



Who Counts as Sexually Fluid? Comparing Four Different Types of Sexual Fluidity in Women

Lisa M. Diamond¹ · Jenna Alley¹ · Janna Dickenson² · Karen L. Blair³

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Abstract

Previous research has examined the phenomenon of “sexual fluidity,” but there is no current consensus on the specific meaning and operationalization of this construct. The present study used a sample of 76 women with diverse sexual orientations to compare four different types of sexual fluidity: (1) fluidity as overall erotic responsiveness to one’s less-preferred gender, (2) fluidity as situational variability in erotic responsiveness to one’s less-preferred gender, (3) fluidity as discrepancy between the gender patterning of sexual attractions and the gender patterning of sexual partnering, and (4) fluidity as instability in day-to-day attractions over time. We examined how these four types of fluidity relate to one another and to other features of women’s sexual profiles (bisexual vs. exclusive patterns of attraction, sex drive, interest in uncommitted sex, age of sexual debut, and lifetime number of sexual partners). The four types of fluidity were not correlated with one another (with the exception of the first and fourth), and each showed a unique pattern of association with other features of women’s sexual profiles. The only type of fluidity associated with bisexuality was overall erotic responsiveness to the less-preferred gender. The findings demonstrate that future research on sexual fluidity should distinguish between its different forms.

Keywords Bisexuality · Sexual orientation · Sexual fluidity · Individual differences · Women

Introduction

Extensive research has investigated sexual fluidity, typically defined as a capacity for variation in sexual responsiveness due to situational, interpersonal, and contextual influences (reviewed in Baumeister, 2000; Diamond, 2008b). Numerous sexual phenomena have been ascribed to sexual fluidity, such as the fact that individuals sometimes experience sexual desires that run counter to their self-described sexual orientation (Chivers & Bailey, 2005; Chivers, Rieger, Latty, & Bailey, 2004; Diamond, 2008b), sometimes report sexual behavior that diverges from their self-described sexual orientation (Diamond, 2008b; Dixon, 1984), and sometimes report changes in their pattern of sexual attractions and behavior over

time (reviewed in Diamond, 2016). Yet, do these divergent experiences represent the same basic phenomenon? If so, then women who are “fluid” according to one definition should be “fluid” according to the others, and in such a case it would be meaningful to conceptualize sexual fluidity as an overarching individual difference dimension. Alternatively, the construct of “sexual fluidity” might be inappropriately combining distinct forms of sexual variability that have different origins and implications. If so, it would be important to determine how these different forms of sexual variability relate to one another and to other features of individuals’ sexual histories and profiles. This is the aim of the present research.

Before proceeding, it bears noting that the present study focuses on variability in the gender organization of one’s erotic responsiveness, meaning the degree to which one’s erotic responsiveness depends on the gender of the erotic target (a construct conventionally denoted as sexual orientation). Yet, gender is certainly not the only dimension that organizes erotic responsiveness: Rather, stable patterns of erotic responsiveness have been observed with regard to dimensions such as partner age and type of sexual activity (Chivers, Roy, Grimbos, Cantor, & Seto, 2014; Seto, 2012), and recent models of sexuality suggest the value of substituting our conventional emphasis on gender-based sexual orientations

✉ Lisa M. Diamond
diamond@psych.utah.edu

¹ Department of Psychology, University of Utah, 380 South 1530 East, Room 502, Salt Lake City, UT 84112-0251, USA

² Program in Human Sexuality, University of Minnesota, Minneapolis, MN, USA

³ Department of Psychology, St. Francis Xavier University, Antigonish, NS, Canada

with a broader notion of sexual configurations (van Anders, 2015) capable of incorporating all relevant organizing domains. Theoretically, “fluidity” could be defined as any form of erotic responsiveness which deviates from an individual’s typical configuration (i.e., someone attracted to children who experiences an unexpected attraction to an adult), and such forms of fluidity deserve much greater investigation. For the present study, however, we focus on variability in the gendered organization of erotic responsiveness, which is arguably one of the most important and distinctive, and our usage of the term “fluidity” should be interpreted as such.

Operationalizing Sexual Fluidity

Previous studies have typically defined sexual fluidity as one or more of the following: a capacity for erotic responsiveness to one’s “less-preferred” gender (abbreviated as LPG), pursuit of sexual behavior with the LPG, or change over time in erotic responsiveness to the LPG. These different definitions capture different forms of variability in erotic responsiveness, but there is little theory or research to suggest whether they represent the same phenomenon. Consider, for example, two women who show sexual arousal to their less-preferred gender in a laboratory assessment. One of these women might also experience periodic sexual attractions to her LPG in the course of everyday life, whereas the other may not: Does this difference matter? One of them might pursue periodic sexual behavior with the LPG, whereas the other might not: Does this difference matter? One may find that her attractions to the LPG strengthen over time, whereas the other may not: Does this difference matter?

Currently, we do not know the answers to these questions, but they are critically important for understanding the prevalence, mechanisms, and implications of sexual fluidity. Toward this end, we take a first step toward answering these questions by differentiating and operationalizing different forms of fluidity and investigating how they relate to one another and to additional features of women’s sexual histories and experiences. Based on previous research, we focus on four types of fluidity that have the strongest empirical and theoretical basis (although there certainly may be others): (1) fluidity as heightened erotic responsiveness to one’s less-preferred gender, (2) fluidity as situational variability in erotic responsiveness to the LPG (for example, laboratory arousal vs. day-to-day attraction), (3) fluidity as discrepancy between sexual attraction and sexual partnering with the LPG, and (4) fluidity as instability in day-to-day attraction to the LPG over time.

The first form of fluidity (heightened erotic responsiveness to the LPG) most strongly resembles the construct of bisexuality. By definition, individuals with bisexual individuals are more strongly attracted to their LPG compared to individuals with exclusively same-sex or other-sex attractions (Rieger, Bailey, & Chivers, 2005; Rosenthal, Sylva, Safron, & Bailey, 2011). This may account for widespread debates over whether and how

fluidity differs from bisexuality (as reviewed in Diamond, 2008a, 2008b, 2016). An implicit assumption underlying this particular conceptualization of sexual fluidity is that individuals who respond erotically to their LPG in one situation (for example, a laboratory study) will also respond erotically to their LPG in *other* situations (for example, day-to-day life).

Our second model of fluidity dispenses with this assumption and instead defines sexual fluidity as variability in one’s erotic responsiveness across different situations. This form of fluidity would characterize a woman who responds erotically to her LPG in the laboratory, but *not* in everyday life. This model is consistent with a conceptualization of fluidity as a heightened sensitivity to context (Diamond, 2008a, 2008b). The third model focuses on the phenomenon of discrepancies between the gender patterning of one’s sexual attractions and the gender patterning of one’s sexual partnering (i.e., self-identified lesbians pursuing sex with men and self-identified heterosexuals pursuing sex with women). It is important to conceptualize this type of fluidity separately from other forms, given that sexual partnering is highly constrained by structural factors and opportunities. The last model focuses on *instability* over time in erotic responsiveness. Importantly, our research uses short-term prospective measurement of daily variation in sexual attraction, and hence, we are unable to assess long-term stability in erotic responsiveness over the scale of years (as in Dickson, Roode, Cameron, & Paul, 2013; Ott, Corliss, Wypij, Rosario, & Austin, 2011; Savin-Williams, Joyner, & Rieger, 2012). Rather we focus on a specific type of instability that is based on dynamical systems theory: the degree to which temporal variability in erotic responsiveness is anchored by an individual’s own setpoint. This model has the advantage of presuming that all individuals might show some degree of variability in erotic responsiveness over time, but that the variability of “highly fluid” individuals takes a different form, in that it is less likely to revert to the original pattern after deviating from this pattern.

