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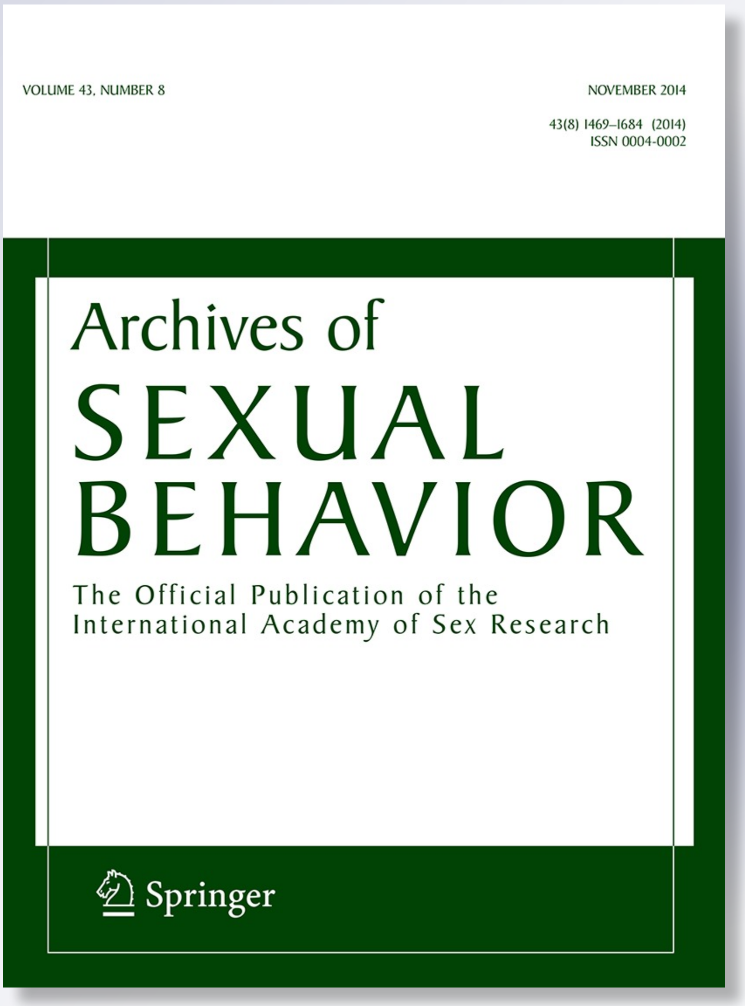
Archives of Sexual Behavior
The Official Publication of the International Academy of Sex Research

ISSN 0004-0002
Volume 43
Number 8

Arch Sex Behav (2014) 43:1477-1490
DOI 10.1007/s10508-014-0378-z



Springer

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ORIGINAL PAPER

Female Same-Sex Sexuality from a Dynamical Systems Perspective: Sexual Desire, Motivation, and Behavior

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Received: 13 February 2013 / Revised: 21 February 2014 / Accepted: 14 April 2014 / Published online: 6 September 2014

Abstract Fluidity in attractions and behaviors among same-sex attracted women has been well-documented, suggesting the appropriateness of dynamical systems modeling of these phenomena over time. As dynamical systems modeling offer an approach to explaining the patterns of complex phenomena, it may be apt for explaining variability in female same-sex sexuality. The present research is the first application of this analytical approach to such data. Dynamical systems modeling, and specifically generalized local linear approximation modeling, was used to fit daily diary data on same-sex attractions and behaviors over a 21 day period among a group of 33 sexual minority women characterized as lesbian, bisexual or "fluid" based on their identity histories. Daily measures of women's reported same-sex attractions were fit using a linear oscillator model and its parameters estimated the cyclicity in these attractions. Results supported the existence of a "core sexual orientation" for women in this sample, regardless of how they identified and despite a high degree of variability in daily same-sex attractions. Thus, modeling individual differences in the variability of attractions and behaviors of sexual minority women may be critical to furthering our understanding of female same-sex sexuality and human sexual orientation more broadly.

