Archives of Sexual Behavior (2020) 49:693–710
https://doi.org/10.1007/s10508-019-1403-z

ORIGINAL PAPER

A Structural Equation Model of Sexual Satisfaction and Relationship Functioning Among Sexual and Gender Minority Individuals Assigned Female at Birth in Diverse Relationships

Christina Dyar[1] · Michael E. Newcomb[1,2] · Brian Mustanski[1,2] · Sarah W. Whitton[3]

Received: 9 July 2018 / Revised: 7 January 2019 / Accepted: 16 January 2019 / Published online: 12 August 2019

Abstract

While there is a sizeable literature on sexual satisfaction among male–female mixed-sex couples, research examining other types of relationships (e.g., same-sex) is limited. The current study aimed to broaden our understanding of sexual satisfaction across the diverse relationships of sexual and gender minority individuals assigned female at birth (SGM-AFAB) and inform models of sexual satisfaction for this population. We examined: (1) differences in sexual satisfaction and characteristics of sexual activity (frequency of sex, frequency of orgasm, duration of sex) by relationship type (same-sex, mixed-sex, gender-diverse) among SGM-AFAB; (2) a model of sexual satisfaction and its correlates; and (3) differences in this model by relationship type. Results indicated cisgender women in relationships with cisgender women (same-sex) reported higher duration of sex, frequency of orgasm, and sexual satisfaction compared to cisgender women in relationships with cisgender men (mixed-sex). There were few differences in characteristics of sexual activity between SGM-AFAB in gender-diverse relationships (involving one or more gender minority partners) and those in same- or mixed-sex relationships. Results indicated similarities across relationship types in a model of sexual satisfaction and its correlates. For all relationship types, more frequent and longer duration of sexual activity predicted higher orgasm frequency, more frequent orgasm predicted higher sexual satisfaction, and higher sexual satisfaction predicted better relationship functioning. Only the association between orgasm frequency and sexual satisfaction varied by relationship type. As one of the first studies examining sexual satisfaction among SGM-AFAB in mixed-sex and gender-diverse relationships, findings substantially further our understanding of sexual satisfaction in this population.

Keywords Sexual minority · Gender minority · Sexual functioning · Sexual relationships · Sexual orientation

Introduction

Sexual satisfaction is an integral aspect of well-being that has been consistently linked with relationship satisfaction and mental health (e.g., Byers, 2005; Rosen & Bachmann, 2008). However, this literature has focused almost exclusively on heterosexual cisgender men and women (individuals whose sex assigned at birth and gender identity match) and their mixed-sex relationships (Armstrong & Reissing, 2013; Henderson, Lehavot, & Simoni, 2009). A small, but growing, literature has begun to explore sexual satisfaction in female same-sex relationships (see Armstrong & Reissing, 2013). However, sexual satisfaction in sexual minority cisgender women's mixed-sex relationships (i.e., relationships with cisgender men) and in sexual minority individuals' gender-diverse relationships (i.e., relationships that include one or more transgender or non-binary partners) remains largely unexplored.[1] While many assume that few sexual minority women have relationships

✉ Christina Dyar
dyar.christina@northwestern.edu

[1] Institute for Sexual and Gender Minority Health and Wellbeing, Northwestern University, 625 N. Michigan Ave. Suite 1400, Chicago, IL 60611, USA

[2] Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

[3] Department of Psychology, University of Cincinnati, Cincinnati, OH, USA

[1] For brevity, we use the following terminology: same-sex (i.e., cisgender women's relationships with cisgender women); mixed-sex (cisgender women's relationships with cisgender men); and gender-diverse (i.e., relationships that involve at least one gender minority partner).

with men, research suggests otherwise. Approximately 40% of sexual minority women identify with non-monosexual identity labels (i.e., labels that reflect attractions to more than one gender) such as bisexual (Pew Research Center, 2013), and moderate proportions of lesbian-identified women report having relationships with men (e.g., 24%; Diamond, 2000). Thus, relationships between sexual minority women and men are not rare. In addition, there are an estimated 1.4 million individuals who identify as transgender in the U.S. (Flores, Herman, Gates, & Brown, 2016) and nearly 10 million women who report having had a sexual or romantic relationship with another woman (Gates, 2011). The limited research on sexual satisfaction in these populations prevents the development of a comprehensive understanding of the sexual health, well-being, and relationships of a sizeable proportion of the U.S. population. This information is critical for the development of culturally sensitivity relationship interventions to help sexual and gender minority individuals establish healthy relationships in the face of societal stigmatization. To address this gap, the current study aims to examine characteristics of sexual activity, sexual satisfaction, and relationship functioning among a sample of sexual and gender minority individuals assigned female at birth (SGM-AFAB; i.e., cisgender women, transgender men, and non-binary/genderqueer individuals who were assigned female at birth).

Existing Research on Sexual Satisfaction Among Cisgender Sexual Minority Women

Much of the limited research on sexual satisfaction in female same-sex relationships has focused on comparing heterosexual women in mixed-sex relationships and sexual minority women in same-sex relationships (Blair & Pukall, 2014; Coleman, Hoon, & Hoon, 1983; Matthews, Tartaro, & Hughes, 2003; Sanchez, Moss-Racusin, Phelan, & Crocker, 2011). This research largely stemmed from Blumstein and Schwartz's (1983) findings that lesbian women in same-sex relationships reported less frequent sexual activity than heterosexual men and women in mixed-sex relationships and gay men in same-sex relationships. This single study led to the publication of a number of theoretical books and articles perpetuating stereotypes that sex is an unimportant component of female same-sex relationships and that sexual frequency decreases to non-existence over time in female same-sex relationships, referred to as "lesbian bed death" (e.g., Burch, 1982; Loulan, 1984; Nichols, 1995). However, research in the 30 years since Blumstein and Schwartz's article has largely contradicted this finding.

While some studies have found that heterosexual women in mixed-sex relationships report more frequent sex than women in same-sex relationships (Blair & Pukall, 2014; Sanchez et al., 2011), these studies have often used measures of frequency that do not define sex (Sanchez et al., 2011). This approach has been critiqued as the word "sex" is often assumed to refer to penetrative sex, which women in same-sex relationships may engage in less frequently than women in mixed-sex relationships (Iasenza, 2002; Nichols, 2004). Additionally, behavioral definitions of sex appear to differ based on the gender-composition of relationships, with behaviorally bisexual women defining "having sex" with men differently than they define "having sex" with women (Schick et al., 2016). Therefore, measures that do not define sex or use heterocentric definitions of sex (e.g., penile-vaginal penetration) may produce inaccurate estimates of sexual frequency for female same-sex relationships. Consistent with this assertion, studies using more inclusive definitions of sex (e.g., defining sex as including oral sex, manual stimulation, and/or penetration) have often found that women in same-sex relationships report similar or higher sexual frequencies compared to women in mixed-sex relationships (Cohen & Byers, 2014; Henderson et al., 2009; Matthews et al., 2003).

Further, researchers have argued that the frequency of sexual activity may not be as important to sexual well-being as other variables, like duration of sex, frequency of orgasm, and sexual satisfaction (Iasenza, 2002; Nichols, 2004). Longer duration of sexual encounters, which has been linked to more frequent orgasms for women (Nichols, 2004; Smith et al., 2012), may be a particularly important variable to consider in women's sexual satisfaction (Blair & Pukall, 2014; Nichols, 2004). Two studies indicate that sexual minority women in same-sex relationships report a substantially longer duration of sexual activity compared to heterosexual women in mixed-sex relationships (Blair & Pukall, 2014; Cohen & Byers, 2014).

Research on the frequency of orgasm has consistently found that women in same-sex relationships have orgasms during sex with their partners more frequently than women in mixed-sex relationships (Beaber & Werner, 2009; Blair, Cappell, & Pukall, 2018; Coleman et al., 1983; Henderson et al., 2009; Schick, Rosenberger, Herbenick, Calabrese, & Reece, 2012; Shindel et al., 2012). Women in same-sex relationships also experience multiple orgasms during a single sexual encounter more frequently than those in mixed-sex relationships (Blair et al., 2017). These differences have been attributed to the longer duration of sexual activity in female same-sex relationships and differences in the behaviors that comprise sex for women in same- and mixed-sex relationships (Blair et al., 2017; Garcia, Lloyd, Wallen, & Fisher, 2014). For example, women in same-sex relationships have reported more frequent engagement in activities that are more likely to result in orgasm for women (e.g., clitoral stimulation, oral sex) and more satisfaction with the orgasms they have as a result of these activities compared to women in mixed-sex relationships (Blair et al., 2017).

Despite consistently higher frequencies of orgasm reported by women in same-sex relationships, evidence for differences in sexual satisfaction is surprisingly mixed. Some studies find that women in same-sex relationships report higher sexual satisfaction compared to those in mixed-sex relationships (Coleman et al., 1983; Henderson et al., 2009; Holmberg, Blair,

& Phillips, 2010; Sanchez et al., 2011; Schick et al., 2012), but others find no differences (Beaber & Werner, 2009; Blair & Pukall, 2014; Kuyper & Vanwesenbeeck, 2011; Matthews et al., 2003). Speculation as to the reasons for these mixed findings is sparse; however, small sample sizes may have contributed to some of the non-significant findings (e.g., Beaber & Werner, 2009; Matthews et al., 2003).

Together, these comparisons between sexual minority women in same-sex relationships and heterosexual women in mixed-sex relationships have provided important information about sex in sexual minority women's same-sex relationships. However, because they confound sexual minority status (i.e., heterosexual, sexual minority) and relationship type (same-sex, mixed-sex), it is unclear whether observed differences are due to relationship type or sexual minority status. In contrast, focusing on sexual minority women and comparing those in same-sex relationships to those in mixed-sex relationships would remove sexual minority status as a confounding variable. Only two studies have utilized this approach. Both examined differences in orgasm frequency by partner gender among sexual minority women. They found that sexual minority women who had a recent female partner reported more frequent orgasm and less sexual dysfunction, whereas having a recent male partner was associated with less frequent orgasms and more sexual dysfunction (Schick et al., 2012; Shindel et al., 2012).