Our research is uniquely able to differentiate the four types of fluidity described above because our multi-method study incorporates data on women’s history of sexual partnering, self-perceived identity/orientation, daily experience of sexual attraction to the less preferred over a 2-week diary assessment, and self-reported arousal to sexual stimuli featuring the less-preferred gender in a laboratory assessment. Hence, we can examine whether different types of fluidity are intercorrelated and how they relate to other features of a woman’s sexual profile (bisexual vs. exclusive patterns of attraction, sex drive, interest in uncommitted sex, total number of sexual partners, and age of sexual debut).

Fluidity and Bisexuality

Bisexuality is typically defined as a capacity for sexual attractions to both sexes, even if one tends to prefer one gender

over the other (Diamond, 2008a; Rosenthal, Sylva, Safron, & Bailey, 2012). Theoretically, a capacity for bisexual attractions may predispose individuals to sexual fluidity given that situational, interpersonal, and contextual factors may “push” bisexual attractions toward one gender over another at different points in time. This is consistent with the fact that bisexually attracted individuals report more longitudinal change in their attractions than exclusively attracted individuals (Diamond, 2008b, 2016), less day-to-day stability in sexual attractions (Diamond, Dickenson, & Blair, 2017), and more genital arousal to their less-preferred gender in the laboratory (Chivers, Bouchard, & Timmers, 2015). Hence, one might argue that sexual fluidity is simply an outgrowth of bisexuality, consistent with the common notion that bisexual orientations are fundamentally more “open” and flexible than exclusive same-sex or other-sex orientations (Ross, Daneback, & Månsson, 2012; Weinberg, Williams, & Pryor, 1994). Yet previous research suggesting associations between fluidity and bisexuality does not take into account the potential differences between different types of fluidity. As noted earlier, we expect that the first model of fluidity (erotic responsiveness to the less-preferred gender) should be most strongly associated with bisexuality, but it is not clear how bisexuality should relate to the other three forms.

Fluidity and Sex Drive

Another individual difference dimension potentially related to sexual fluidity is sex drive. Lippa (2006) has noted that according to classic drive theory, higher levels of drive should increase the probability of dominant tendencies and behaviors, but should not increase the probability of non-dominant tendencies and behaviors. According to this view, if fluidity represents a generalized capacity to experience sexual attraction to either gender, then one might expect higher levels of sex drive to be associated with greater experiences of sexual fluidity. Alternatively, if sexual fluidity is more accurately viewed as a capacity for “non-dominant” sexual responses (i.e., sexual responses to the less-preferred gender), then one would expect greater sex drive to be associated with lesser degrees of sexual fluidity.

There is evidence for both perspectives. Lippa’s (2006, 2007) research found that among men and lesbian women, high sex drive was associated with greater sexual attraction to their preferred gender (i.e., their dominant response). For heterosexual and bisexual women, high sex drive was associated with greater attraction to both their more-preferred and less-preferred genders (i.e., both their dominant and non-dominant response). Lippa speculated that for some heterosexual and bisexual women, same-sex attractions might actually be a direct outgrowth of high sex drive, such that a high sex drive amplifies and energizes sexual feelings that would otherwise remain dormant. Hence, the relationship between sexual orientation (i.e., bisexual vs. exclusive attractions), sexual fluidity, and sex drive appears multifaceted,

and it is not clear how sex drive should relate to the four types of fluidity assessed in the present study.

Fluidity and Sociosexuality

Sociosexuality represents an individual’s interest in unrestricted sexual activity (i.e., sexual contact that occurs outside the context of a committed relationship). Sexual fluidity may relate to sociosexuality because both phenomena reflect a willingness to acknowledge sexual interests that are socially stigmatized in the present culture. Women who experience sexual attractions for their less-preferred gender violate conventional expectations regarding the categorical nature of sexual orientation, and may be denigrated by peers as “confused” or “curious” (Diamond, 2008b). Even when a woman’s LPG is socially approved (as would occur for a lesbian-identified women experiencing attractions for men), the violation of contemporary cultural expectations (and potentially those of her own friends and family) regarding the fixity of sexual orientation may expose her to disapproval. Similarly, women who pursue casual sexual activity have historically been socially stigmatized (Sprecher, Treger, & Sakaluk, 2013). Hence, women with unrestricted orientations toward sexual activity may prove more likely to attend to and acknowledge experiences of sexual responsiveness which violate cultural expectation or deviate from their own previous patterns, and they might be more responsive to opportunities for acting on these patterns. Yet it is not clear whether women with an unrestricted orientation should show greater temporal instability in their attractions. In investigating these questions, the present research supplements self-report assessments of unrestricted orientation with behavioral indices of unrestricted orientations: earlier age at sexual debut (Nield, Magnusson, Chapman, & Lapane, 2014) and higher numbers of lifetime sexual partners (Ostovich & Sabini, 2004).

Operationalizing Different Forms of Fluidity

As noted earlier, there is no single, agreed-upon definition of sexual fluidity, and no single operationalization. Previous studies have focused on longitudinal change in patterns of sexual attraction (reviewed in Diamond, 2016), sexual contact with the less-preferred gender (Diamond, 2008a, 2008b), or situational variability in sexual arousal, such as self-reported and physiological arousal in response to erotic stimuli featuring their “less-preferred” gender (reviewed in Chivers, 2017). More recently, daily diary studies (such as Diamond et al., 2017) have assessed day-to-day variability in attractions to the more-preferred and less-preferred gender. All of these indices provide meaningful approaches for capturing the phenomenon of sexual fluidity, and they all have unique advantages. Yet presently, there is little information on how they relate to one another (Diamond et al., 2017), and how they each relate to the polarization of a woman’s attractions,

her sex drive, and her sociosexuality. Our research directly examines these questions.

The Current Study

We examined four different types of sexual fluidity in a sample of women with diverse sexual orientations: (1) fluidity as heightened erotic responsiveness to one's less-preferred gender, (2) fluidity as variability in erotic responsiveness to one's less-preferred gender across different domains, (3) fluidity as discrepancy between sexual attraction and sexual partnering, and (4) fluidity as temporal instability in attraction (defined as the degree to which fluctuations over time fail to correct to a woman's own "set point"). To operationalize these forms of fluidity, we incorporate questionnaire data on women's attractions and behavior, daily diary data on their sexual attractions over a 2-week period, and laboratory assessments of women's self-reported arousal to same-sex and other-sex sexual stimuli.