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Keywords Dynamical systems analysis · Female sexuality · Sexual orientation · Sexual attraction · Sexual behavior

Introduction

Traditional models describing sexual orientation have generally considered only "homosexual" versus "heterosexual" models. However, recent research with diverse populations of sexual minority persons (i.e., individuals with same-sex attractions, behaviors, and/or identities) suggests a far more complex picture about the development and nature of sexual orientation. Traditional models have tended to suggest sexual orientation is innate, biologically driven, and stable over time. However, findings from recent studies illustrate that same-sex sexuality, particularly female same-sex sexuality, unfolds through multiple developmental pathways, has multiple manifestations, and may have multiple determinants (Diamond, 2005; Diamond & Savin-Williams, 2000; Garnets & Kimmel, 2003; Hyde, 2005; Mustanski, Chivers, & Bailey, 2002; Peplau & Garnets, 2000; Savin-Williams & Diamond, 2000).

Findings from studies specifically exploring female same-sex sexuality consistently demonstrate poor fit with conventional models, since women are more likely than men to report bisexuality (i.e., attractions towards and/or behaviors with same- and other-sex individuals) and women show less stability over time than men in reported attractions and behaviors (Baumeister, 2000; Diamond, 2003a, 2005, 2008a). In effect, developing and testing systematic models of female same-sex sexuality have proven complicated. Dynamical systems analysis offers a suitable approach to analyzing extant longitudinal data regarding female same-sex sexuality (e.g., Diamond, 2008b), which could further our understanding about relationships among sexual orientation, attraction, desire, motivation, and behaviors across time.

Female Same-Sex Sexuality

Numerous studies have demonstrated that female same-sex sexuality is characterized by greater fluidity than is male same-sex sexuality—meaning that it is particularly sensitive to situational, interpersonal, and contextual factors (Baumeister, 2000; Diamond, 2003b, 2005; Peplau, 2001). Women are more likely than men to report changes in their sexual attractions, behavior, and identities over time and across situations, often as a result of changes in their relationships or environments (Baumeister, 2000; Blumstein & Schwartz, 1990; Diamond, 2003a, 2005, 2008c; Weinberg, Williams, & Pryor, 1994). Research also indicates that women are more likely than men to report bisexual patterns of attraction and arousal rather than exclusive same-sex sexuality (Baumeister, 2000; Chivers, Rieger, Latty, & Bailey, 2004; Chivers, Seto, & Blanchard, 2007; Laumann, Gagnon, Michael, & Michaels, 1994; Russell & Consolacion, 2003). Women, more so than men, often highlight the roles of choice, circumstance, and chance in influencing their sexual orientation and identity (Golden, 1996). In fact, some women experience several transitions in sexual identity as a result of changes in relationships, attractions, and experiences (Diamond, 2003a, 2005). Lastly, women often engage in sexual behavior that may seem counterintuitive given their reported attractions and identities (e.g., women who have nearly exclusive heterosexual attractions having sex with women and women who have predominantly same-sex attractions pursuing sex with men) (Bell, Weinberg, & Hammersmith, 1981; Diamond, 2003a, 2005; Weinberg et al., 1994). Thus, studies of female sexuality have emerged as demonstrating it to be unique from male sexuality in several ways, particularly as characterized by its fluidity.

However, not all women are sexually "fluid" or show such "plasticity" (Baumeister, 2000). The patterns of same-sex sexuality for some women fit rather well with more traditional models of sexual orientation, since some women report nearly exclusive and stable attractions toward and behaviors with members of the same-sex, identify consistently over time as lesbian, and describe their sexuality as something intrinsic that is impervious to conscious control (Diamond, 2005, 2008c; Golden, 1996). Such variability among women makes it particularly important to identify the underlying mechanisms and dynamics of female sexual fluidity.