Correlates of Sexual Satisfaction

It is important to expand research on sexual activity and satisfaction beyond simple mean differences across sexual orientation. Examining correlates of sexual satisfaction among sexual minority women can inform the development of models of sexual satisfaction for sexual minority women. A few isolated studies have examined associations between sexual satisfaction and characteristics of sexual activity among sexual minority women in same-sex relationships. This research indicates that higher sexual satisfaction is predicted by higher frequency of orgasm, sexual frequency, and duration of sexual activity (Blair & Pukall, 2014; Henderson et al., 2009; Scott, Ritchie, Knopp, Rhoades, & Markman, 2018; Tracy & Junginger, 2007). A similar pattern of associations is present for heterosexual women in mixed-sex relationships (e.g., Byers, 2005; Christopher & Sprecher, 2000; Hendrick & Hendrick, 2004; McNulty, Wenner, & Fisher, 2016). Only one known study has statistically compared associations between characteristics of sexual activity and sexual satisfaction for sexual minority women in same-sex relationships versus heterosexual women in mixed-sex relationships. Henderson et al. (2009) found that a composite of orgasm frequency and sexual frequency predicted sexual satisfaction similarly for women in same-sex and mixed-sex relationships. No known research has examined whether associations between duration of sexual activity and sexual satisfaction are similar for women in same-sex versus mixed-sex relationships.

Similarly, limited research has examined the association between sexual satisfaction and relationship satisfaction among sexual minority women, or how it may differ by relationship type. Higher sexual satisfaction has been linked with higher relationship satisfaction among sexual minority women in same-sex relationships (Bridges & Horne, 2007; Henderson et al., 2009; Holmberg et al., 2010; Sanchez et al., 2011; Tracy & Junginger, 2007) and among heterosexual mixed-sex couples (e.g., Byers, 2005; Rosen & Bachmann, 2008). Of the three studies that have tested for potential differences in this association between sexual minority women in same-sex relationships and heterosexual women in mixed-sex relationships, two found no differences (Holmberg et al., 2010; Sanchez et al., 2011) and one found that it was marginally stronger among women in mixed-sex relationships (Henderson et al., 2009).

Overall, research examining associations among sexual satisfaction, characteristics of sexual activity, and relationship satisfaction is limited for sexual minority women in same-sex relationships and we are not aware of any research comparing same-sex to mixed-sex relationships in samples of sexual minority women. More research in this area is needed to inform models of sexual and relationship functioning among sexual minority women, which are critical for the development of interventions aimed at promoting the well-being of sexual minority women's relationships.

Sexual Satisfaction and Characteristics of Sexual Activity in Gender-Diverse Relationships

An additional gap in the literature is the lack of studies on sex in relationships that involve one or more gender minority partners (e.g., individuals who identify as transgender, non-binary, genderqueer, or with a gender that does not correspond to their sex assigned at birth), which are referred to as gender-diverse relationships. Due to the stigmatization of gender minorities, individuals in gender-diverse relationships experience unique stressors including discrimination and the devaluation of their romantic relationships (Hendricks & Testa, 2012). Researchers are just beginning to explore relationship functioning in gender-diverse relationships, but have already documented that experiences of transgender discrimination and relationship stigma are associated with poorer relationship functioning and mental health among transgender women and their cisgender male partners (e.g., Brown, 2010; Gamarel, Reisner, Laurenceau, Nemoto, & Operario, 2014; Reisner, Gamarel, Nemoto, & Operario, 2014a). Given that gender minorities are at high risk for a wide range of adverse health outcomes (Perez-Brumer, Day, Russell, & Hatzenbuehler, 2017; Reisner, White, Bradford, & Mimiaga, 2014b) and relationship functioning is predictive of health in heterosexual samples

(Kiecolt-Glaser, Gouin, & Hantsoo, 2010), it is important for research to identify factors that may promote relationship functioning in gender minority individuals' relationships, including sexual satisfaction (Kiecolt-Glaser et al., 2010).

The few studies on sexual satisfaction and characteristics of sexual activity among gender minority samples have primarily focused on sexual satisfaction following gender-affirmation treatment (e.g., hormones, top and/or bottom surgery; Costantino et al., 2013; Weyers et al., 2009; Wierckx et al., 2014). While this research is important for informing gender-affirmation treatment, not all transgender individuals desire these treatments (e.g., Kuper, Nussbaum, & Mustanski, 2012). Additionally, this research often excludes individuals who identify in non-binary ways (e.g., genderqueer, non-binary, fluid) or categorizes all transgender participants as either MTF or FTM (male to female or female to male) irrespective of how they self-identify. This is problematic as a sizeable proportion of individuals who fall under the transgender umbrella identify with non-binary gender identity labels (e.g., Harrison, Grant, & Herman, 2012; Kuper et al., 2012). No known research has examined sexual satisfaction and its correlates among SGM-AFAB in gender-diverse relationships. In order to further our understanding of factors that may promote better health and to broaden our understanding of sexual satisfaction and relationship functioning to be inclusive of SGM's diverse relationship types, research on sexual satisfaction and relationship functioning must expand to include gender-diverse relationships.

Current Study

In the current study, we aimed to extend the literature on sexual satisfaction among SGM by addressing methodological weaknesses and gaps in existing research. First, we examined mean differences in sexual satisfaction and characteristics of sexual activity (i.e., orgasm frequency, sexual frequency, and duration of sex) among female assigned at birth sexual and gender minorities (SGM-AFAB) in same-sex (cisgender women in relationships with cisgender women), mixed-sex (cisgender women in relationships with cisgender men), and gender-diverse relationships (relationships involving one or more transgender individuals). Based on existing research, we expected that women in same-sex relationships would report longer duration of sex, more frequent orgasms, and higher sexual satisfaction compared to women in mixed-sex relationships. Given mixed evidence, we did not make an a priori hypothesis about differences in the frequency of sex. Due to the lack of research on gender-diverse relationships, we did not make a priori hypotheses about whether individuals in gender-diverse relationships would differ from those in same- or mixed-sex relationships.

Second, we tested a model of associations among sexual satisfaction, characteristics of sex, and relationship functioning in the full sample. In this model, we hypothesized that higher frequency of sex, frequency of orgasm, and longer duration of sexual activity would be associated with higher sexual satisfaction. We also hypothesized that higher frequency and duration of sexual activity would be associated with more frequent orgasm and that higher sexual satisfaction would be associated with higher relationship satisfaction.

Third, we examined whether this model differed by relationship type (i.e., same-sex, mixed-sex, and gender-diverse relationships). Given limited evidence from existing research, we did not make a priori hypotheses about which associations would differ by relationship type. We also used indirect effects analyses to test whether characteristics of sexual activity were associated with relationship functioning through sexual satisfaction.

In the main analyses, we included all SGM-AFAB. However, in the current sample, all cisgender women in relationships with cisgender men reported attractions to more than one gender (e.g., men and women), and therefore, combining all SGM-AFAB may confound relationship type with attractions. To determine whether this affected results, we conducted sensitivity analyses in which all monosexual women (women with exclusive same-sex attractions) were excluded and analyses were repeated with only non-monosexual women (women with attractions to more than one gender). We hypothesized that the pattern of results for these sensitivity analyses would be similar to the pattern of results from the analyses conducted with the full sample.

Given the diversity of individuals included in the gender diversity relationship group (i.e., cisgender female participants in relationships with gender minority partners; gender minority participants in relationships with partners of any gender), we also conducted sensitivity analyses in which all cisgender female participants in relationships with gender minority partners were excluded from the gender diversity relationship group.

Method

Participants and Procedure

FAB 400 is an ongoing cohort study of 488 young sexual and gender minorities assigned female at birth (SGM-AFAB), focused on their health, development, and intimate relationships. FAB400 employs a merged cohort accelerated longitudinal design (Galbraith, Bowden, & Mander, 2017), and includes two cohorts: (1) a late adolescent cohort recruited for FAB400 in 2016–2017 ($N = 400$; 16–20 years old at baseline), and (2) a young adult cohort comprised of SGM-AFAB participants from Project Q2, a longitudinal study of SGM youth that began in 2007 ($N = 88$; 23–32 years old at the FAB400 baseline assessment; Mustanski, Garofalo, & Emerson, 2010). Inclusion criteria for FAB400 and Project

Q2 were identical, requiring participants to be 16–20 years old when they enrolled, speak English, and either identify with a sexual or gender minority label, report same-sex attractions, or report same-sex sexual behavior. To enroll in FAB400, participants were also required to be female-assigned at birth. Each cohort was recruited using an incentivized snowball sampling approach, in which participants were recruited directly from various venues (i.e., SGM community organizations, health fairs, high school/college groups) and online social media advertisements (45% of the sample), and then those enrolled participants could refer up to 5 peers to the study (55% of the sample). Participants were paid $10 for each peer they successfully recruited into the cohort.

In 2016–2017, all 488 participants completed the FAB400 baseline assessment. Participants were paid $50 for each assessment, which included a battery of self-report measures using computer-assisted self-interview. The study protocol was approved by the Institutional Review Board at Northwestern University with a waiver of parental permission for participants under 18 years of age under 45 CFR 46, 408(c). Participants provided written informed consent, and mechanisms to safeguard participant confidentiality were used (i.e., a federal certificate of confidentiality). For additional detail about the study design, see Whitton, Dyar, Newcomb, & Mustanski, 2019.

The current analyses used data from the baseline assessment. Participants were asked about the sexual and romantic relationships they had in the past 6 months, to answer questions about their 3 most recent partners, and to indicate which of these partners was most significant (i.e., "… the person that you spent the most time with, were most serious about, or who had the biggest effect on you."). Detailed measures of characteristics of sexual activity and sexual satisfaction were only assessed for the most significant partner to reduce participant burden, so the current analyses focus on participants' most significant relationship. For this study, we excluded participants who reported: not having had a relationship in the past 6 months at baseline ($n = 81$), not having had sex with their most significant sexual or romantic partner in the past 6 months ($n = 95$), or a one-time sexual encounter as their most significant relationship in the past 6 months ($n = 17$; because measures of relationship functioning, orgasm, duration of sex, and frequency of sexual activity were not assessed for these relationships). We also excluded one randomly selected partner from each of 16 couples who participated, to eliminate non-independence.