A unique advantage of the daily diary assessment is that in addition to calculating the average magnitude of a woman's desires for her less-preferred gender across the diary period, we can use multilevel modeling to calculate day-to-day stability in sexual desire. This approach is based on dynamical systems models (see Diamond, 2007, 2012; Guastello & Gregson, 2012) which conceptualize the stability of a system as the degree to which its fluctuations consistently "self-correct" to a particular homeostatic setpoint (Butner, Gagnon, Geuss, Lessard, & Story, 2015). If a fluctuating system is inherently stable, then when it rises too far above the setpoint, it will subsequently self-correct by declining toward the set point, and when it falls too far below the setpoint, it will subsequently self-correct by increasing toward the setpoint. This produces a negative correlation between the state of the system on Day 1 and change in the system from Day 1 to Day 2. The magnitude of this negative correlation should be larger for highly stable systems, and weaker for systems that are more easily perturbed by situational influences. Previous research has used this technique for assessing temporal stability in men's and women's attractions (Diamond et al., 2017) as well as temporal stability in positive and negative emotions (Queen, Butner, Wiebe, & Berg, 2016). Hence, we define the fourth form of sexual fluidity as weak temporal stability (i.e., less tendency for daily attractions to "self-correct" to a woman's own set point over time). Notably, there is no longitudinal research assessing whether temporal stability at the level of days is associated with temporal stability at the level of years; research using retrospective accounts of changes in attractions (specifically, whether individuals report changes in their attractions from adolescence to adulthood) has found that these retrospective reports of long-term change are not associated with day-to-day temporal instability (Diamond

et al., 2017), suggesting that individual differences in fluidity may not be preserved across different time scales.

We address the following questions:

1. How does each form of fluidity relate to the others? Do they appear to represent a single dimension?
2. How does each form of fluidity relate to individual differences in bisexuality, sex drive, and unrestricted sexuality?

As discussed earlier, previous research suggests a number of plausible expectations regarding how each type of fluidity may relate to these individual difference dimensions. Yet given the lack of previous research distinguishing between different types of fluidity, and given the novelty of our empirical operationalizations of each type of fluidity, we treat our analyses as descriptive and exploratory rather than confirmatory, and expect that they will prove most valuable in identifying the most fruitful avenues for future research.

Method

Participants

Participants were 76 women between the ages of 19 and 37 years (M age = 27.1), 90% of whom were white. In all, 32% of the women identified as heterosexual, 42% as bisexual, and 26% as lesbian. Participants were recruited through Facebook ads that described the study as an investigation of sexuality and stress hormones, and were approved by the University of Utah Institutional Review Board. Regarding education, 42% of women had not completed college (the majority of these women had completed at least 1 year of college), 48% had completed college or an associate's degree, and 20% had a graduate degree (or were in the process of obtaining one). Regarding income, 38% had a household income of less than \$25,000, 51% had a household income between \$25,000 and \$75,000, and 11% had a household income of more than \$75,000.

Procedures

Women arrived at the laboratory, underwent informed consent, and completed a detailed questionnaire (described below). Next, women were escorted to a private room to participate in the arousal induction task. First, they underwent a 15-min baseline period. During the first 5 min, they sat quietly. During the second 5 min, they rated their liking of a set of landscape photographs, in order to engage their attention in a restful pleasant task (Jennings, Kamarck, Stewart, & Eddy, 1992). During the remainder of the baseline period, they paced their breathing slowly in response to a timer. Next,

the sexual arousal task began. Participants listened (through headphones) to 8 different stories describing, from a first-person perspective, the unfolding of an interaction with a woman or a man. Half of the stories were sexually explicit, including detailed descriptions of genital and non-genital sexual activity, and to prevent habituation, half were neutral stories that described non-erotic interactions with women or men. There was a 1-min recovery period between each story, and the total listening time was 20 min. We elected to use auditory rather than visual sexual stimuli to reduce the potential barriers for women's participation in the study (given that we expected women to be more hesitant to engage in a study incorporating sexually explicit videos than sexually explicit audio narratives). The validity of these stimuli is demonstrated by the fact that were found to elicit both subjective and genital arousal in women (Chivers & Timmers, 2012), and their reliability is indicated by the fact that they elicited comparable genital and subjective responses across several independent samples (Chivers & Timmers, 2012).

During the sexual arousal task, participants used rating dials to indicate their degree of sexual arousal on a 1–10 scale. Although we have no way of determining the degree to which variation in women's self-reported arousal was specifically attributable to the gendered attributes of the sexual partners described in the stories, each story referred to gender-specific body parts (i.e., the other person's penis, vulva, clitoris, etc.), thereby heightening women's attention to the partner's gender. After the task, participants completed an 11-min guided relaxation task, and then filled out an additional set of questionnaires. Then they received instructions for the online diary. Participants were instructed to complete the daily diary each day before bedtime for 14 days. Diary entries were made online, and data were maintained through a secure server at the primary investigator's institution.

Measures

Participants completed the Alderson Sexuality Questionnaire (Brown & Alderson, 2010) to assess the magnitude of their current attractions to women and men. The specific instructions were as follows: "Over the past 12 months, to what extent have you experienced sexual attraction to each gender, defined as feeling aroused by someone whom you find attractive." Responses categories were "none," "low," "moderately," or "high." For each woman, we identified her "more-preferred" and "less-preferred" gender by comparing their ratings of attraction to each gender, and we then subtracted her rating of attraction to the less-preferred gender from her rating of attraction to the more-preferred gender. This provides an index of the degree to which her attractions are gender polarized (i.e., more exclusively directed to one gender or the other), versus non-polarized (i.e., bisexual). Importantly, the lack of polarization in a woman's attractions does not necessarily mean that

her attractions are gender neutral. Although some women with bisexual patterns of attraction report that their sexuality is relatively insensitive to gender categories, and that they become attracted to "the person and not the gender," other women with bisexual patterns of attraction report that their sexuality is highly sensitive to gender categories, and that they simply find *both* male and female characteristics comparably arousing (Diamond, 2008a, 2008b). Hence, we cannot assume that women with non-polarized attractions are less erotically sensitive to gender categories overall.

In all, 18 women reported exclusive attractions to women and 13 women reported exclusive attractions to men. Among the 45 participants with attractions to both women and men, approximately one-third gave equal ratings of attraction to each gender, and so we examined their responses to an additional item on the Alderson measure (assessing the magnitude of their desire to engage in sexual behavior with each gender) to identify their more-preferred gender. Hence, in the "both-attracted" group, a total of 69% preferred men and 31% preferred women.

The questionnaire measure also assessed women's age of sexual debut (described on the questionnaire as "the age of your first significant sexual contact, which you would consider as losing your virginity"), her total number of lifetime sexual partners, and her total number of male and female sexual partners since age 18. This allowed us to calculate the proportion of her sexual partners which were same-sex versus other-sex over adulthood. The questionnaire defined "sexual partner" as "anyone with whom you have had sexual contact, including "petting" or genital, oral, or anal contact." To assess sociosexuality, we used the revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008). This scale assesses women's sex drive and their attitudes about unrestricted sexual activity (sample items include Sex without love is okay; I think about sex almost every day; I can imagine myself being comfortable enjoying casual sex with different partners; 6 items, $\alpha = .78$).

As noted above, during the sexual arousal task, women used a dial to provide continuous ratings of their sexual arousal on a 1–10 scale. Previous research suggests that continuous self-report ratings of subjective arousal provide the most valid and reliable indices of subjective sexual arousal (Huberman & Chivers, 2015), and these continuous self-report ratings have been shown to correlate with multiple indices of physiological arousal (Huberman, Maracle, & Chivers, 2015). We averaged women's self-reported arousal to stories featuring their less-preferred gender (defined as the gender to she reported being less attracted to on the questionnaire assessment). We then ipsatized these ratings (i.e., subtracted each woman's average sexual arousal across all of the stories), to control for interindividual variability in women's arousability. Hence, each women's ipsatized score represents her degree of self-reported arousal to the less-preferred gender, relative to the degree of arousal she experienced across the entire assessment.