A Dynamical Systems Perspective

Dynamical systems models are ideal to further our understanding of female same-sex sexuality, since these models focus on describing dynamics of underlying variables in systems and how nonlinear changes in experience and behavior occur over time. Furthermore, because sexual attractions and behaviors involve dynamic and complex interactions among biological (e.g., genes, hormones, and maturational state) and social influences (e.g., situational, interpersonal, and cultural contexts), a dynamical systems perspective could be beneficial in sexuality studies (Savin-Williams & Diamond, 2004; Tolman & Diamond, 2001).

Dynamical systems models attempt to explain the order and patterning of complex physical phenomena in the natural world (e.g., Kelso & Tuler, 1984) and may prove better suited to explaining variability in female same-sex sexuality than have traditional models. Specifically, traditional models have not been able to adequately conceptualize phenomena such as within-person variability and nonlinear change in women's same-sex sexuality over time and across different environments. Historically, such phenomena have been discounted as idiosyncratic and unexplainable "noise" in the data, reflecting the long-standing presumption that same-sex sexuality is a fundamentally stable trait (Diamond, 2008c). When change over time has been studied, it has only been in the context of the classic "coming out" process, the linear "unfolding" of same-sex attractions and desires that culminates with the individual's eventual realization, acceptance, and integration of his/her same-sex orientation and identity. The specific contribution of a dynamical systems approach is that it would treat change over time as a fundamental characteristic of the system, rather than an atypical aberration.

One particularly important contribution of the dynamical systems approach is its capacity to reconcile both stability and change. As noted earlier, not all women appear equally "fluid" in their same-sex attractions, behaviors, and identities. Similarly, the substantial within-person variability that has emerged in studies of women's same-sex sexuality should not be taken to suggest that women will tend toward progressively increasing (and increasingly idiosyncratic) variability in their sexual experiences and self-concept over time. Rather, there appear to be both constraining and propelling influences on women's propensities for change and the degree of change which occurs over time (including both biological and cultural factors). Over time, synergistic interactions between these propelling and constraining influences tend to channel individuals in regular, albeit flexible, trajectories. Dynamical systems models are ideally suited to modeling such interactions and representing the co-occurrence of global stability of sexual orientation combined with local variability in attractions and behaviors.

The Present Study

Previous research has examined differences between the sexual attractions and behaviors of women with lesbian, bisexual, and other sexual identifications (such as queer-identified and "unlabeled" women) and those comparisons have yielded somewhat mixed results. For instance, lesbian women have been found to report greater attractions to women than do bisexual women, but lesbian women are often not exclusively attracted to women (e.g., Diamond, 2008a). For reasons such as this, there continues to be debate about the distinction between lesbian and bisexual women. As a result, there remain questions about how fluidity operates among women with different self-ascribed sexual identities. Although previous research has examined the amount of same-sex and other-sex attractions and behaviors reported by women with different identities, no study to our knowledge has examined whether women in these different groups might also be distinguished by patterns of dynamic variability in their attractions. For example, perhaps a distinguishing feature of lesbianism as opposed to bisexuality has to do with the day-to-day stability of a woman's same-sex attractions, rather than the simple ratio of same-sex to other-sex attractions. Similarly, perhaps the difference between bisexual and fluid women (who otherwise appear quite similar given that they both report sexual attractions to both men and women) has to do with the regularity of their pattern of attractions over time. Thus, dynamical systems models could help to address whether the distinction between lesbian and bisexual women—and between bisexual and fluid women—is one of degree or kind. The present study provides the first empirical application of dynamical systems modeling to data on within-person variability (in this case, day-to-day change over a 21 day period) in female same-sex sexuality. While it must be acknowledged that 21 days is a relatively short span of time, we believe that our data will be useful in providing a starting point to examine the utility of a dynamical systems approach for studying female same-sex sexuality.

Modeling Specifications and Hypotheses

Our tested model was based on a differential equation and structural equation modeling, using derivatives estimated by generalized local linear approximation (GLLA) modeling (Boker, Deboeck, Edler, & Keel, 2010). GLLA offers a method of estimating first and second order derivatives and separating these time-dependent components of the data from time-independent components. Once GLLA estimates of first and second derivatives are obtained, a differential equation can be used to test the relationship between sexual desire and its derivatives. Thus, a model of the dynamics of sexual desire can be specified and fit to individuals' data over the 21 day period.