Table 1 includes descriptive information about the demographic makeup of the resulting analytic sample ($n = 279$). The largest proportion identified as bisexual, followed by lesbian/gay, pansexual, queer, and other sexual identity labels (e.g., unsure/questioning, straight/heterosexual). The majority were cisgender women (79.2%) and the remainder identified as transgender, male, genderqueer, gender non-conforming, non-binary, or with another gender identity. The analytic sample was racially/ethnically diverse, with 44.8% Black/African American, 19.0% White/Caucasian, and 24.0% Hispanic or Latino/a. Most participants were from the late adolescent cohort ($M = 18.78$ years, SD = 1.30), with 80 participants from the young adult cohort ($M = 27.31$ years, SD = 1.73). The majority of participants reported attractions to men and women (i.e., non-monosexual), and 65 reported being attracted exclusively to women (i.e., monosexual). Five participants reported no current sexual attractions to men or women and 1 transman reported exclusive attractions to men. These six individuals were excluded from analyses comparing individuals exclusively attractions to women to non-monosexual individuals. The most significant relationships reported by participants were approximately evenly distributed between same-sex (36.2%), mixed-sex (35.5%), and gender-diverse relationships (28.3%).

Table 1 Demographics of the analytic sample

Variable	*n*	%
Cohort		
Late adolescent	199	71.3
Young adult	80	28.7
Sexual identity		
Lesbian/gay	79	28.3
Bisexual	107	38.4
Pansexual	44	15.8
Queer	29	10.4
Other identity	20	7.2
Gender identity		
Cisgender women	221	79.2
Gender minority	58	20.8
Relationship type		
Same-sex	101	36.2
Mixed-sex	99	35.5
Gender-diverse	79	28.3
Relationship status		
Current	191	68.5
Past	88	31.5
Race/ethnicity		
Black/African American	125	44.8
White/Caucasian	53	19.0
Hispanic/Latinx	67	24.0
Other identity	34	12.2

Measures

Demographics

Sexual Identity To assess sexual identity, participants were asked, "Which of the following commonly used terms best

describes your sexual orientation?" with the options: gay, lesbian, bisexual, queer, unsure/questioning, straight/heterosexual, pansexual, asexual, and not listed (please specify).

Attractions were assessed by asking participants to indicate "the individuals to whom you are physically attracted": only males; mostly males, but some females; males and females equally; mostly females but some males; only females; and I'm not physically attracted to anyone. Participants who selected "only females" were categorized as monosexual and individuals who reported attractions to men and women were categorized as non-monosexual.

Participant Gender Identity To assess current gender identity, participants were asked, "What is your current gender identity?" with the options: male, female, transgender, gender non-conforming, genderqueer, non-binary, and not listed (please specify). Gender identity was used to assign participants to one of two groups: cisgender women (self-identified as female) and gender minorities (participants who identified with any other gender identity).

Partner Gender Identity and Sex Assigned at Birth Participants were asked to indicate their partner's sex assigned at birth (male or female) and to report their partner's gender identity (same options listed for participant gender identity). Sex assigned at birth and gender identity were used to categorize partners into one of three groups: cisgender women (assigned female at birth and identified as women), cisgender men (assigned male at birth and identified as men), and gender minority. Gender minorities included individuals who identified as transgender, genderqueer, non-binary, gender non-conforming, or another gender identity (e.g., gender fluid), and those who did not identify with the sex they were assigned at birth (e.g., assigned male at birth and identified as female).

Relationship Status Participants were asked whether the most significant romantic or sexual relationship they had in the past 6 months was ongoing or had ended (i.e., "Are you still in this relationship with [partner's name]?"; coded 0 = no; 1 = yes). The participant provided the partner's first name and last initial, which was piped in place of [partner name] in this and all measures described below. 68.5% of relationships were ongoing and 31.5% had ended. The tense used in the measures below depended on the status of the relationship, with items using the present tense presented to participants in current relationships and items using the past tense presented to participants in relationships that had ended.

Sexual Satisfaction, Functioning, and Orgasm Variables

Given that people vary in how they define sex, participants were provided with a broad and inclusive definition of sex prior to items about sexual activity: "By sex, we mean any intimate contact intended to create sexual pleasure, including but not limited to: oral sex, vaginal penetration (penis, finger, fist, dildo, vibrator, etc.), clitoral stimulation, humping (moving your body against [partner name]s, with or without clothes on, for sexual pleasure), anal sex, breast stimulation, BDSM play." Then, participants were asked whether they had ever had sex with their partner ("Have you had sex with [partner name]?").

Sexual frequency was assessed using the item "How frequently do/did you and [partner name] have sex?" on a scale of 0 to 30 days per month.

Duration of sexual activity was assessed with the two items, "How long does/did your average sexual encounter with [partner name] last?" and "How long did your last sexual encounter with [partner name] last?" These items were adapted from Blair and Pukall's (2014) measure of duration of sexual encounters, which used a 7-point Likert-type scale, by allowing participants to select any number of minutes.

Sexual satisfaction was assessed using three items adapted from Blair and Pukall (2014) and Laumann, Gagnon, Michael, and Michaels (2008): (1) physical satisfaction, "How physically pleasurable do you find your sexual encounters with [partner name] to be?" (2) emotional satisfaction, "How emotionally satisfying do you find your sexual encounters with [partner name] to be?" and 3) overall sexual satisfaction, "Overall, how satisfying is your sex life with [partner name]?" Each item had a response scale of 1 (*not at all*) to 5 (*extremely*).

Orgasm frequency was assessed using two items, one assessing frequency of orgasm ("How frequently do you orgasm during sex with [partner name]?") and the second assessing frequency of multiple orgasm ("How frequently do you orgasm more than once during sex with [partner name]?"). Responses were provided on a scale of 1 (*never*) to 7 (*always*). These items were adapted from a similar item used by Garcias et al. (2014) by asking about frequency of orgasm during sex with a specific partner rather than partners in general.

Relationship Functioning

Relationship quality was measured using the 7-item relationship quality subscale of the Relationship Assessment Scale (Vaughn & Matyastik Baier, 1999). Items are measured on a scale of 1 to 5, with anchors varying on the content of the item (e.g., "How well does [partner name] meet your needs?" 1 = *not satisfied* to 5 = *very satisfied*). Internal consistency for this scale was high ($\alpha = .86$).

Dedication was assessed using a 3-item measure (Johnson et al., 2002; Stanley & Markman, 1992). An example item is, "My relationship with [partner name] is more important to me than almost anything in my life," and the response scale ranges from 1 (*strongly disagree*) to 7 (*strongly agree*). This scale demonstrated adequate internal consistency in the current sample ($\alpha = .73$).

Social support from partner was assessed using an abbreviated 4-item version of the Source-Specific Social Provisions Scale (Cutrona, 1989). Items assess the extent to which one's

relationship partner is a source of social support (e.g., "I have a close relationship with [partner name] that provides me a sense of emotional security and well-being"; 1 = *strongly disagree* to 4 = *strongly agree*). This scale demonstrated high internal consistency ($\alpha = .95$).

Analytic Plan

Analyses were conducted in Mplus Version 7 using robust maximum likelihood estimation. 1.3% of data was missing and was handled using full information maximum likelihood.

Testing for Non-independence Due to Incentivized Peer Recruitment

Because participants within a given recruitment chain are potentially more similar to each other than to other participants, we calculated design effects for all variables included in the current analyses to determine if it was necessary to account for clustering due to recruitment chain. The design effect quantifies the extent to which the sampling error deviates from what would be expected if individuals were randomly assigned to clusters. All design effects were below the recommended cutoff of 2.0 (Muthen & Satorra, 1995), indicating that the small amount of non-independence present due to recruitment chain would have a negligible effect on the Type I error rate if clustering is not taken into account in analyses. Given this result, it was not necessary to use multilevel modeling to account for clustering due to recruitment chain.

Testing Mean Differences by Relationship Type

We first used linear regression to test for mean differences in characteristics of sexual activity and sexual satisfaction by relationship type (same-sex [reference group], mixed-sex, or gender-diverse). Mean differences between mixed-sex and gender-diverse relationship groups were calculated using a planned contrast.

Building the Structural Equation Model to Test Hypotheses about Associations

Prior to testing subsequent hypotheses, we utilized an exploratory factor analysis (EFA) with geomin rotation to determine the most appropriate way to model characteristics of sexual activity and sexual satisfaction in the subsequent structural equation model. The number of factors to extract was determined by a parallel analysis test with 5000 samples (see Horn, 1965; Wood, Akloubou Gnonhosou, & Bowling, 2015), examination of model fit, and factor interpretability. The comparative fit index (CFI), Tucker–Lewis index (TLI), and root-mean-squared error of approximation (RMSEA) were used to evaluate model fit, with good model fit indicated by CFI and TLI values $\geq .95$ and RMSEA values $< .08$ (Browne & Cudeck, 1993; Hu & Bentler, 1999). Chi-square goodness-of-fit values are reported, but this test is overpowered in moderately sized samples, and thereby, likely to reject even good-fitting models.

After determining how to model sexual satisfaction and characteristics of sex, we created the structural equation model we would use to test hypotheses about associations among characteristics of sex, sexual satisfaction, and relationship functioning. We added relationship functioning (indicated by relationship quality, dedication, and commitment) to the model of sexual satisfaction and characteristics of sex. We did not conduct an EFA of relationship functioning because it was only comprised of three variables, too few for an EFA.

Testing Differences in the Model by Relationship Type

Next, we tested whether associations among characteristics of sex, sexual satisfaction, and relationship functioning differed across relationship types. This was accomplished by testing the structural invariance of associations. Before we could do so, it was necessary to determine if all lower levels of invariance were present, including measurement invariance (factor loadings, intercepts, and residual variances) and structural invariance for factor means and variances. Measurement and structural invariance were tested by constraining subsequent sets of parameters across groups and testing the change in model fit between the more constrained (more parameters set to equality across groups) and less constrained models (fewer parameters set to equality across groups; e.g., Kline, 2015).

