). Both average scores fall below the threshold for mild depression (Beck et al., 1996). In the regression model ($R^2 = .06$, $F(7, 348) = 3.30$, $p < .01$), the aromantic versus romantic predictor was not significant ($B = -.14$, $t = -.12$, $p > .05$).

Discussion

We found that approximately one in four asexual individuals fell into the aromantic category of asexuality, and that some significant distinctions existed between romantic and aromantic asexual groups in addition to many similarities. As expected, romantic activity was seen at higher levels among romantic asexual participants through a higher likelihood of being in a relationship, more past romantic and sexual partners, more frequent kissing, and significantly higher scores in dyadic sexual desire. Romantic asexual individuals were found to be less cold, more nurturant, and more intrusive than their aromantic counterparts in terms of personality. No difference was seen in gender distribution between romantic and aromantic asexual participants, though we did see higher prevalence of women and non-binary genders compared to men and binary genders, respectively, in the asexual group compared to the allosexual group. Finally, we saw higher rates of same-sex romantic attraction, particularly biromantic attraction, among asexual participants compared to allosexual participants. These findings provide insight into the diversity among the asexual population and into the role of gender in sexual and romantic attraction.

Gender and Romantic Orientation

Conceptualizing sexual orientation as either heterosexual, homosexual, or bisexual is fundamentally based in a gender binary. While there are many more possible orientations for sexual desire among allosexual people, asexuality is particularly unrestrained by the gender binary, as the target of sexual attraction cannot be gendered if it is lacking altogether. We found that nearly one in five aromantic asexual participants and more than one in seven romantic asexual participants identified as a gender other than man or woman, though the difference between the two asexual groups was not significant. This is comparable to other estimates of non-binary prevalence among asexual people which range from 12.6 to 18.0% (Brotto et al., 2010; Gazzola & Morrison, 2012), with up to nearly one in four asexual people who reported a gender other than their gender assigned at birth in the AVEN 2014 survey (Ginoza et al., 2014).

Romantic attraction among asexual participants was seen to be less gender specific than among allosexual participants, with asexual people 2.1 times more likely to report a biromantic orientation than their allosexual counterparts (and 53.9% of romantic asexual participants identifying as biromantic). This has also been found in other studies, with proportions ranging from 26 to 54% of asexual individuals who reported a romantic attraction to beyond strictly the same or opposite gender (Ginoza et al., 2014; Zheng & Su, 2018; see also Scherrer, 2008). The Ace Community Survey (Bauer et al., 2018) found that 45% of asexual people endorsed bisexual, so our higher levels of biromanticism among asexual participants compared to allosexual participants are aligned with those findings. Although the reasons for the higher rates of biromanticism in

Table 7 Interpersonal problems circumplex scores of aromantic ($n = 114$) and romantic ($n = 300$) asexual participants

	Aromantic asexual		Romantic asexual	
	M	SD	M	SD
Domineering	3.0	3.0	2.6	2.7
Vindictive	3.0	3.3	2.5	2.9
Cold	8.0	5.0	6.1	4.6
Socially avoidant	8.0	5.5	7.7	5.1
Non-assertive	6.8	5.1	7.5	5.0
Exploitable	5.4	4.1	6.1	4.3
Overly nurturant	4.6	4.0	6.2	4.6
Intrusive	2.2	3.1	3.0	3.6
Total	41.1	21.6	41.7	20.5

Subscale ranges: 0–16. Total score range: 0–128

asexual people compared to allosexual people are unknown, it is possible that asexual people's greater likelihood of rejecting sex and gender binaries (Gazzola & Morrison, 2012; Ginoza et al., 2014; MacNeela & Murphy, 2015) may also be contributing to their non-preference for a certain gender of romantic partner. Clearly, this speculation deserves further study in the future.

Diamond (2003) posits that the intimate tie between sex (the activity) and sex (the binary biological designation) is rooted in its evolutionary role as heterosexual, and penile–vaginal intercourse is required for reproduction. However, Diamond positions romantic attraction and coupled pair bonding as a derivative of infant–caregiver attachment, which is entirely independent of gender. In this model, the genderedness of our sexual attraction spills into our romantic orientations, and as a result, we tend to align our romantic desires alongside our sexual drive, causing an indirectly gender-based romantic orientation (Diamond, 2003). It follows, therefore, that a person who does not experience sexual attraction may be less restricted by gender in their romantic attraction, resulting in romantic desires independent of gender or even a disconnect from the concept of gender altogether. Our finding that asexual individuals were more likely to identify as non-binary genders and were more likely to be romantically attracted to both men and women compared to allosexual individuals, provides evidence for Diamond's theory. Specifically, our finding that romantic and aromantic asexual participants did not differ in prevalence of non-binary genders, whereas allosexual participants did, may provide evidence that the gendered basis of attraction truly originates from sexual and not romantic attraction.