The simplest form of this model can be specified as:

$$x_t'' = \eta x_t + \zeta x_t' + e_t$$

With this differential equation model, GLLA produces estimates of the displacement, velocity, and acceleration of each individual's same-sex attractions at each occasion of measurement. In this case, *displacement* (x_t) is the value of the attractions, behaviors, or other dependent variable measured each day and centered at equilibrium. *Velocity* (x_t') is the first derivative of the variable mathematically and it represents how quickly the variable of attractions or behaviors is changing over time (i.e., the slope). *Acceleration* (x_t'') is the second derivative of the variable being measured. Acceleration describes how the rate of change in the variable (the velocity) is changing over time. In other words, acceleration describes how quickly an individual's patterns of attractions and behaviors change over time. Parameters of stiffness, η, and damping, ζ, are constants less than zero, and e_t represents the error term. Statistical power has two sources in this GLLA modeling: within-person reliability of estimation of the self-regulation parameters and between-persons reliability of estimation of individual differences in those parameters. There is at least some indication that GLLA has more power than would be naively expected (von Oertzen & Boker, 2010).

The *stiffness* parameter is related to the displacement term in the equation above and relates to how a self-regulating system responds to being at some displacement (i.e., distance) from its own equilibrium (i.e., homeostatic set point). When some external event or force changes the system such that it has been moved away from its equilibrium, the self-regulating process tends to accelerate back towards its equilibrium. The greater the stiffness in the system, the faster the system would tend to oscillate around its equilibrium. In terms of the present data, stiffness can be described as a force keeping a woman's patterns of attractions and behaviors from departing too far from an equilibrium or homeostatic value. One might think of stiffness as broadly reflecting the core "strength" of an individual women's sexual orientation (i.e., same- or other-sex attractions)—resistance to moving too far away from one's core sexual orientation.

It is reasonable that a woman would regulate so as to maintain attractions and behaviors within some comfortable range of an equilibrium. But also, it is reasonable that a woman might not want to change too rapidly. *Damping* is related to the velocity term in the equation above and is the part of the self-regulation that avoids changing too rapidly. When day-to-day change is high, this damping part of self-regulation acts to slow the change down. Damping can thus be thought of as resistance to change in a woman's patterns of attractions and patterns. If change is occurring too rapidly, damping tends to slow this change, so as to maintain an individual's interpersonal image of self-consistency. In this sample, damping could reflect social influences that constrain an individual from exhibiting too much day-to-day change in particular attractions or behaviors. Of course, there may be individual differences in both stiffness and damping—not all women would be expected to self-regulate in the same way.

Using GLLA, we used one model to test three specific hypotheses that could explain three different types of meaningful variability in day-to-day sexual attractions and behaviors. The first hypothesis represents the presumption that all women are fundamentally bisexual and that their situational circumstances and opportunities determine whether they end up having more same- or other-sex attractions and behavior. One can imagine that each woman possesses a single point *attractor*—akin to an equilibrium point somewhere between exclusive same-sex and exclusive other-sex attractions or behaviors. Although her attractions will tend to gravitate toward this bisexual homeostatic midpoint over long stretches of time, on a day-to-day basis her sexual desires and behaviors can swing quite far from this midpoint (toward same-sex or other-sex attractions) and then back toward it like a pendulum.

In dynamical systems terminology, this first hypothesis describes a *damped linear oscillator* model, where variability in both directions is determined by the parameters of stiffness and damping. Linear in this case refers to the fact that the differential equation describing the model is a linear combination of variables even though the resulting pattern of behavior may follow a nonlinear trajectory. This first hypothesis may best fit the patterns of consistent bisexual women. It is possible that all women are "born bisexual," but some women are more easily "pulled" than others in the direction of same-sex or other-sex attractions and behaviors. Bisexual women, however, may be more strongly "stuck" at the equilibrium midpoint of the point attractor in this model. If this model were to fit the data for all women in this sample, it could suggest that all women may be bisexual in attractions and behaviors. Alternatively, if lesbian (or heterosexual) orientations exist, then this damped linear oscillation model should only fit bisexual women in the sample. Thus, we refer to this as the "bisexual orientation" hypothesis.