Models were compared using change in AIC (Akaike Information Criterion), BIC (Bayesian Information Criterion), CFI, RMSEA, and the Satorra–Bentler chi-squared difference test. Lower AIC and BIC values indicate a better fitting model, with a 10 point difference indicating a strong preference for the model with the lower AIC or BIC, a 6-point difference indicating a moderate preference, and a 2-point difference indicating a slight preference. (Raftery, 1995). A non-significant Satorra-Bentler chi-squared difference test indicates a preference for the less constrained model (Satorra & Bentler, 2010) and a decrease in the CFI of more than .01 or an increase in RMSEA of more than .015 from the less constrained to the more constrained model indicates a preference for the less constrained model (Chen, 2007; Cheung & Rensvold, 2002).

As examining structural invariance was the primary aim of invariance testing, factor variances, factor means, and correlations continued to be released during structural invariance testing until no modification indices were significant. In the final model, indirect effects between characteristics of

sexual activity and relationship functioning were examined using the bootstrap approach, with 5000 resamples (MacKinnon, Lockwood, & Williams, 2004). As bootstrapping is not available with robust maximum likelihood, indirect effects were tested using maximum likelihood estimation, which produced nearly identical parameters.

Sensitivity Analyses

We also conducted two sets of sensitivity analyses. The first set of analyses tested whether results were affected by partially confounding non-monosexuality and mixed-sex relationships. We conducted linear regressions to determine whether there were mean differences between monosexual ($n = 46$) and non-monosexual ($n = 54$) women in same-sex relationships on any sexual satisfaction or characteristics of sexual activity variables. We also examined measurement and structural invariance in the subsample of non-monosexual women ($n = 208$), to determine whether the same pattern of results emerged for the full sample and non-monosexual only subsample. The second set of sensitivity analyses tested whether combining cisgender female participants in relationships with gender minority participants and gender minority participants in relationships with partners of any gender affected results. We conducted linear regressions to determine whether there were mean differences between cisgender female participants in gender-diverse relationships and gender minority participants in gender-diverse relationships. As power for the mean difference sensitivity analyses was relatively low, we focused on effect sizes rather than significance for these analyses. We also examined measurement and structural invariance with cisgender female participants in gender-diverse relationships ($n = 21$) excluded from analyses to determine whether the same pattern of findings held when only gender minority participants ($n = 58$) were included in the gender-diverse relationships group.

Results

Means, SDs, and bivariate correlations are presented in Table 2. As age was significantly correlated with orgasm frequency and relationship status (ongoing versus ended) and relationship length were correlated with sexual satisfaction and orgasm frequency, we controlled for these three variables in subsequent analyses.

Mean Differences in Sexual Satisfaction, Functioning, and Orgasm

First, we examined whether there were differences in frequency of sexual activity, duration of sex, sexual satisfaction, or orgasm frequency by relationship type (same-sex, mixed-sex, or gender-diverse; with same-sex serving as the reference group). Results and group means are reported in Table 3. Groups did not differ on frequency of sex, but participants in same-sex relationships reported that sex with their partners lasted, on average, 14.28 min longer than participants in mixed-sex relationships. Group differences in orgasm frequency also emerged, with participants in same-sex relationships reporting a higher frequency of orgasm compared to those in mixed-sex and gender-diverse relationships and a higher frequency of multiple orgasms compared to those in gender-diverse relationships. Participants in same-sex relationships also reported higher emotional, physical, and overall sexual satisfaction than participants in both mixed-sex and gender-diverse relationships.

To determine whether the combination of monosexual (women with exclusive same-sex attractions) and non-monosexual women (women with attractions to more than one gender) in same-sex relationships into a single group (cisgender women in relationships with cisgender women) was appropriate, we conducted a series of linear regressions among the subsample of individuals in same-sex relationships. Results indicated that monosexual and non-monosexual women in same-sex relationships did not differ significantly on duration of sex, frequency of sex, frequency of orgasm, or sexual satisfaction—suggesting that the combination of these two groups was acceptable in analyses examining mean differences in characteristics of sexual activity and sexual satisfaction.

To determine whether there were differences in characteristics of sexual activity and sexual satisfaction among gender-diverse relationships based on the gender of the participant (cisgender woman versus gender minority), we conducted linear regressions among the subsample of individuals in gender-diverse relationships. Results indicated that cisgender women and gender minority individuals in gender-diverse relationships did not differ significantly on duration of sex, frequency of sex, frequency of orgasm, or sexual satisfaction. These analyses were somewhat underpowered (power = .50 to detect a medium effect $d = .50$); however, the largest observed effect size was $d = .20$, suggesting that these two groups did not differ meaningfully on these variables.

Measurement Model of Sexual Satisfaction and Characteristics of Sex

The EFA and measurement model described in this section do not test hypotheses, but were conducted to inform the way in which sexual satisfaction and characteristics of sexual activity were modeled in the subsequent SEM. Hypotheses are tested using the final SEM described in the next section.

EFA analyses indicated that frequency of sexual activity did not load well on any factor in one-, two-, or three-factor models, so we removed frequency of sexual activity from the EFA and treated it as an observed variable in subsequent

Table 2 Correlations, means, and standard deviations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	–															
2. Relationship status	.10	–														
3. Relationship length (months)	.47**	.03	–													
4. Mixed-sex relationship	−.09	.05	−.01	–												
5. Gender-diverse relationship	−.16*	−.01	−.09	−.46**	–											
6. Sexual frequency	.18*	.05	.08	−.01	.10	–										
7. Sexual duration—last	.07	−.01	−.14*	−.04	.04	−.01	–									
8. Sexual duration—average	.06	−.06	−.10	.001	.06	.07	.70**									
9. Frequency of orgasm	.25**	.17*	−.19*	−.12	.14*	.23**	.19*	.16*	–							
10. Frequency of multiple orgasm	.23**	.18*	−.11	−.14*	.12*	.22**	.19*	19*	.75**	–						
11. Physical satisfaction	.06	.16*	−.17*	−.23**	.12*	.16*	.16*	.16*	.58**	.50**	–					
12. Emotional satisfaction	−.01	.18*	−.20*	−.12	.10	.14*	.02	.04	.40**	.37**	.63**	–				
13. Overall sexual satisfaction	.05	.10	−.16*	−.19*	.06	.24**	.13*	.12*	.51**	.51**	.80**	.69**	–			
14. Relationship satisfaction	.03	.22**	−.09	−.04	.21**	.15*	.07	.06	.33**	.24**	.40**	.47**	.45**	–		
15. Dedication	.15*	.31**	−.04	.02	.27**	.16*	.05	.11	.27**	.20*	.39**	.42**	.34**	.50**	–	
16. Social support from partner	.02	.28**	−.08	−.05	.12*	.11	.02	−.02	.26**	.16*	.27**	.37**	.23**	.58**	.42**	–
M	21.23	–	20.59	–	–	9.35	53.57	57.84	4.78	3.76	4.25	4.15	4.13	3.52	5.10	3.37
SD	4.12	–	24.27	–	–	7.87	47.22	49.84	1.97	2.14	.91	1.09	1.03	.49	1.51	.82
Range	16–32	–	.2–133.8	–	–	1–30	2–300	0–350	1–7	1–7	1–5	1–5	1–5	1–5	1–7	1–4

Cohort (0 = adolescent; 1 = young adult); relationship status (0 = past; 1 = current); Relationship type (same-sex, mixed-sex, gender-diverse; dummy coded with same-sex as reference group)

*$p < .05$; **$p < .001$

Table 3 Mean differences by relationship type

Dependent variable	Group mean (SE)		
	Same-sex	Mixed-sex	Gender-diverse
Sexual frequency	8.53 (.73)[a]	10.57 (.81)[a]	8.87 (.87)[a]
Sexual duration—last	62.88 (4.92)[a]	44.29 (4.45)[b]	53.34 (5.44)[a,b]
Sexual duration—average	63.57 (4.56)[a]	49.29 (5.25)[b]	61.34 (5.80)[a,b]
Frequency of orgasm	5.22 (.17)[a]	4.45 (.19)[b]	4.61 (.22)[b]
Frequency of multiple orgasm	4.14 (.20)[a]	3.67 (.21)[a,b]	3.38 (.23)[b]
Physical satisfaction	4.54 (.07)[a]	4.17 (.09)[b]	3.99 (.11)[b]
Emotional satisfaction	4.42 (.09)[a]	3.96 (.11)[b]	4.02 (.13)[b]
Overall sexual satisfaction	4.40 (.09)[a]	4.04 (.11)[b]	3.92 (.12)[b]

Marginal means calculated holding age, relationship status, and relationship length at their means. Marginal means that differ significantly from one another are denoted by different superscript letters and those that do not differ significantly from one another share the same superscript letter

structural equation models. Using the seven remaining items (frequency of orgasm, frequency of multiple orgasm, duration of last sex, average duration of sex, and emotional, physical, and overall sexual satisfaction), we conducted a second EFA, examining one-, two-, and three-factor solutions. The first three eigenvalues were 3.42, 1.63, and .85 and explained 48.9%, 23.3%, and 12.1% of the variance in the 7 items. A parallel analysis conducted using 5000 random samples produced the following first three 95th percentile eigenvalues: 1.31, 1.19, and 1.11, which suggested a two-factor solution. However, the two-factor solution did not fit the data well ($\chi^2[8] = 136.75$, $p < .001$; RMSEA = .24, CFI = .81, TLI = .51). The three-factor solution, which fit the data well ($\chi^2[3] = 1.90$, $p = .59$; RMSEA < .001, CFI = 1.00, TLI = 1.01), produced an orgasm latent variable with high standardized factor loadings (> .80) for frequency of orgasm and multiple orgasm, a duration latent variable with high standardized factor loadings (> .80) for duration of last sex and average duration of sex, and a sexual satisfaction latent variable with high factor loadings (> .75) for the three sexual satisfaction items. Therefore, we selected the three-factor model.