We conducted ancillary analyses to examine how this rating correlated with the peak arousal that women reported during each epoch, and found a correlation of .91.

The items in the online daily diary were modeled after the Sexual Desire Inventory (Spector, Carey, & Steinberg, 1996). Women were asked to “think back over the course of the entire day, from when you woke up to right around now.” To assess generalized daily sex drive (i.e., desire for sexual activity regardless of the gender of the partner), women were asked to rate how often that day they had felt sexually aroused, thought about sex, or had a sexual fantasy, on a 1–4 scale (not at all, 1–2 times, 3–4 times, or more than 5 times). Participants were then asked to indicate the degree to which these sexual thoughts concerned women versus men, using a 1–7 scale in which 1 indicated “all men,” 7 indicated “all women,” and 4 indicated an equal split between sexual thoughts about men and women. We recoded this measure in order to represent the degree to which each woman experienced sexual thoughts for her less-preferred gender relative to her more-preferred gender (so that scores greater than 4 represent having more sexual thoughts about the less-preferred gender than the more-preferred gender, scores of 4 represent having equivalent sexual thoughts about both genders, and scores less than 4 represent having less sexual thoughts about the less-preferred gender than the more-preferred gender).

In the total sample, the polarization of women’s attractions (more preferred minus less preferred) was correlated .19 with the percentage of her sexual partners which were the more-preferred gender (ns). Polarization was correlated .54 with her average attraction to the more-preferred gender in

the diary ($p < .001$), and .11 (ns) with her arousal to sexual stimuli featuring the more-preferred gender in the laboratory assessment. Descriptive statistics for the sample, stratified by their overall pattern of attraction, are presented in Table 1.

Results

Deriving Indices of Each Type of Fluidity

The first step in our analytic strategy was to derive theoretically meaningful indices of the four types of sexual fluidity: (1) erotic responsiveness to the less-preferred gender, (2) situational variability in erotic responsiveness to the less-preferred gender, (3) discrepancy between sexual attraction and sexual partnering, and (4) temporal instability in attraction.

For the first form of fluidity, we created a composite index of (1) women’s self-reported magnitude of sexual attractions to the less-preferred gender over the previous year, (2) her average daily level of attraction to the less-preferred gender across the 2-week diary assessment, and (3) her average self-reported arousal to sexual stimuli featuring the less-preferred gender in the laboratory assessment. These measures were significantly intercorrelated (see Table 1). We standardized each measure and averaged them (the Cronbach alpha for the resulting scale was .74). This index ranged from -1.1 to 2.1 , with a mean of .01 and a standard deviation of .8.

The second form of fluidity is situational variability in erotic responsiveness, representing the degree to which a woman’s erotic responsiveness to the less-preferred gender

Table 1 Descriptive statistics for study variables

	Exclusively other-sex attracted $N=13$		Attracted to both sexes $N=44$		Exclusively same-sex attracted $N=18$	
	M (SD)	Range	M (SD)	Range	M (SD)	Range
Age (in years)	25.9 (4.9)	19–34	26.8 (4.8)	20–37	28.6 (4.6)	21–35
Degree of attraction to same sex, past 12 mos.	1.0 (0)	1–1	3.1 (.8)	2–4	3.8 (.4)	3–4
Degree of attraction to other sex past 12 mos.	3.8 (.4)	3–4	3.7 (.5)	2–4	1.0 (0)	1–1
Degree of attraction to more-preferred gender over past year	3.8 (.4)	3–4	3.9 (.3)	3–4	3.8 (.4)	3–4
Degree of attraction to less-preferred gender over past year	1.0 (0)	1–1	3.0 (.8)	2–4	1.0 (0)	1–1
Average ipsatized arousal to erotic laboratory stimuli featuring the preferred gender	.13 (1.0)	-.01–3.2	1.2 (.8)	-.8–3.9	1.7 (1.0)	0–3.6
Average ipsatized arousal to erotic laboratory stimuli featuring the non-preferred gender	.11 (.6)	-.8–1.5	.73 (.8)	-1.4–2.4	-.14 (.6)	-1.3–1.1
Relative daily attraction to the non-preferred versus the preferred gender, averaged across the 2-week daily diary assessment	1.5 (1.2)	1–5.5	2.4 (1.4)	1.0–6.5	1.2 (.4)	1–2.3
Percentage of total sexual partners who were the non-preferred gender	1 (2.4)	0–8.8	22 (20.6)	0–67	34 (33.7)	0–100
Daily sexual arousal, averaged across the 2-week daily diary assessment	2.0 (.4)	1.6–2.8	2.4 (.6)	1.4–4.0	2.4 (.8)	1.1–4.0
Total number of sexual partners	11.6 (15.8)	2–59	17.3 (14.0)	1–60	13.8 (9.9)	1–31
Sociosexuality	3.3 (.7)	1.7–4.4	4.0 (.7)	2.3–5.0	3.6 (1.0)	1.1–4.6
Age of sexual debut (in years)	18.6 (4.6)	10–26	17.7 (3.9)	10–30	16.2 (4.0)	10–27

changes across different contexts. Hence, whereas the first form of fluidity (overall arousability to the LPG) can be conceptualized as the shared variance in erotic responsiveness to the LPG across different contexts, the second form of fluidity can be conceptualized as the unshared variance in erotic responsiveness to the LPG across different contexts. To capture this variance, we used regression analysis to predict *each* of the three measures of responsiveness to the LPG (overall attraction to the LPG during the past year, average attraction to the LPG during the diary assessment, and arousal to LPG sexual stimuli in the laboratory) from each of the others, and saved the standardized residuals from these regressions. These residuals represent variation in each form of erotic responsiveness that is independent of variation in the others. We took their absolute value of these residuals and averaged them. Hence, women with a large value on this index are those whose erotic responsiveness to the LPG in one context is independent of her erotic responsiveness to the LPG in other contexts. This index ranged from .1 to 2.4, with a mean of .80 and a standard deviation of .42.

The third form of fluidity focuses on discrepancy between the gender patterning of one's attractions and the gender patterning of one's sexual partnering. To reflect the gender patterning of women's attractions, we subtracted women's self-reported magnitude of other-sex attractions over the past year from her self-reported magnitude of same-sex attractions over the past year (hence, larger values represent more same-sex than other-sex attractions). To reflect the gender patterning of her sexual partnering, we calculated the percentage of her total sexual partners which were same-sex (hence, larger values represent more same-sex than other-sex partners). We again used regression analysis to predict the gender patterning of women's partnering from the gender patterning of her attractions and saved the standardized residuals. The absolute value of these residuals represents the degree to which a woman's relative pursuit of same-sex versus other-sex partners deviates from her relative self-reported attraction to the same sex versus the other sex. This index ranged from .02 to 3.4, with a mean of .7 and a standard deviation of .65.