However, our second hypothesis describes a model using the same differential equation for a damped linear oscillation model, but with an unstable equilibrium midway point (rather than a stable homeostatic midpoint described for the first hypothesis). This unstable equilibrium point is produced by a point *repeller*, in contrast to a point *attractor* as in the first hypothesis. With a point *repeller*, an individual would be inclined more toward either same-sex or other-sex desires or behaviors over time, depending on initial conditions. This second hypothesis would be supported when both stiffness and damping in the linear oscillation model are positive in value and may best fit the patterns of consistent lesbian women. This second hypothesis, unlike the first one, describes a model allowing for "real" lesbian orientations, which "pull" behavior toward them. If lesbian women do, in fact, have core sexual orientations (notwithstanding the capacity for variability outside of that range from time to time), then this model should best fit the lesbian women in the sample. (If heterosexual women were included in this sample, this second hypothesis would also be expected to best fit their patterns of attractions and behaviors). Thus, we call this the "core orientation" hypothesis.

Yet, a third hypothesis described by a *nonlinear oscillation* model in dynamical systems is also possible. This involves two *point* attractors and two stable outcomes (same-sex or other-sex attractions or behaviors) with possible oscillations between the two. In a nonlinear oscillation model, the differential equation includes two variables that are multiplied together (e.g., sexual attractions or behaviors with both same-sex and other-sex individuals). This third hypothesis would be expected for women whose patterns of sexual desire and behavior are characterized by notable fluidity across time. In other words, the nonlinear oscillation model allows for the possibility of "non-orientation," i.e., there could be several competing attractors with frequent oscillation but no "core." This model would be true if women had no orientation and the idea that there is no candidate mechanism for women's sexual orientation, at least not one directly connected to sexual arousal patterns, has been argued recently by some researchers in this area (e.g., Bailey, 2009). Thus, we refer to this as the "non-orientation" hypothesis.

We expected women in the two groups to differ from one another in their patterns of day-to-day variability in sexual attractions and behavior. Specifically, we expected lesbian women to be more likely to report same-sex sexual attractions and behaviors than bisexual women. Bisexual women would be likely to report more other-sex sexual attractions and behaviors than lesbian women. Regarding the dynamical systems model tested, we had the following hypotheses:

Hypothesis 1, the "bisexual orientation" hypothesis, would best fit the patterns of sexual attraction and behavior for bisexual-identified women. If Hypothesis 1 resulted in the best fitting model for the whole sample, this would support the notion that all women are fundamentally bisexual.

Hypothesis 2, the "core orientation" hypothesis, would best fit the patterns of sexual attraction and behavior of lesbian-identified women. Hypothesis 2 supports the notion that all women have a "core" sexual orientation. If Hypothesis 2 provided the model with the best fit for the whole sample, this would suggest that women are not truly "bisexual." Rather, women tend to consistently demonstrate either same-sex or other-sex attractions and behaviors despite some variability.

Hypothesis 3, the "non-orientation" hypothesis, would likely provide the best fit for the patterns of sexual attraction and behavior exhibited by women who are more fluid in their sexuality. Hypothesis 3 suggests that women demonstrate variability in both same-sex and other-sex attractions and behaviors without an underlying core sexual orientation. If Hypothesis 3 resulted in the best fitting model for the whole sample, this would indicate that women do not have a fundamental sexual orientation and rather are truly fluid in sexual attractions and behaviors.