Sexual Satisfaction, Characteristics of Sexual Activity, Orgasm, and Relationship Functioning

To test hypotheses about the associations among sexual satisfaction, characteristics of sexual activity and relationship functioning, we created the final structural equation model. This final model (see Fig. 1) included four latent variables: orgasm (indicated by frequency of orgasm and multiple orgasm), sexual satisfaction (indicated by emotional, physical, and overall sexual satisfaction items), duration (indicated by duration of last sex and average duration of sex), and relationship functioning (indicated by relationship quality, dedication, and social support from partner) and a single observed variable (frequency). Duration and frequency were allowed to correlate and the following regression paths were included: orgasm, sexual satisfaction, and relationship functioning on duration and frequency; sexual satisfaction and relationship functioning on orgasm, and relationship functioning on sexual satisfaction. This model fit the data well ($\chi^2[35] = 84.77$, $p < .001$; RMSEA = .07, CFI = .95, TLI = .93; see Fig. 1).

Consistent with hypotheses, more frequent and longer duration of sexual activity predicted more frequent orgasm, which in turn predicted higher sexual satisfaction. Higher sexual satisfaction predicted higher relationship functioning. Contrary to hypotheses, duration of sexual activity was not associated with sexual satisfaction or relationship functioning and frequency of sexual activity did not directly predict sexual satisfaction.

Invariance Testing

Before we were able to test hypotheses about differences in associations among sexual satisfaction, characteristics of sexual activity, orgasm, and relationship functioning by relationship type, we first needed to determine whether other aspects of the model (e.g., factor loadings, variable means) were similar across relationship types by testing for measurement invariance. Measurement invariance must be present to allow for the examination differences in associations by relationship type. Invariance testing indicated measurement invariance across relationship types, with factor loadings, intercepts, and residual variances equal across relationship types (see Table 3 for model fit indices and model numbers and Table 4 for invariance testing results). Models 1–4 in Table 3 are used to test for measurement invariance and comparisons of model fit indices among these models are presented in Table 4.

As measurement invariance was present, we examined structural invariance next. Consistent with the results of linear regressions, factor means differed across groups (see comparisons of Model 5 with Models 6–6c in Table 4), with

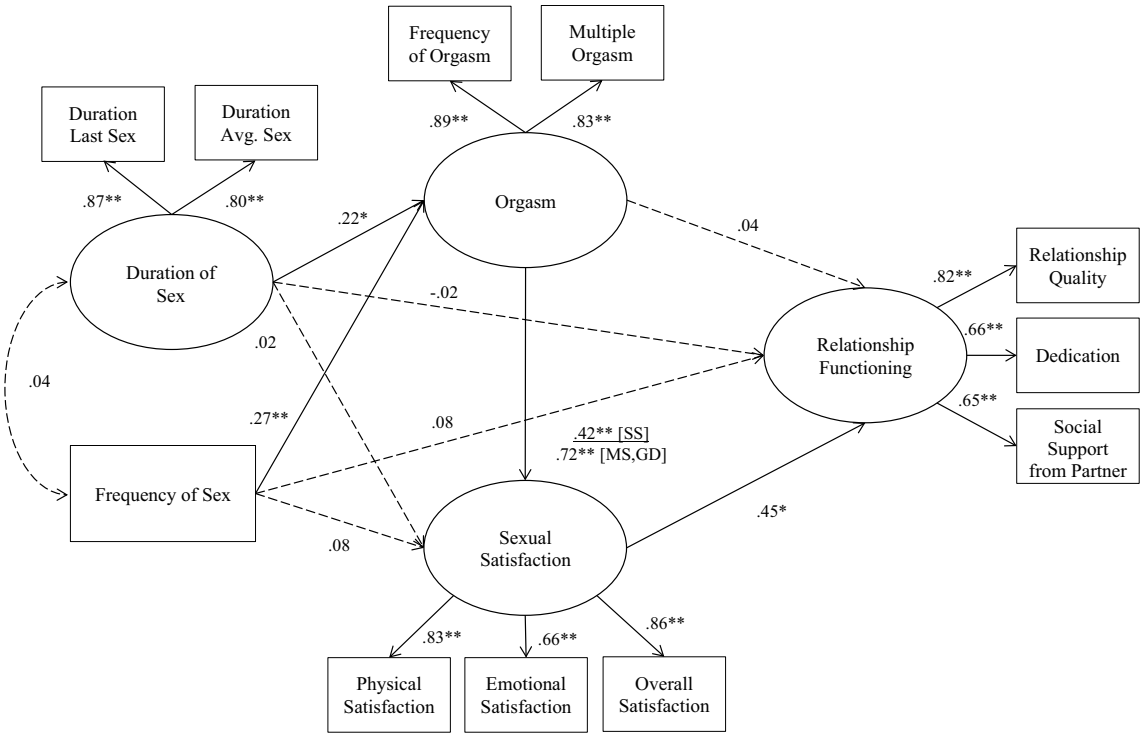

Fig. 1 Final model of associations among duration and frequency of sex, orgasm, sexual satisfaction, and relationship satisfaction. All path coefficients depicted are invariant across relationship types (same-sex [SS], mixed-sex [MS], and gender-diverse [GD]), except for association between orgasm and sexual satisfaction. For this path, associations are presented by relationship type. Lines with two arrowheads represent correlations and lines with one arrowhead represent factor loadings or regression paths. Dashed lines represent non-significant effects. *$p < .05$; **$p < .001$

Table 4 Invariance testing: model parameters

Model #	Invariance type	Additional parameter constrained [released]	AIC	BIC	RMSEA	CFI	TLI
1	Configural	None	8817.71	9275.25	.102	.918	.871
2	Metric	Factor loadings	8805.05	9219.01	.099	.913	.878
3	Scalar	Intercepts/means	8794.64	9157.77	.091	.917	.895
4	Residual	Residual variances/variances	8799.07	9082.30	.092	.901	.893
5	Factor variance	Factor variances	8791.16	9045.35	.076	.929	.927
6	Factor means	Factor means	8794.73	9019.87	.079	.921	.923
6a		[Mean of sexual satisfaction for same-sex]	8791.77	9020.54	.077	.923	.925
6b		[Mean of duration for mixed-sex]	8787.28	9019.68	.075	.929	.929
6c		[Mean of orgasm for same-sex]	8784.45	9020.48	.074	.931	.931
7	Correlations/regressions	Correlations/regressions	8773.04	8936.44	.073	.925	.934
7a		[Regression of sexual satisfaction on orgasm for same-sex]	8761.22	8928.26	.068	.935	.942

Models were compared using change in AIC, BIC, CFI, RMSEA, and the Satorra-Bentler chi-squared difference test. AIC, BIC, CFI, TLI, and RMSEA values are presented for each model. Comparisons between models are presented in Table 5

individuals in same-sex relationships reporting higher sexual satisfaction ($b = .43$, SE = .18, $z = 2.43$, $p = .01$) and more frequent orgasm ($b = .44$, SE = .13, $z = 3.28$, $p = .001$) compared to individuals in mixed-sex or gender-diverse relationships. Individuals in mixed-sex relationships also reported shorter duration of sexual activity compared to individuals in same-sex and gender-diverse relationships ($b = -.36$, SE = .13, $z = 2.77$, $p = .01$). Means on sexual satisfaction and orgasm did not differ for individuals in mixed-sex versus gender-diverse relationships and means on duration of sexual activity

Table 5 Invariance testing: model comparisons

Less constrained model	More constrained model	Additional parameter constrained [released]	MI for released path	ΔAIC	ΔBIC	ΔRMSEA	ΔCFI	Satorra–Bentler chi-square difference test
1	2	**Factor loadings**		−12.66[a]	−56.24[a]	−.003[a]	−.005[a]	$\chi^2(12) = 15.78$, $p = .20$[a]
2	3	**Intercepts/means**		−10.41[a]	−61.24[a]	−.008[a]	.004[a]	$\chi^2(14) = 14.06$, $p = .45$[a]
3	4	**Residual variances/ variances**		4.43[b]	−75.47[a]	.001[a]	−.016[b]	$\chi^2(22) = 109.18$, $p < .001$[b]
4	5	**Factor variances**		−7.91[a]	−36.95[a]	−.016[a]	.028[a]	$\chi^2(8) = 2.16$, $p = .98$[a]
5	6	*Factor means*		3.57[b]	−25.48[a]	.003[a]	−.008[a]	$\chi^2(8) = 18.74$, $p = .02$[b]
5	6a	[Mean of sexual satisfaction for same-sex]	$\chi^2(1) = 4.55$, $p < .05$	.61	−24.81[a]	.001[a]	−.006[a]	$\chi^2(7) = 14.39$, $p = .04$[b]
5	6b	[Mean of duration for mixed-sex]	$\chi^2(1) = 5.46$, $p < .05$	−3.88[a]	−25.67[a]	−.001[a]	<.001[a]	$\chi^2(6) = 6.96$, $p = .32$[a]
5	6c	[Mean of orgasm for same-sex]	$\chi^2(1) = 3.98$, $p < .05$	−6.71[a]	−24.87[a]	−.002[a]	.002[a]	$\chi^2(5) = 2.95$, $p = .71$[a]
6c	7	*Correlations/regressions*		−11.41[a]	−84.04[a]	−.001[a]	−.006[a]	$\chi^2(20) = 27.05$, $p = .13$[a]
6c	7a	[Regression of sexual satisfaction on orgasm for same-sex]	$\chi^2(1) = 10.97$, $p < .05$	−23.23[a]	−92.22[a]	−.006[a]	.004[a]	$\chi^2(19) = 14.58$, $p = .75$[a]

In each model with a higher number (e.g., 2), one additional set of parameters is constrained (e.g., factor loadings) and this more constrained model (e.g., model 2) is compared to the model in which this parameter is not constrained (e.g., model 1). When fit indices indicate that the additional constraint reduces model fit substantially (e.g., model 6), one constrained parameter is released at a time until model fit is no longer worse for the more constrained model than the less constrained model (or until no modification indices are significant). Bold indicates invariance across the additional constrained parameter. Italics indicate partial invariance

[a]Indicates preference for more constrained model (i.e., invariance across additional constrained parameter)

[b]Indicates preference for less constrained parameter (i.e., non-invariance across additional constrained parameter)

did not differ for individuals in same-sex versus gender-diverse relationships. Groups did not differ on relationship functioning.