The final form of fluidity focuses on the temporal instability of a woman's attractions. As noted earlier, our conceptualization of instability is based on dynamical systems models, which conceptualize the stability of a system as the degree to which its fluctuations consistently "self-correct" to its own homeostatic setpoint (Butner et al., 2015). If a fluctuating system is inherently stable, then when it rises too far above its setpoint, it will subsequently self-correct by declining back toward the set point, and when it falls too far below the setpoint, it will subsequently self-correct by increasing back toward the setpoint. This produces a negative association between the state of the system on Time 1 and change in the system from Time 1 to Time 2. The magnitude of this negative association represents the stability of the system (note that this is the only index in

which greater fluidity is indicated by a larger positive score, and greater stability is indicated by a larger negative score).

To generate an estimate of the dynamic stability of each woman's attractions over the 2-week diary assessment, we used multilevel random coefficient modeling, implemented with HLM (Bryk & Raudenbush, 1992). These models are designed for nested data such as ours, in which variation at one level of analysis (days) is nested within a higher level (persons). In essence, this model calculates a regression for each separate woman, using her 14 days of diary data, to represent her own individual stability coefficient. The regression predicts change in her attractions to the less-preferred gender from 1 day to the next from her attractions to the less-preferred gender on the previous day (Butner et al., 2015; Queen et al., 2016). This model takes the following form:

$$\begin{aligned} \text{Change in attractions day}_t \text{ to day}_{t+1} \\ = \beta_0 + \beta_1(\text{Attractions at day}_t) + \text{residual} \end{aligned}$$

The resulting β_1 slope for "Attractions at day_t" represents dynamic stability. As noted earlier, steeper negative slopes represent more stable systems, in which a woman's attractions to the less-preferred gender "self-correct" to her own homeostatic setpoint (i.e., when attractions deviate above the setpoint on Day 1, they decline from Day 1 to Day 2; when attractions deviate below the setpoint on Day 1, they increase from Day 1 to Day 2). We ran this model within HLM and outputted the slope coefficients as indices of each woman's dynamic stability. These coefficients ranged from $-.3$ to $.4$, with a mean of 0 and a standard deviation of $.1$. As noted earlier, negative coefficients represent greater "self-correction" to one's own setpoint, so that greater fluidity is indicated by larger positive scores.

To illustrate the distribution of each type of fluidity in the sample, Figs. 1, 2, 3, and 4 present stacked histograms of each form of fluidity, stratified by the polarization of women's attractions (predominantly other-sex, predominantly same-sex, or bisexual).

How Do Different Types of Fluidity Relate to Each Other and to Other Features of Sexuality?

We assessed correlations among the four different indices of fluidity (erotic responsiveness to the less-preferred gender, situational variability in erotic responsiveness, discrepancy between sexual attraction and sexual partnering, and temporal instability in attraction) to determine whether they "hang together" as a single dimension.

With one exception, the different forms of fluidity were uncorrelated with one another. Erotic responsiveness to the LPG was uncorrelated with situational variability ($r[74] = .17$) and attraction-partnering discrepancy ($r[74] = .04$), but it was associated with dynamic stability

Fig. 1 Stacked histogram of erotic responsiveness to the less-preferred gender across questionnaire report, daily diary, and laboratory assessment, categorized by women's pattern of attraction

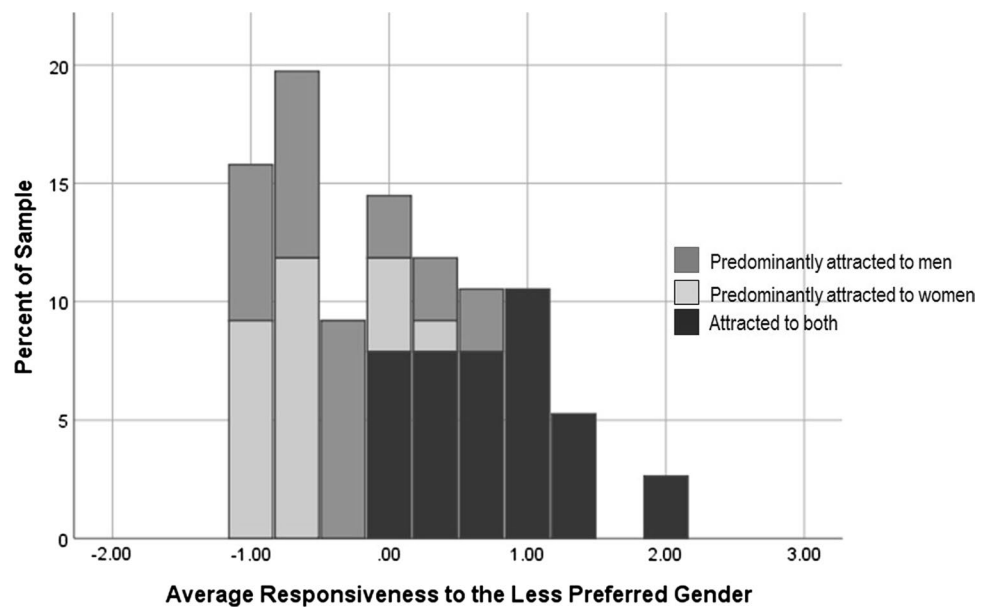
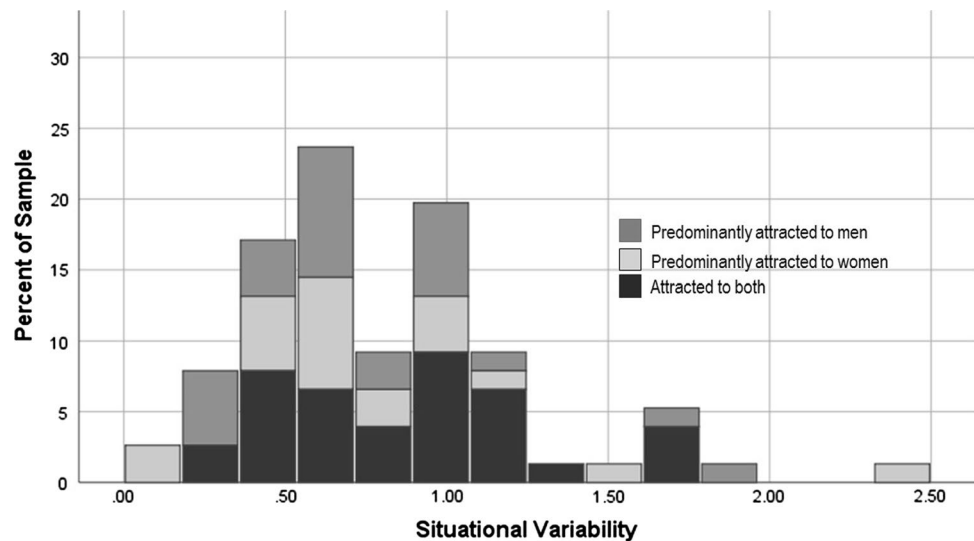


Fig. 2 Stacked histogram of situational variability in erotic responsiveness to the less-preferred gender across questionnaire report, daily diary, and laboratory assessment, categorized by women's pattern of attraction



($r[74] = .26, p < .05$). The positive coefficient indicates that women with stronger overall attractions to the less-preferred gender showed *less* temporal stability in their daily attractions (i.e., more fluidity) across the diary assessment (recall that for the index of dynamic stability, larger negative scores represent greater stability, or “anchoring” to one’s own setpoint). Situational variability was uncorrelated with attraction-partnering discrepancy ($r[74] = -.17$) and dynamic stability ($r[74] = -.01$), and attraction-partnering discrepancy was uncorrelated with dynamic stability ($r[74] = .03$).