These three hypotheses were tested in comparison to one another and also to evaluate whether different hypotheses explained the attractions and behaviors of different groups of non-heterosexual women best. Furthermore, several covariates were included in the models to explore interactions with the main dependent variable of reported same-sex sexual attractions (the acceleration term in the equation) as well as to evaluate whether these additional variables were responsible for driving patterns of same-sex attractions. These covariates were daily intensity of attraction to women and to men, daily sex drive, daily sexual activity (with or without a partner), and daily sexual activity with a female or male partner. We did not have specific hypotheses regarding the covariates included in the dynamical model tested; these analyses were seen as exploratory. The covariates were included in the models because we expected that factors such as sex drive, sexual activity, and intensity of attraction to women and to men would be related to the degree to which participants would report same-sex attraction and we were interested in exploring the relationships among these variables in this sample of sexual minority women. In sum, the hypotheses tested represented different ways to understand variability in women's sexuality.

Method

Participants

The present research incorporated data on day-to-day variability in same-sex attractions, motivation, and behavior, which were collected from a subset of original participants in an ongoing longitudinal study about sexual identity development (Diamond 1998, 2008a). Dating back to 1995, the study involved collection of detailed interview data (approximately every 2 years) on women's sexual identification, sexual behavior, and their same-sex and other-sex attractions. As part of the study, women participated in five interviews (approximately 2 years apart) assessing sexual attractions, behaviors, and identities (for more details on the range of interview questions and responses, see Diamond, 1998, 2008a).

The subsample of 33 non-heterosexual women included here were divided into three different groups based on their identity and behavior histories: *lesbians*, who showed consistent patterns of lesbian identification and nearly exclusive same-sex attractions over the past 10 years; *bisexuals*, who showed consistently bisexual identification and attractions over the past 10 years; and *fluid women*, who showed inconsistent patterns of same-sex attractions and identification over the past 10 years (for a more detailed discussion of these and other heuristic typologies for sexual minority populations, see Diamond, 2005). Only three "fluid" women provided sufficient data to be included for the current study, so separate analyses comparing this subgroup to lesbian and bisexual subgroups were not possible. We include descriptive information about the fluid women and their data were considered in the analyses with the whole sample ($N = 33$).

The original sample from 1995 was comprised of 89 non-heterosexual women; 79 of these original participants were still in the study in 2007. Initial sampling occurred at a variety of settings, from lesbian, gay, and bisexual community events and youth groups in several smaller rural and urban communities and two moderately-sized cities in central New York state (35 % of original sample), college courses on sexuality and gender taught at a large, private university in central New York (36 % of original sample), and lesbian, gay, and bisexual student groups at large public and private universities, as well as a small, private women's college, in central New York (29 % of original sample). No previous findings from the larger longitudinal research project have been found to vary as a function of recruitment site (e.g., Diamond, 1998, 2000, 2003a).

All of the participants in the longitudinal study were invited to participate in the current study. Of the 51 women who expressed interest in participating, 5 were ineligible because they were pregnant or nursing, and 1 additional woman had recently had a hysterectomy (estrogen data were collected for a related project and hence these women could not be included). An additional 12 women provided too few data for analysis and were eliminated. Thus, a total of 33 women who were eligible participated in the current investigation. We found no significant differences between the study participants and the rest of the sample in terms of average attraction to women over the entire course of the study (i.e., since 1995), ratio of same-sex to other-sex behavior over the course of the whole study, age of first sexual questioning, and age of first consciously remembered same-sex attraction.

In terms of demographic characteristics, women were, on average, 30 years of age (SD = 1.5). The majority (94 %) were white and most were well-educated (67 % had a college degree and at least some graduate school). Regarding socioeconomic status (SES), 64 % described their family background as middle or upper class (25 % upper, 39 % middle, and 36 % lower) and 71 % described their current SES as middle or upper class (29 % upper, 42 % middle, and 29 % lower).

Measures

To measure daily fluctuations in sexual attractions, motivations, and behaviors, participants completed an online questionnaire each day for 21 days regarding their daily levels of sexual attraction to both women and to men, as well as their daily sexual motivations and behaviors. 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." The daily diary questions included 17 items and addressed: (1) the number of women and men to whom they felt attracted, (2) the intensity of each attraction, (3) their motivation to engage in sexual activity as a result of their attraction, and (4) actual sexual activity (with or without a partner).