However, Diamond's theory would predict that all asexual people would be either aromantic or bi-/panromantic, where gender was not a governing factor in romantic attraction. We found that approximately one-third of asexual individuals reported either same- or other-gender romantic attraction, suggesting that sexual attraction cannot be the only contributor to reliance on gender in romantic attraction. It should be noted, however, that biromantic attraction is not necessarily non-gendered, but rather it is not focused on a single gender as are same-gender and opposite-gender attractions. Further, romantic asexual persons, by definition, show that the target of a person's sexual attraction may not be the same as the target of their romantic attraction. While we observed asexual participants to be more likely to have divergent romantic and sexual orientations compared to the allosexual group, divergent orientations were seen in one in six allosexual participants, showing that it is not unique to asexuality. This separation of romantic and sexual desires and attraction is critical to understanding each phenomenon individually and provides further evidence for Diamond's (2003) theory that conceptualizes romantic and sexual attraction as distinct—a sentiment also expressed by the ace community (e.g., mod j, n.d.). Specifically, our finding suggests that conflation of romantic and sexual desires in research will cloud details of the underlying attraction, and as such we suggest that researchers should ask participants to report a romantic and sexual orientation as separate fields.

Romantic Behavior and Desire

We found that approximately one in five romantic asexual participants reported a current relationship, which is comparable to other estimates ranging from 9% of asexual men (Brotto et al., 2010) to 44% of all asexual people (Bogaert, 2004). It perhaps comes as no surprise that romantic asexual participants were more likely to be in a relationship at the time of completing the survey, reported more past romantic partners, and kissed more often than aromantic asexual participants. However, this information provides evidence to support what we have already heard from the asexual community itself: that some asexual people form relationships and/or desire intimate or sensual (but non-sexual) activity (Overview, n.d.). Beyond romantic experiences, we also found that romantic asexual participants reported significantly more past sexual partners and experienced higher levels of dyadic sexual desire than aromantic asexual participants. Previous studies have seen a wide diversity of reactions toward intercourse and other sexual activities among asexual people, ranging from enjoyment to disinterest to disgust (Carrigan, 2011), with some asexual people who reported engaging in sexual activity for reasons including "to please a partner" (75.5%), "curiosity" (56.7%), and "social expectations" (40.8%), as well as "I find it pleasurable" (36.1%; Ginoza et al., 2014). As such, higher numbers of past sexual partners among romantic asexual participants were likely linked to their elevated chances of being in a relationship, particularly if their partner was allosexual. Higher levels of partnered sexual desire among romantic compared to aromantic asexual participants may have also been related to the desire to behave sensually (but not sexually; e.g., cuddling, kissing, etc.) with a partner, or due to the presence of demisexuality (asexual people who experience sexual desire only after forming an intimate bond) or other similar subtypes of asexual individuals in the romantic asexual sample. While the elevated level of dyadic sexual desire among romantic asexual participants was quantitatively very minimal (scoring an average of 3.8 out of a possible 63 points on the SDI), and still significantly lower than allosexual participants' scores, our findings show that there is heterogeneity within the ace umbrella in how persons experience sexual desire.

Personality

Aromantic asexual participants were colder, less nurturant, and less intrusive than romantic asexual participants based on the Inventory of Interpersonal Problems. These significant group

differences may be accounted for by the wording of items on the IIP-SC given that two of the four questions on the cold subscale asked about feelings associated with romantic love: "It is hard for me to show affection to people," and "it is hard for me to experience a feeling of love for another person" (Soldz et al., 1995, p. 57). While love and affection could refer to familial love or love between friends, it was possible that participants interpreted these questions to ask about romantic love in particular. As such, heightened coldness among aromantic asexual participants may have reflected their lack of desire to form romantic relationships more than a distinctly cold personality. In general, mean scores for our asexual participants were higher than available normative data based on a general non-clinical population. Future research should aim to explore whether asexual people, as a group, experience more interpersonal issues generally, or if these interpersonal features relate specifically to romantic partnerships. Aromantic and romantic asexual participants did not differ on the personality traits domineering, vindictive, socially avoidant, non-assertive, or exploitable, though nonsignificant ANOVA values suggested poor model fit in the intrusive, non-assertive, and exploitable subscales.

Beyond the above-mentioned differences, many similarities were observed between romantic and aromantic asexual individuals. This suggests a high degree of complexity in asexual diversity, where binary classification as romantic or aromantic does not capture the full extent of the very heterogeneous group. No difference was seen in age, income, education, ethnicity, height, weight, medical conditions, gender (men/women and binary/non-binary), likelihood of having children, amount of solitary sexual desire, sexual function, frequency of masturbation or sexual fantasy, or the endorsement of having sexual concerns or seeking professional help for sexual concerns. Similarity between romantic and aromantic asexual participants on all measures of sexuality highlights that the presence of romantic attraction does not negate the lack of sexual attraction, and that one can have either romantic attractions, or no romantic attractions, and still fully identify as asexual. However, measures of male sexual desire, and female lubrication, orgasm and satisfaction, as well as total FSFI scores, as well as frequencies of fantasy and masturbation, showed no significant ANOVA regression values, indicating poor fit of the model. As such, these results should be considered lightly.