We then assessed links between each type of fluidity and other features of women’s sexual profiles: the degree to which her attractions were more bisexual (non-polarized) versus more exclusive (polarized), her average sex drive as assessed across 2-week daily diary, her interest in unrestricted sex (assessed with

the sociosexuality scale), her age of sexual debut, and her lifetime number of sexual partners. The results of these analyses are presented in Table 2.

As shown in this table, each type of fluidity showed a different pattern of associations. The first form of fluidity (average erotic responsiveness to the LPG across different situations) was strongly negatively associated with the polarization (i.e., exclusivity) of a woman’s attractions. This confirms our expectation that this form of fluidity should be the most similar to bisexuality (given that individuals with bisexual attractions are, by definition, more erotically responsive to their less-preferred gender than are individuals with more exclusive attractions). Notably, none of the other types of fluidity was associated with the polarization of women’s attractions.

Fig. 3 Stacked histogram of discrepancy between pattern of sexual attraction and pattern of sexual partnering, categorized by women's pattern of attraction

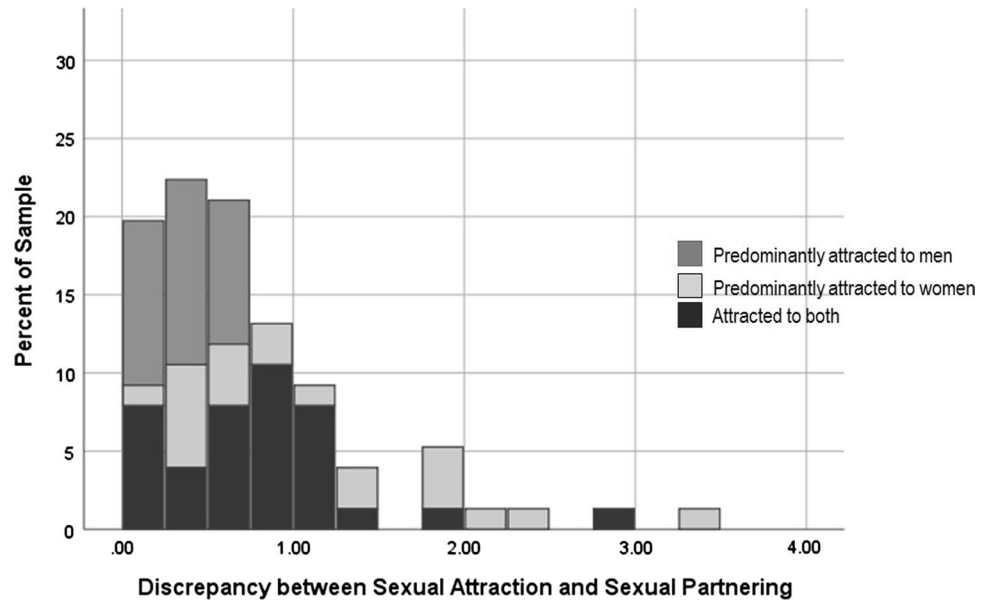
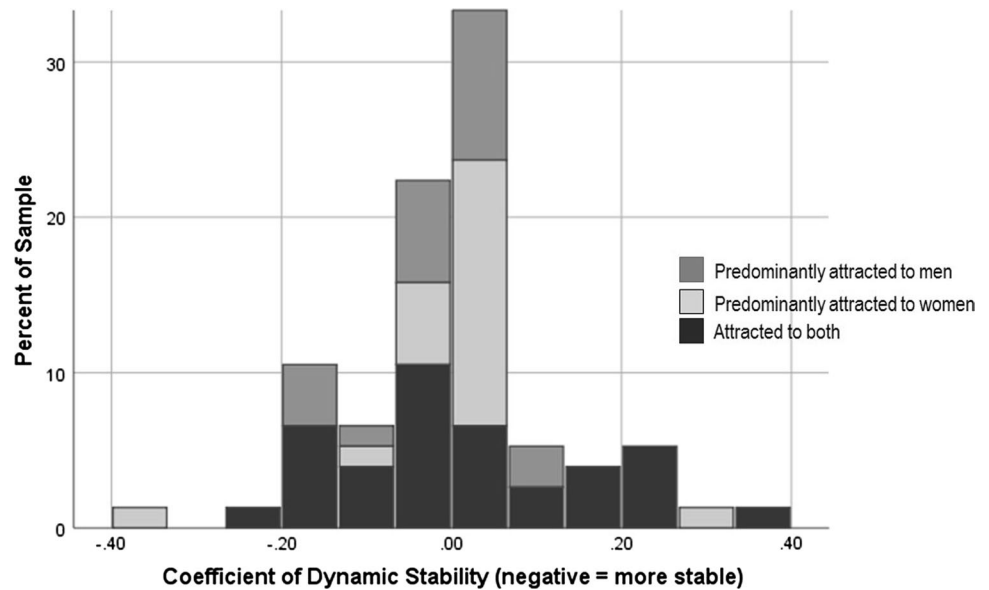


Fig. 4 Stacked histogram of coefficients of dynamic stability in daily attractions to the less-preferred gender over a 2-week period, categorized by women's pattern of attraction



Erotic responsiveness to the less-preferred gender was also significantly associated with sociosexuality and with number of lifetime sex partners. Given that these two variables were also associated with the polarization of women's attractions ($-.38$ and $-.29$, respectively, both p values $< .05$), we ran a regression in which erotic responsiveness to the less-preferred gender was predicted by polarization, sociosexuality, and number of sex partners, in order to test for unique associations involving these predictors. The only variable that remained significant in this model was gender polarization, $b = -.45$, $p < .001$. This supports the notion that the distinguishing characteristic of one's erotic responsiveness

to the less-preferred gender is a capacity for attractions to both men and women.

The second form of fluidity, situational variability in women's erotic responsiveness to the less-preferred gender, was not associated with the polarization of a woman's attractions, and instead was related to an earlier age of sexual debut and a greater number of sexual partners. The third form of fluidity (discrepancy between a woman's sexual attraction and sexual partnering) and the fourth form of fluidity (dynamic stability in day-to-day attractions) were unrelated to the polarization of attractions, sex drive, sociosexuality, age of sexual debut, and total number of sexual partners.

Table 2 Correlations between each type of fluidity and features of women's sexual profiles

	Average erotic responsiveness to the less-preferred gender	Situational variability in erotic responsiveness to the less-preferred gender	Discrepancy between self-reported pattern of attraction and sexual partnering	Dynamic stability in daily sexual attractions (i.e., self-correction to setpoint over time)
Polarization of attractions (lower represents more bisexual)	-.80**	-.01	-.02	-.05
Sex drive	.14	.06	.04	.05
Sociosexuality	.44**	.16	.05	-.06
Age of sexual debut	-.15	-.30**	.05	-.20
Number of lifetime sex partners	.34*	.30**	.05	.02

* $p < .05$; ** $p < .01$

In light of the fact that erotic responsiveness to the less-preferred gender was associated both with bisexuality (i.e., polarization of attractions) and with dynamic stability, we conducted an additional regression predicting erotic responsiveness to the less-preferred gender from both polarization of attractions and dynamic stability, and found that both showed significant associations ($b_{\text{polarization}} = -.50, p < .001$, $b_{\text{dynamic stability}} = 1.50, p < .001$). Hence, women with stronger erotic responsiveness to the less-preferred gender are more “bisexual” in their overall attractions *and* they show less “anchoring” of their day-to-day attractions.