Finally, one path coefficient differed across groups (see comparisons between Model 6c and Models 7–7a). The association between orgasm and sexual satisfaction was weaker for individuals in same-sex relationships ($\beta = .42$, $p < .001$) compared to those in mixed-sex or gender-diverse relationships ($\beta = .72$, $p < .001$; $\chi^2[1] = 10.97$, $p < .001$), but did not differ for mixed-sex compared to gender-diverse relationships.

Next, we tested the indirect effects of frequency and duration of sexual activity on relationship functioning through frequency of orgasm and sexual satisfaction. Results indicated that the indirect effect of frequency of sexual activity on relationship functioning was significant for individuals in mixed-sex and gender-diverse relationships (effect = .02, SE = .01, 95% CI .01, .03) and those in same-sex relationships (effect = .007, SE = .004, 95% CI .002, .02). Additionally, the indirect effect of duration of sexual activity on relationship functioning was significant for individuals in mixed-sex and gender-diverse relationships (effect = .11, SE = .06, 95% CI .01, .29) as well as those in same-sex relationships (effect = .05, SE = .03, 95% CI .004, .12). We did not test other indirect effects as these were the only indirect effects in which all paths were significant.

Sensitivity Analyses

Next, we re-examined measurement and structural invariance across relationship types among the non-monosexual subsample (excluding monosexual individuals). Although the group size for same-sex relationships was somewhat small for invariance testing ($n = 46$), these analyses demonstrated the same pattern of results as the invariance tests conducted in the full sample. This indicates that partially confounding sexual attractions and relationship type did not affect the pattern of results. To determine whether findings for the gender-diverse group were affected by including cisgender female participants in gender-diverse relationships, we re-examined measurement and structural invariance across relationship type, excluding cisgender female participants in gender-diverse relationships ($n = 21$). Although the group size for gender-diverse relationships was somewhat small for invariance testing ($n = 58$), these tests demonstrated the same pattern of results as the invariance tests which included the full gender-diverse relationship group, suggesting that including cisgender female participants in gender-diverse relationships did not affect results.

Discussion

The current study extended the literature on sexual satisfaction among SGM-AFAB by examining their diverse relationships, including same-sex, mixed-sex, and gender-diverse relationships. To our knowledge, this was the first study to examine whether the associations between sexual satisfaction, characteristics of sexual activity, and relationship functioning differed by relationship type among SGM-AFAB. Consistent with hypotheses, findings indicated that sexual minority women in same-sex relationships had higher sexual satisfaction and more frequent orgasms, and longer sexual duration compared to sexual minority women in mixed-sex relationships. Participants in gender-diverse relationships appeared more similar to sexual minority women in mixed-sex relationships than to those in same-sex relationships. Also consistent with hypotheses, more frequent and longer duration of sexual activity predicted more frequent orgasms, which in turn predicted higher sexual satisfaction. Higher sexual satisfaction predicted better relationship functioning. Most of these associations were similar across relationship types; however, relationship type moderated the association between frequency of orgasm and sexual satisfaction, with this association being weaker among SGM-AFAB in same-sex relationships than among those in mixed-sex and gender-diverse relationships.

Group Differences in Levels of Characteristics of Sexual Activity and Sexual Satisfaction

The first substantive finding was that there were no differences in frequency of sexual activity by relationship type; SGM-AFAB in same-sex, mixed-sex, and gender-diverse relationships reported having sex at similar frequencies. As such, the current study adds to accumulating evidence that female same-sex couples engage in sex as often as mixed-sex couples (Cohen & Byers, 2014; Henderson et al., 2009), contradicting outdated notions of "lesbian bed death" (Blumstein & Schwartz, 1983). The current study also extends research on frequency of sexual activity to include individuals in gender-diverse relationships, who engage in sex as frequently as same- and mixed-sex couples. It is important to note that we explicitly defined sex as inclusive of a wide range of sexual activities, an approach shared by other studies that have not found differences in the frequency of sexual activity (Cohen & Byers, 2014; Henderson et al., 2009). In contrast, some studies that have found evidence of differences in the reported frequency of sexual activity between women in same-sex and mixed-sex relationships have not defined sex (Sanchez et al., 2011). This pattern suggests that if sex is not inclusively defined, participants may assume that it refers to penetrative sex, leading to lower reported frequency for women in same-sex relationships (e.g., Iasenza, 2002; Nichols, 2004). Consequently, future research on sex—especially among sexual minority samples—would benefit from defining sex and using an inclusive and comprehensive definition to accurately measure sexual frequency.

We also found that women in same-sex relationships reported longer duration of sex, more frequent orgasm, and higher sexual satisfaction compared to women in mixed-sex relationships, consistent with a growing body of research (Blair et al., 2017; Henderson et al., 2009; Schick et al., 2012; Shindel et al., 2012). This study is the first to demonstrate that these differences are present among sexual minority women in same- versus mixed-sex relationships, as opposed to comparing sexual minority women with heterosexual women. This indicates that these differences are not an artifact of confounding sexual minority status and partner gender, but rather, appear to be due to relationship type (same-sex vs. mixed-sex). Additionally, sensitivity analyses examining differences by relationship type among the non-monosexual subsample demonstrated the same pattern differences in duration of sex, frequency of orgasm, and sexual satisfaction by relationship type, indicating that these differences do not reflect differences between monosexual and non-monosexual sexual minority women. Of note, we were not adequately powered to examine whether this pattern of results was consistent across specific sexual orientation identities (e.g., lesbian, bisexual, pansexual). Future research should examine whether these associations differ by sexual identity.

Because duration of sex, frequency of orgasm, and sexual satisfaction are positively associated with one another (Blair & Pukall, 2014; Henderson et al., 2009; Nichols, 2004), some researchers have suggested that differences in frequency of orgasm may be explained by the longer duration of sexual activity reported by women in same-sex versus mixed-sex relationships (Garcia et al., 2014; Nichols, 2004). However, differences in the frequency of orgasm persisted when duration of sexual activity was accounted for in the current study, suggesting that additional factors may also play a role. Women in same-sex relationships may report more frequent orgasms because they engage in activities with a higher likelihood of resulting in orgasm for women (e.g., clitoral stimulation and oral sex) more frequently than do women in mixed-sex relationships (Blair et al., 2017). Future research is needed to test this hypothesis, because we did not assess frequency of specific sexual activities in this study. Differences in associations between sexual satisfaction and other variables may also explain the higher rates of sexual satisfaction found among women in same-sex relationships. For example, because sexual intimacy (feelings of emotional closeness and safety within the

context of sexual encounters with partner) is more strongly associated with sexual satisfaction among women in same-sex compared to mixed-sex relationships (Birnie-Porter & Lydon, 2013), similar levels of sexual intimacy would contribute more to sexual satisfaction for women in same-sex relationships than among those in mixed-sex relationships.

By including individuals in gender-diverse relationships, we have extended this research to be inclusive of gender minority individuals and their relationships. Of note, participants in gender-diverse-relationships appeared very similar to cisgender women in mixed-sex relationships—particularly in frequency of orgasm and sexual satisfaction. They did not differ from either group on sexual duration. We were adequately powered to detect small to moderate ($r = .15$; power $> .80$) differences between individuals in gender-diverse relationships and individuals in same- or mixed-sex relationships, so the observed similarities were not due to insufficient power to detect true effects. However, to have adequate power, we combined cisgender female participants in relationships with gender minority partners and gender minority participants in relationships with partners of any gender. It is likely that the experiences of subgroups of individuals in gender-diverse relationships are distinct and combining these subgroups may obscure differences among them. Although sensitivity analyses indicated that cisgender women in relationships with gender minority partners did not differ from gender minority participants in relationships with partners of any gender, we were unable to examine other specific patterns of gender-diverse relationships (e.g., transgender men in relationships with cisgender women; non-binary individuals in relationships with cisgender men; etc.). Further research with larger samples of individuals in gender-diverse relationships is necessary to explore potential differences in the experiences of individuals in different types of gender-diverse relationships. These findings add to a small but growing literature examining gender minority individuals' romantic and sexual relationships (Gamarel et al., 2014; Reisner et al., 2014a). More research is needed to develop a literature that is inclusive of their relationships and experiences. The current study did not examine gender minority-specific factors that may be associated with sexual satisfaction and relationship functioning, such as experiences of transnegativity, couple marginalization, aspects of social and/or physical transition, and levels of dysphoria. This is an important area for future research.

Associations Among Characteristics of Sex, Sexual Satisfaction, and Relationship Functioning

Consistent with hypotheses, results indicate that more frequent and longer duration of sexual activity predicted more frequent orgasm; more frequent orgasm predicted higher sexual satisfaction; and higher sexual satisfaction predicted better relationship functioning. These findings are consistent with the results of other studies examining similar associations among sexual minority women in same-sex relationships and heterosexual women in mixed-sex relationships (Blair & Pukall, 2014; Henderson et al., 2009; Scott et al., 2017; Tracy & Junginger, 2007). While direct associations between longer duration and frequency of sexual activity and higher sexual satisfaction were not present in the context of the model, duration and frequency of sexual activity were both indirectly associated with sexual satisfaction through frequency of orgasm. This indicates that longer duration and higher frequency of sexual activity are associated with higher frequency of orgasm, which in turn is associated with higher sexual satisfaction.