Similarity among demographic variables between romantic and aromantic asexual participants had not been measured before, but showed contrast against the studies that found significant demographic distinctions between allosexual and asexual groups (e.g., Bogaert, 2004), though this may be due partially to our categorization by self-identification, which is a more inclusive criterion than requiring endorsement of sexual attraction to no one. We observed no significant difference between romantic and aromantic asexual participants in age, income, education, ethnicity, height, weight, or likelihood of having a medical condition or children. These similarities suggested that underlying differences between romantic and aromantic asexual people were small and mostly limited to those related to romantic attraction, as well as a closer similarity between romantic and aromantic asexual participants than between allosexual and asexual groups. The similar likelihood of having children between aromantic and romantic asexual participants was intriguing, as one may presume romantic asexual individuals to be more likely to have children as they are more likely to be in a relationship and may conform more readily to the expectation of producing a nuclear family. However, it must be noted that the average age of our asexual sample was 25.5 years, which is perhaps before some people would choose to have children.

Romantic and aromantic asexual participants reported sexual fantasies at a similar frequency. This finding was somewhat unexpected given that asexual people have reported fantasies that centered on romantic experiences rather than sexual, such as emotional connection and cuddling (Yule et al., 2017). As such, we would have predicted higher frequencies of fantasies among romantic asexual participants as they explore their romantic desires.

Varying results have been reported on depression in the asexual population, including one study that found lower depression levels among asexual people compared to healthy allosexual people and women with hypoactive sexual desire disorder (Brotto et al., 2015). Our finding that romantic and aromantic asexual participants did not differ in depression levels suggests that a lack of romantic attraction was generally unlikely to cause depression, perhaps contrary to a general societal belief that places romantic love as integral to happiness.

Limitations

We amalgamated data from seven different original studies that all used varying recruitment techniques ranging from online questionnaires to in-person interviews. While controls for study differences were used, the distinct samples warranted caution when merging data. Additionally, our sample was somewhat homogenous in ethnicity with a large majority of White or Caucasian participants, very few Hispanic and African American participants and only two First Nations participants. Gender and attraction are deeply cultural phenomena, and as such we are limited by our lack of input from other cultural groups. We did not separate allosexual participants into romantic and aromantic groups, even though a very small proportion of the allosexual participants were likely to be aromantic, limiting our ability to compare the effects of romantic attraction between allosexual and asexual populations. We were also limited in our measurement of sexual functioning because the FSFI and IIEF required sexual activity in the preceding 4 weeks, excluding all asexual participants who did not engage in sexual activity, or whose sexual activity did not meet the normative definition given by the scales. This is particularly limiting as a broad range of sexual and romantic activities have been reported among

asexual groups, and one survey found that nearly less than third of asexual individuals had been sexually active in the preceding year (Ginoza & Miller, 2014). We were also unable to capture extensive complexity among relationship formats and characteristics, which would be highly relevant to studies of romantic attraction and behavior within asexuality.

We must also acknowledge that our quantitative approach restricted participant's answers to either those provided, or in some cases an "other" option. Quantifying diversity in this way presented a paradox where a small enough number of categories to perform meaningful statistical tests were necessary, while a large enough range of categories were required to fully capture the variation within the group. This categorization limits exploration of queer, unrestrained identities that are crucial to research in sex, gender, and asexuality, highlighting the importance of both qualitative and quantitative research. The limitations imposed by categorization and terminology within the English language raise concerns when classifying sexual and romantic attraction, identities, and behaviors which exist in a nonlinear continuum. Future investigations in this area should take caution when categorizing and always seek to employ terminology created and used by the members of the group in question, seeing the communities and people themselves as the primary creators and holders of knowledge.

Conclusions

This study is the first of its kind to directly compare romantic and aromantic asexual people on a variety of measures. We found that gender diversity is a prominent characteristic of the asexual community, and that a wide range of romantic orientations—including a lack of romantic attraction—are present among individuals who do not experience sexual attraction or desire. These findings have implications not only for societal perceptions of asexuality, but for research design. We suggest that future research in asexuality consider separating romantic from aromantic asexual individuals, particularly when investigating topics related to romantic attraction or relationships. We further suggest movement beyond the gender binary to encompass full identities when characterizing asexual populations, as well as to be inclusive of all non-binary participants. Through this, we hope to provide visibility and awareness of the diversity within asexuality to the academic community.

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Compliance with Ethical Standards

Conflict of interest All authors declare that they have no conflict of interest.

Ethical Approval 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.

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

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