Discussion

These results provide the first systematic study differentiating between distinct forms of sexual fluidity, and they provide powerful evidence that sexual fluidity is *not* a single overarching individual difference dimension, but a multifaceted phenomenon that takes different forms and which has different implications for sexual experience. We theorized four potential types of fluidity: (1) overall erotic responsiveness to one's less-preferred gender, (2) situational variability in erotic responsiveness to one's less-preferred gender, (3) discrepancy between the gender patterning of one's sexual attractions and the gender patterning of one's sexual partnering, and (4) instability in day-to-day attractions over time. We used a combination of questionnaire data, daily diary assessments, and laboratory data to derive meaningful indices of each form of fluidity, and tested how they related to one another and to other features of sexuality in a sexually diverse sample of women. The results significantly expand our understanding of sexual fluidity by demonstrating that it is not, in fact, a unitary construct. The four types of fluidity were uncorrelated with one another (with one exception), and each showed a different pattern of associations with other features of women's sexuality.

A notable finding is that the only type of fluidity associated with bisexuality (i.e., the lack of polarization in a woman's attractions) was overall erotic responsiveness to the less-preferred gender. This concurs with previous research suggesting that heightened erotic responsiveness to one's less-preferred gender is a defining feature of bisexual attractions, and it helps to explain why the construct of sexual fluidity is often conflated with (or attributed to) bisexuality. Yet the findings of the present research substantially expand our understanding of the association between sexual fluidity and bisexuality by demonstrating that this association only holds for one specific type of fluidity: general erotic responsiveness to one's less-preferred gender. Women with less polarized (i.e., more bisexual) attractions were not more likely to show any of the other types of fluidity we assessed (situational variability in attractions, discrepancies between sexual attraction and sexual partnering, or temporal instability in day-to-day attractions). Additionally, we found that although the first type of fluidity was also associated with women's sociosexuality (interest in uncommitted sex) and total number of sexual partners, these associations were no longer significant after controlling for women's bisexuality. Hence, one possible interpretation of our findings is that the first form of fluidity—erotic responsiveness to the less-preferred gender—should not be considered fluidity at all, but rather bisexuality.

The second form of fluidity—situational variability in a woman's attractions—is theoretically closest to the notion that fluidity represents a heightened sensitivity to contextual influences on sexuality (Diamond, 2008a, 2008b), since it captures the degree to which a woman's erotic responsiveness to the less-preferred gender varies across different domains of assessment (self-report of attractions over the past year, average day-to-day attractions reported in the diary, and self-reported arousal to sexual stimuli in the laboratory). Unlike the first type of fluidity (average responsiveness to the LPG across different contexts), the second type of fluidity was

unassociated with the polarization of a woman's overall attractions. Hence, women with more bisexual patterns of attraction do not show more variation in their erotic responsiveness to the less-preferred gender across different contexts. This finding significantly clarifies the persistent debate over links and distinctions between fluidity and bisexuality. As argued by Diamond et al. (2017), the key difference between the construct of fluidity and the construct of bisexuality concerns the element of change: Bisexuality is typically theorized as a consistent pattern of sexual responsiveness to both genders, whereas situational fluidity represents as a capacity for variation in responsiveness across different contexts. Whereas women with greater situational variability in their erotic responsiveness did not have less polarized attractions, they reported an earlier age of sexual debut and a greater total number of sexual partners, perhaps reflecting the fact that women with high situational variability in erotic responsiveness are more responsive to situation-specific opportunities for sexual contact. This might amplify their total opportunities for sexual contact, thereby increasing their total number of sexual partners and accelerating their initial transition into sexual activity.

Discrepancies between women's attractions and their sexual partnering were not associated with any other features of women's sexuality, which may be attributable to the aforementioned fact that sexual partnering is more directly circumscribed by cultural and opportunistic factors than subjective sexual responsiveness. Hence, when a woman's sexual partnering deviates from her pattern of attraction, it is impossible to know whether this reflects her own desires, her responsiveness to an unexpected opportunity, social pressure, or the dynamics of a specific relationship. Additionally, our measure of sexual partnering focused on the ratio of same-sex to other-sex partners in adulthood. This is clearly not the only way to represent the gender patterning of women's behavior: consider a woman who has 50 sexual encounters with the same man, and a single sexual encounter with a woman. Her percentage of same-sex partners would be 50%, but her percentage of same-sex sexual activity would be less than 2%. Future research investigating fluidity between one's attractions and one's behavior should explore different assessments of behavior, across different time scales, in order to determine the relevance of different types of discrepancy. Additionally, qualitative research should investigate women's motives for engaging in "uncharacteristic" or "less desirable" patterns of sexual activity, the proximal contexts for such activity, and women's interpretations of their subjective meaning (Diamond, 2008a, 2008b).

The last type of sexual fluidity—temporal instability in attractions—is the most conceptually and empirically novel, having been used in only one other investigation of temporal variability in sexuality (Diamond et al., 2017, although see Farr, Diamond, & Boker [2014] for a related dynamical

systems approach to modeling temporal change in attractions). A particular advantage of this approach is that it focuses not on the simple observation of change in attraction, but on what happens after this change occurs. Does the original pattern reassert itself? If so, the underlying pattern can be viewed as stable, anchored to the individual's own personal setpoint. If not, the underlying pattern can be viewed as unstable, and more prone to perturbations from and disruptions in the setpoint. This type of instability is conceptually quite distinct from the other types of fluidity assessed in the present study. The only form of fluidity with which it was associated was the magnitude of women's average erotic responsiveness to the less-preferred gender (and this association was independent of the overall polarization of a woman's attractions). We found that women who showed greater overall erotic responsiveness to their less-preferred gender across different contexts also showed more temporal instability (i.e., less "anchoring" to their own setpoint) over the 2-week diary assessment. This concords with the notion that individuals with a greater readiness to be attracted to their less-preferred gender are more fluid than those whose attractions are more strongly anchored to their more-preferred gender.

The lack of an association between temporal instability and situational variability presents interesting questions: On the one hand, one might expect that women with high *situational* variability in their erotic responsiveness will show less temporal "anchoring" in their responsiveness within a single situation. Yet this presumes that similar factors drive both temporal and situational change in attractions, and this presumption remains untested. A key direction for future research is to assess temporal instability across different time scales, and to compare the proximal "drivers" of both temporal change (across different situations) and situational change (over time).

Notably, all forms of fluidity were unrelated to sex drive and sociosexuality (as described above, general attraction to the less-preferred gender was initially correlated with sociosexuality, but this was no longer the case after controlling for the polarization of women's attractions). The lack of associations involving sex drive runs counter to previous research. As noted above, Lippa (2006, 2007) found that among heterosexual and bisexual women, high sex drive was associated with greater attraction to both their more-preferred and less-preferred genders, suggesting that sex drive might amplify non-dominant sexual responses. Yet we did not find that women with higher sex drive were more erotically responsive to the less-preferred gender (the first form of fluidity) or to the other forms of fluidity. Given that Lippa found different linkages between sex drive and sexual attraction among lesbian, heterosexual, and bisexual respondents, we conducted ancillary analyses to examine potential interactions between the polarization of a woman's attractions and

her sex drive in predicting any of the types of fluidity, and found no such effects.