Group Differences in Associations

Overall, there were few differences in these associations by relationship type. This is consistent with the results of Henderson et al. (2009) and Holmberg et al. (2010) who also found similarities across models of sexual satisfaction for women in same-sex and mixed-sex relationships. Specifically, only the association between frequency of orgasm and sexual satisfaction differed by relationship type, with this association being weaker among SGM-AFAB in same-sex relationships compared to those in mixed-sex or gender-diverse relationships. This suggests that while frequency of orgasm is associated with higher sexual satisfaction in both groups, frequency of orgasm may be less strongly associated with sexual satisfaction for women in same-sex relationships. There are several reasons as to why might this be. One possibility is that sex is less important to women in same-sex relationships (i.e., "lesbian bed death"). However, given similar frequency of sex, longer duration, more frequent orgasm, and higher satisfaction among women in same-sex relationships compared to women in mixed-sex relationships, this explanation is untenable. Instead, it is plausible that the higher orgasm frequency and sexual satisfaction reported by women in same-sex relationships may have caused a ceiling effect, attenuating this association for this group. The data support this potential explanation as more individuals in same-sex relationships had the highest possible scores on sexual satisfaction and orgasm frequency compared to individuals in mixed-sex and gender-diverse relationships and there was less variance on these variables in the same-sex relationship group compared to the mixed-sex and gender-diverse groups. Further research is needed to determine why this effect differs by relationship type.

Although only sexual satisfaction was directly associated with relationship functioning in the context of the model, frequency and duration of sexual activity were associated indirectly with relationship functioning through frequency of orgasm and sexual satisfaction for all relationship types.

This indicates that characteristics of sexual activity may be associated with relationship functioning because of their contribution to sexual satisfaction. Future research is needed to determine the directionality of these effects, such as longitudinal research examining whether changes in frequency or duration of sexual activity and orgasm are associated with subsequent changes in sexual satisfaction and relationship functioning and/or vice versa.

Clinical Implications

The results of the current study have some clinical implications for interventions focused on SGM-AFAB individuals and their relationships. Findings directly contradict the outdated notion of "lesbian bed death" and myths that sex is not important in female same-sex relationships and that gender minority individuals inevitably experience sexual dysfunction. It is important that clinicians do not fall prey to these common stereotypes and myths and instead work to promote relationship functioning by dispelling these misconceptions. This may help to reduce internalized stigma and help promote healthy relationship functioning. Although women in same-sex relationships reported higher levels on nearly all of these variables, it is important to keep in mind that levels of sexual satisfaction, frequency and duration of sexual activity, and frequency of orgasm were relatively high for all groups—with means well above the midpoint. This highlights the high levels of sexual functioning and satisfaction in this sample of young SGM-AFAB as a whole.

Sexual satisfaction and relationship functioning were strongly associated among SGM-AFAB across relationship types, indicating that interventions seeking to increase relationship or sexual functioning may be enhanced by addressing both areas. Findings also indicate that only the frequency of orgasm (not frequency of sexual activity or duration of sexual activity) predicted sexual satisfaction for SGM-AFAB individuals, and the only sex-related variable to predict relationship functioning was sexual satisfaction (not frequency of orgasm). Frequency and duration of sexual activity were only indirectly related to sexual satisfaction and relationship functioning via orgasm frequency. Therefore, advising couples with concerns about sexual satisfaction to focus on increasing the quality of their sexual interactions rather than their frequency and duration may be effective in increasing sexual satisfaction and have downstream effects on relationship functioning overall. Clinical interventions that increase orgasmic response would also likely increase sexual satisfaction.

Limitations

While the current study had a number of notable strengths, including a sample diverse in sexual and gender identities, relationship types, and race/ethnicity, findings should be considered in light of study limitations. First, because the sample only included individuals in late adolescence and young adulthood, findings may not generalize to middle-aged and older adults. Findings may also not generalize to relationships of longer durations, as 48.4% of relationships had durations of 1 year or less and 78.9% of 2 years or less. Of note, much of the existing research to compare characteristics of sexual activity and sexual satisfaction across relationship types has utilized samples with an older average age, wider age range, and relationships of longer duration. Therefore, differences in findings between the current study and existing research may be partially due to differences in the ages of the samples. Second, the current study was cross-sectional so causal conclusions cannot be drawn. Third, while we were adequately powered to examine gender-diverse relationships as a separate relationship type, the sizes of specific types of gender-diverse relationships (e.g., non-binary participants in relationship with cisgender woman) were too small to examine separately. Future research with large diverse samples of individuals in gender-diverse relationships is necessary to more fully examine how characteristics of sexual activity, relationship functioning, and sexual satisfaction and associations among these variables may (or may not) vary by the combination of genders represented in gender-diverse relationships. Fourth, the current study did not include assessments of the sexual activities that participants engaged in during sex. Differences in the frequency in which couples engage in different sexual activities are associated with frequency of orgasm and satisfaction with orgasm (Blair et al., 2017) and may explain women in same-sex relationship's higher rates of orgasm and sexual satisfaction. Thus, further research examining mechanisms that may explain differences in the frequency of orgasm and satisfaction, such as frequency of engagement in different sexual activities, is needed. Fifth, we only had data from one partner in each relationship. Given the dyadic nature of relationships, future research that collects data from both relationship partners would enhance our understanding of associations among characteristics of sexual activity, sexual satisfaction, and relationship functioning.

Despite these limitations, this study substantially extends our understanding of sexual satisfaction and its correlates among SGM-AFAB. This was the first study to examine a model of sexual satisfaction among SGM-AFAB in mixed-sex and gender-diverse relationships—relationship types which are common, yet have received little to no empirical attention. By focusing on SGM-AFAB, we were able to address a major methodological weakness of existing research (i.e., confounding sexual minority status and relationship type). This study also helps move research on sexual satisfaction among sexual minority women past comparisons with heterosexual women to including more in-depth within-group examinations of how sexual satisfaction functions

among SGM-AFAB. The results of this study can not only inform the development of comprehensive models of sexual functioning, sexual satisfaction, and relationship functioning but may also inform the development or adaptation of interventions that aim to promote long-term healthy relationship functioning among SGM-AFAB.

Acknowledgements This study was supported by a grant from the National Institute of Child Health and Human Development (Grant No. R01HD086170). The content of this article is solely the responsibility of the authors and does not necessarily reflect the views of the National Institutes of Health or the National Institute of Child Health and Human Development.

Compliance with Ethical Standards

Conflict of Interest The 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 institution and/or national research committee (Northwestern University Internal Review Board STU00203054) 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.

References

Armstrong, H. L., & Reissing, E. D. (2013). Women who have sex with women: A comprehensive review of the literature and conceptual model of sexual function. *Sexual and Relationship Therapy, 28,* 364–399. https://doi.org/10.1080/14681994.2013.807912.

Beaber, T. E., & Werner, P. D. (2009). The relationship between anxiety and sexual functioning in lesbians and heterosexual women. *Journal of Homosexuality, 56,* 639–654.

Birnie-Porter, C., & Lydon, J. E. (2013). A prototype approach to understanding sexual intimacy through its relationship to intimacy. *Personal Relationships, 20,* 236–258.

Blair, K. L., Cappell, J., & Pukall, C. F. (2018). Not all orgasms were created equal: differences in frequency and satisfaction of orgasm experiences by sexual activity in same-sex versus mixed-sex relationships. *Journal of Sex Research, 55*, 719–733. https://doi.org/10.1080/00224499.2017.1303437.

Blair, K. L., & Pukall, C. F. (2014). Can less be more? Comparing duration vs. frequency of sexual encounters in same-sex and mixed-sex relationships. *Canadian Journal of Human Sexuality, 23,* 123–136. https://doi.org/10.3138/cjhs.2393.

Blumstein, P., & Schwartz, P. (1983). *American couples: Money, work and sex*. New York: William Morrow.

Bridges, S. K., & Horne, S. G. (2007). Sexual satisfaction and desire discrepancy in same sex women's relationships. *Journal of Sex and Marital Therapy, 33,* 41–53. https://doi.org/10.1080/00926230600998466.

Brown, N. R. (2010). The sexual relationships of sexual-minority women partnered with trans men: A qualitative study. *Archives of Sexual Behavior, 39,* 561–572.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). London: Sage.

Burch, B. (1982). Psychological merger in lesbian couples: A joint ego psychological and systems approach. *Family Therapy, 9,* 201.

Byers, E. S. (2005). Relationship satisfaction and sexual satisfaction: A longitudinal study of individuals in long-term relationships. *Journal of Sex Research, 42,* 113–118. https://doi.org/10.1080/00224490509552264.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling, 14,* 464–504.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9,* 233–255.

Christopher, F. S., & Sprecher, S. (2000). Sexuality in marriage, dating, and other relationships: A decade review. *Journal of Marriage and Family, 62,* 999–1017.

Cohen, J. N., & Byers, E. S. (2014). Beyond lesbian bed death: Enhancing our understanding of the sexuality of sexual-minority women in relationships. *Journal of Sex Research, 51,* 893–903.

Coleman, E. M., Hoon, P. W., & Hoon, E. F. (1983). Arousability and sexual satisfaction in lesbian and heterosexual women. *Journal of Sex Research, 19,* 58–73.

Costantino, A., Cerpolini, S., Alvisi, S., Morselli, P. G., Venturoli, S., & Meriggiola, M. C. (2013). A prospective study on sexual function and mood in female-to-male transsexuals during testosterone administration and after sex reassignment surgery. *Journal of Sex and Marital Therapy, 39,* 321–335. https://doi.org/10.1080/009262 3X.2012.736920.

Cutrona, C. E. (1989). Ratings of social support by adolescents and adult informants: Degree of correspondence and prediction of depressive symptoms. *Journal of Personality and Social Psychology, 57,* 723–730.

Diamond, L. M. (2000). Sexual identity, attractions, and behavior among young sexual-minority women over a 2-year period. *Developmental Psychology, 36,* 241–250. https://doi.org/10.1037/0012-1649.36.2.241.

Flores, A., Herman, J., Gates, G., & Brown, T. (2016). *How many adults identify as transgender in the United States?* Los Angeles, CA: The Williams Institute.

Galbraith, S., Bowden, J., & Mander, A. (2017). Accelerated longitudinal designs: an overview of modelling, power, costs and handling missing data. *Statistical Methods in Medical Research, 26,* 374–398.

Gamarel, K. E., Reisner, S. L., Laurenceau, J. P., Nemoto, T., & Operario, D. (2014). Gender minority stress, mental health, and relationship quality: A dyadic investigation of transgender women and their cisgender male partners. *Journal of Family Psychology, 28,* 437–447. https://doi.org/10.1037/a0037171.