One potential explanation for the difference between Lippa's findings and the present research may concern cohort effects. Lippa's research was conducted over a decade ago, during which there was less cultural visibility and more skepticism regarding individuals who described their attractions as "bisexual" or "mostly heterosexual" (Savin-Williams & Vrangalova, 2013). Hence, one possibility is that the individuals in Lippa's study who were most likely to notice and disclose attractions to their less-preferred gender were those whose high sex drives made it harder to ignore them. Presently, individuals may be more familiar with, and comfortable disclosing, attractions to the less-preferred gender even when those attractions are relatively mild in intensity. Clearly, further investigation of the link between sex drive and different forms of fluidity (not to mention investigation of fluidity in sex drive itself) is an important direction for future research.

Limitations and Future Directions

There are important limitations of the present study. Our sample was relatively small, and although it was adequately powered to detect moderate correlations between the study variables (correlations of .3 or greater) at an alpha of .05, its power to detect small correlations (.2) was less than .5. Hence, before drawing robust conclusions regarding the pattern of associations among different forms of sexual fluidity and other aspects of sexual experience, the results should be replicated with larger samples. Also, although our sample was sexually diverse, we cannot assess its representativeness, and hence the generalizability of the findings remains unclear. The sample contains little ethnic or age diversity, and hence a priority for future research involves replication of these investigations in more diverse samples of women at different stages of the life course. Studying men is another key priority. The degree to which men and women have equal propensities for sexual fluidity remains debated (Diamond, 2016, 2017; Diamond et al., 2017; Ott et al., 2011; Savin-Williams, 1996; Savin-Williams & Ream, 2007; Savin-Williams & Vrangalova, 2013). One possibility is that men and women do not differ in their overall propensity for fluidity but in their specific type of fluidity. This possibility is consistent with the fact that studies assessing different types of fluidity, using different methods, stimuli, and time scales, have yielded mixed findings regarding gender differences (Chivers, 2017; Chivers, Seto, & Blanchard, 2007; Diamond, 2016; Diamond et al., 2017; Spape, Timmers, Yoon, Ponseti, & Chivers, 2014). Hence, perhaps instead of asking whether women are "more fluid" than men, we should instead ask what types of fluidity appear more common among women versus men.

Another key limitation of the study is that our quantitative indices of the four different types of fluidity were directly dependent on the type of data we collected (all of which, notably, relied on self-report, which has inherent

weaknesses), and hence, it is impossible to know the degree to which comparable indices derived from different or more reliable measures might yield different results. Consider, for example, our measure of discrepancy between sexual attraction and sexual partnering. This index relied on self-reported, retrospective data on the ratio of a woman's female and male sexual partners during adulthood. Not only are we unable to verify the accuracy of women's memories, but this measure fails to capture the types of partners that women may have unsuccessfully sought out. Additionally, as noted earlier, the gender distribution of woman's sexual partners does not necessarily represent the gender distribution of her sexual acts. In light of these issues, we are wary of strongly interpreting our index of the discrepancy between women's sexual behavior and sexual partnering until we can reexamine this issue with more comprehensive measures of sexual behavior.

Measurement issues are particularly important for our index of situational variability. The most reliable assessment of situational variability would incorporate assessment of erotic responsiveness across a wide range of situations and contexts, whereas the present study only incorporates three (self-report of attractions over the previous year, daily attractions over a 2-week period, and laboratory arousability to sexual stimuli). Furthermore, there is likely to be "hidden" situational variability across the daily diary assessment, reflecting the fact that one's attraction to the less-preferred gender may depend on how many individuals of that gender one encounters, and whether they are encountered at work, in the grocery store, or at a bar. The inability to assess these additional forms of situational variability is an important weakness of our diary measure, and highlights the importance of collecting additional detail on divergent situational contexts for sexual responsiveness in order to more reliably capture situational variability in individuals' attractions, and individual differences in their *responsivity* to contextual factors.

Another limitation of our research concerns the lack of long-term longitudinal observation. Our measure of temporal stability, for example, focuses on the "anchoring" of a woman's erotic setpoint from day to day, and it is not clear how this might relate to "anchoring" across longer time scales (weeks, months, and years). Long-term longitudinal change in the specific patterning of same-sex and other-sex attractions is relatively common among sexual-minority individuals, particularly those with less polarized attractions (reviewed in Diamond, 2016), and yet the reasons for these changes are poorly understood. Long-term longitudinal change may, in fact, represent its own distinct type of fluidity, distinct from the four discussed here. Hence, a future research should examine whether long-term longitudinal changes in erotic responsiveness correspond to the short-term indices of sexual fluidity used in the present study.

This might help to inform our understanding of the possible psychological mechanisms underlying different forms of fluidity, which is another critical direction for future research. One potential mechanism for sexual fluidity suggested by Diamond and Alley (2019) is that women with more variable patterns of attractions may have a tendency to prioritize their own sexual pleasure over traditional societal restrictions (which dictate that women restrict their amount and type of sexual activity, even if they find “unapproved” sexual activities more pleasurable, Armstrong, England, & Fogarty, 2012). Specifically, a capacity to become aroused to one’s less-preferred gender, coupled with a tendency to prioritize one’s own pleasure despite social norms, might facilitate certain types of sexual fluidity (such as situational variability). Accordingly, one “missing link” in studies of individual differences in fluidity might be individual differences in individuals’ prioritization of sexual pleasure. Future research should integrate the study of sexual pleasure—including individual differences in capacities for pleasure and attitudes about pleasure—into future research on sexual fluidity.

Assessment of other individual difference dimensions that are *not* specifically focused on sexuality would further contribute to our understanding of the potential psychological mechanism underlying sexual fluidity. Currently, little research directly addresses such questions. One intriguing study found that women who described their sexuality as more fluid reported a lower need for structure in their overall life (Preciado & Peplau, 2012), suggesting that a cognitive openness to change and fluctuation may facilitate sexual fluidity (although, of course, it is also possible that women with greater sexual fluidity come to develop a lower need for structure as a result). Other studies have focused on the personality trait of openness to experience. In a large online sample of over 100,000 individuals, openness to experience was higher among nonheterosexuals, and particularly bisexuals, compared to heterosexuals (Bogaert, Ashton, & Lee, 2018). Another study using smaller samples found that bisexual men scored higher on openness to experience than both gay and heterosexual men (Ifrah, Shenkman, & Shmotkin, 2018). Clearly, investigation of whether different types of fluidity show different patterns of association with broader personality dimensions would make important contributions to future research.

Finally, another important direction for future research involves examining temporal and situational fluidity in women’s erotic responsiveness to dimensions other than gender. As elucidated by van Anders (2015), although our society (and the field of sex research) has historically privileged gender-based patterns of sexual attraction, there are clearly other forms of sexual patterning (age, relationship context, type of activity) whose temporal and situational variability warrant attention.

In conclusion, the present research provides important new evidence for different and independent types of sexual fluidity that bear distinct relationships with other features of sexuality. Future research should seek to develop more reliable measures of these constructs and to rigorously investigate their prevalence and implications in larger and more generalizable samples of women and men.

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Compliance with Ethical Standards

Ethical Approval This study was approved by the Institutional Review Board at the home institution of the first author. Informed consent was obtained by all participants, and all procedures were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

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