Garcia, J. R., Lloyd, E. A., Wallen, K., & Fisher, H. E. (2014). Variation in orgasm occurrence by sexual orientation in a sample of U.S. singles. *Journal of Sexual Medicine, 11,* 2645–2652. https://doi.org/10.1111/jsm.12669.

Gates, G. J. (2011). *How many people are lesbian, gay, bisexual, and transgender?* UCLA: The Williams Institute. Retrieved from https://escholarship.org/uc/item/09h684X2

Harrison, J., Grant, J., & Herman, J. L. (2012). A gender not listed here: Genderqueers, gender rebels, and otherwise in the National Transgender Discrimination Survey. *LGBTQ Public Policy Journal at the Harvard Kennedy School, 2,* 13–24.

Henderson, A. W., Lehavot, K., & Simoni, J. M. (2009). Ecological models of sexual satisfaction among lesbian/bisexual and heterosexual women. *Archives of Sexual Behavior, 38,* 50–65.

Hendrick, C., & Hendrick, S. S. (2004). Sex and romantic love: Connects and disconnects. In J. H. Harvey, A. Wenzel, & S. Sprecher (Eds.), *The handbook of sexuality in close relationships* (pp. 159–182). Mahwah, NJ: Lawrence Erlbaum Associates.

Hendricks, M. L., & Testa, R. J. (2012). A conceptual framework for clinical work with transgender and gender nonconforming clients:

An adaptation of the minority stress model. *Professional Psychology-Research and Practice, 43,* 460.

Holmberg, D., Blair, K. L., & Phillips, M. (2010). Women's sexual satisfaction as a predictor of well-being in same-sex versus mixed-sex relationships. *Journal of Sex Research, 47,* 1–11. https://doi.org/10.1080/00224490902898710.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30,* 179–185.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6,* 1–55.

Iasenza, S. (2002). Beyond "lesbian bed death" the passion and play in lesbian relationships. *Journal of Lesbian Studies, 6,* 111–120.

Johnson, C., Stanley, S., Glenn, N., Amato, P., Nock, S., & Markman, H. (2002). *Marriage in Oklahoma: 2001 Baseline statewide survey on marriage and divorce (S02096 OKDHS)*. Oklahoma City, OK: Oklahoma Department of Human Services.

Kiecolt-Glaser, J. K., Gouin, J.-P., & Hantsoo, L. (2010). Close relationships, inflammation, and health. *Neuroscience and Biobehavioral Reviews, 35,* 33–38.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. New York: Guilford Publications.

Kuper, L. E., Nussbaum, R., & Mustanski, B. (2012). Exploring the diversity of gender and sexual orientation identities in an online sample of transgender individuals. *Journal of Sex Research, 49,* 244–254. https://doi.org/10.1080/00224499.2011.596954.

Kuyper, L., & Vanwesenbeeck, I. (2011). Examining sexual health differences between lesbian, gay, bisexual, and heterosexual adults: The role of sociodemographics, sexual behavior characteristics, and minority stress. *Journal of Sex Research, 48,* 263–274. https://doi.org/10.1080/00224491003654473.

Laumann, E. O., Gagnon, J. H., Michael, R. T., & Michaels, S. (2008). *National Health and Social Life Survey, 1992*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research. https://doi.org/10.3886/ICPSR06647.v2.

Loulan, J. (1984). *Lesbian sex*. San Francisco: Spinsters Ink.

MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research, 39,* 99–128.

Matthews, A. K., Tartaro, J., & Hughes, T. L. (2003). A comparative study of lesbian and heterosexual women in committed relationships. *Journal of Lesbian Studies, 7,* 101–114. https://doi.org/10.1300/J155v07n01_07.

McNulty, J. K., Wenner, C. A., & Fisher, T. D. (2016). Longitudinal associations among relationship satisfaction, sexual satisfaction, and frequency of sex in early marriage. *Archives of Sexual Behavior, 45,* 85–97. https://doi.org/10.1007/s10508-014-0444-6.

Mustanski, B., Garofalo, R., & Emerson, E. M. (2010). Mental health disorders, psychological distress, and suicidality in a diverse sample of lesbian, gay, bisexual, and transgender youths. *American Journal of Public Health, 100,* 2426–2432.

Muthen, B. O., & Satorra, A. (1995). Complex sample data in structural equation modeling. *Sociological Methodology, 25,* 267–316.

Nichols, M. (1995). Sexual desire disorder in a lesbian-feminist couple: The intersection of therapy and politics. In R. C. Rosen & S. R. Leiblum (Eds.), *Case studies in sex therapy* (pp. 161–175). New York: Guilford Press.

Nichols, M. (2004). Lesbian sexuality/female sexuality: Rethinking 'lesbian bed death'. *Sexual and Relationship Therapy, 19,* 363–371. https://doi.org/10.1080/14681990412331298036.

Perez-Brumer, A., Day, J. K., Russell, S. T., & Hatzenbuehler, M. L. (2017). Prevalence and correlates of suicidal ideation among transgender youth in California: Findings from a representative, population-based sample of high school students. *Journal of the American Academy of Child and Adolescent Psychiatry, 56,* 739–746.

Pew Research Center. (2013). *A survey of LGBT Americans: Attitudes, experiences and values in changing times*. Retrieved from file:///C:/Users/baf418/Downloads/SDT_LGBT-Americans_06-2013.pdf. Accessed February 2018

Raftery, A. E. (1995). Bayesian model selection in social research. *Sociological Methodology, 25,* 111–163. https://doi.org/10.2307/271063.

Reisner, S. L., Gamarel, K. E., Nemoto, T., & Operario, D. (2014a). Dyadic effects of gender minority stressors in substance use behaviors among transgender women and their non-transgender male partners. *Psychology of Sexual Orientation and Gender Diversity, 1,* 63–71.

Reisner, S. L., White, J. M., Bradford, J. B., & Mimiaga, M. J. (2014b). Transgender health disparities: Comparing full cohort and nested matched-pair study designs in a community health center. *LGBT Health, 1,* 177–184.

Rosen, R. C., & Bachmann, G. A. (2008). Sexual well-being, happiness, and satisfaction, in women: The case for a new conceptual paradigm. *Journal of Sex and Marital Therapy, 34,* 291–297. https://doi.org/10.1080/00926230802096234.

Sanchez, D. T., Moss-Racusin, C. A., Phelan, J. E., & Crocker, J. (2011). Relationship contingency and sexual motivation in women: Implications for sexual satisfaction. *Archives of Sexual Behavior, 40,* 99–110. https://doi.org/10.1007/s10508-009-9593-4.

Satorra, A., & Bentler, P. M. (2010). Ensuring positiveness of the scaled difference Chi square test statistic. *Psychometrika, 75,* 243–248.

Schick, V., Rosenberger, J. G., Herbenick, D., Calabrese, S. K., & Reece, M. (2012). Bidentity: Sexual behavior/identity congruence and women's sexual, physical and mental well-being. *Journal of Bisexuality, 12,* 178–197. https://doi.org/10.1080/15299716.2012.674855.

Schick, V., Rosenberger, J. G., Herbenick, D., Collazo, E., Sanders, S. A., & Reece, M. (2016). The behavioral definitions of "having sex with a man" and "having sex with a woman" identified by women who have engaged in sexual activity with both men and women. *Journal of Sex Research, 53,* 578–587. https://doi.org/10.1080/00224499.2015.1061632.

Scott, S. B., Ritchie, L., Knopp, K., Rhoades, G. K., & Markman, H. J. (2018). Sexuality within female same-gender couples: Definitions of sex, sexual frequency norms, and factors associated with sexual satisfaction. *Archives of Sexual Behavior, 47*, 681–692. https://doi.org/10.1007/s10508-017-1077-3.

Shindel, A. W., Rowen, T. S., Lin, T. C., Li, C. S., Robertson, P. A., & Breyer, B. N. (2012). An Internet survey of demographic and health factors associated with risk of sexual dysfunction in women who have sex with women. *Journal of Sexual Medicine, 9,* 1261–1271. https://doi.org/10.1111/j.1743-6109.2012.02659.x.

Smith, A. M., Patrick, K., Heywood, W., Pitts, M. K., Richters, J., Shelley, J. M., … Ryall, R. (2012). Sexual practices and the duration of last heterosexual encounter: Findings from the Australian longitudinal study of health and relationships. *Journal of Sex Research, 49,* 487–494.

Stanley, S. M., & Markman, H. J. (1992). Assessing commitment in personal relationships. *Journal of Marriage and the Family, 54,* 595–608.

Tracy, J. K., & Junginger, J. (2007). Correlates of lesbian sexual functioning. *Journal of Women's Health, 16,* 499–509. https://doi.org/10.1089/jwh.2006.0308.

Vaughn, M. J., & Matyastik Baier, M. E. (1999). Reliability and validity of the Relationship Assessment Scale. *American Journal of Family Therapy, 27,* 137–147. https://doi.org/10.1080/019261899262023.

Weyers, S., Elaut, E., De Sutter, P., Gerris, J., T'Sjoen, G., Heylens, G., … Verstraelen, H. (2009). Long-term assessment of the physical, mental, and sexual health among transsexual women.

Journal of Sexual Medicine, 6, 752–760. https://doi.org/10.1111/j.1743-6109.2008.01082.x.

Whitton, S. W., Dyar, C., Newcomb, M. E., & Mustanski, B. (2019). Intimate partner violence experiences of young sexual and gender minorities assigned female at birth. *Psychology of Women Quarterly*. (in press).

Wierckx, K., Van Caenegem, E., Schreiner, T., Haraldsen, I., Fisher, A., Toye, K., … T'Sjoen, G. (2014). Cross-sex hormone therapy in trans persons is safe and effective at short-time follow-up: Results from the European network for the investigation of gender incongruence. *Journal of Sexual Medicine, 11,* 1999–2011.

Wood, N. D., Akloubou Gnonhosou, D. C., & Bowling, J. (2015). Combining parallel and exploratory factor analysis in identifying relationship scales in secondary data. *Marriage & Family Review, 51,* 385–395. https://doi.org/10.1080/01494929.2015.1059785.