To evaluate generalized daily sex drive (i.e., desire for sexual activity—regardless of whether this activity was with a partner or not and regardless of a partner's sex), women rated how frequently they had thought about sex, felt sexually aroused, had a sexual fantasy, and how frequently they had found another person attractive at any point during that day (not at all, 1–2 times, 3–4 times, or more than 5 times). This index had a Cronbach's alpha of .79.

To evaluate the specific strength of same-sex motivation, women were prompted to think about the strongest attraction to a woman they had experienced that day and rate how strongly they had wanted to act on that attraction on a 1–9 scale. Higher scores indicate a stronger desire to act on that attraction. Participants also answered the same questions with regard to attraction to a man. Thus, data describing participants' sexual desire for women and for men were collected each day. Lastly, participants reported whether they had any sexual activity that day that was solitary or partnered (with either female or male partners).

Table 1 Means and SDs of variables related to same-sex attractions and behaviors among lesbian, bisexual, and fluid women over 21 days

Variable	Lesbian ($n=11$) M (SD)	Bisexual ($n=19$) M (SD)	Fluid ($n=3$) M (SD)
Attractions			
Same-sex attractions	.61 (.60)	−.18 (.57)	−.91 (.38)
Sex drive	−.01 (.72)	.07 (.80)	−.29 (.80)
Attraction intensity (women)	.52 (.66)	−.16 (.63)	−.73 (.34)
Attraction intensity (men)	−.51 (.38)	.24 (.81)	.15 (.97)
Felt desirable to others	.19 (.53)	−.09 (.70)	.03 (.87)
Behaviors			
Any sexual activity	.34 (.44)	.31 (.39)	.27 (.43)
Sex (female partner)	−.36 (.31)	−.42 (.15)	−.50 (.00)
Sex (male partner)	−.50 (.07)	−.33 (.32)	−.36 (.34)

The means for the attraction variables represent z-scores centered at zero for the sample. A score of 0 is equivalent to the sample mean. Positive and negative values indicate whether the score is above or below the mean. Behavior variables are coded as 0 = no, 1 = yes for frequency of any sexual activity each day, and −.5 for no and .5 for yes for sex with a female or male partner each day

Procedure

For the current study, 33 participants completed an online daily diary assessing daily sexual desires for women and/or men and daily sexual activity. Women began the diary entries the first day of their menstrual period and completed it for approximately 18–21 days. Women were given a calendar to keep track of their completion of daily study procedures, and were instructed to mark "Day 1" on the first day they began menstruating. A secure server at the University of Utah was used to maintain the online diary. Each day, participants were instructed to complete the diary just before going to bed. Each participant logged onto the server with a unique login and password and each individual entry was date and time-stamped. As an alternative, two participants completed paper copies of the diary. There were no significant differences, however, in results from paper and online entries. The current study was approved by the University of Utah's Institutional Review Board.

Results

Analytic Strategy

As noted earlier, a dynamical systems model was developed to test the specific hypotheses in the study. The model was created using a linear differential equation and structural equation modeling that allowed for goodness of fit tests. The second order linear differential equation used was $\ddot{x}_t = \eta x_t + \zeta \dot{x}_t + e_t$. In order to determine the specific differential equation representing the model used in this study, approximations of first and second derivatives (velocity and acceleration, respectively) of each variable were calculated at each occasion of measurement using GLLA (as described earlier). Additional parameters of the model were also determined using GLLA. For example, damping parameters (ζ) were calculated to determine whether they were positive or negative in value. In dynamical systems modeling, a negative damping parameter suggests the model would be based on a point *attractor*; if positive, the model would be based on a point *repeller*. A dynamical systems model was first tested to fit the whole sample of 33 women. Secondly, the model was fit to the two subgroups of lesbian and bisexual women.

Descriptive Statistics

Means and SDs for each variable of sexual attraction, desire, and behavior for lesbian, bisexual, and fluid women are shown in Table 1.

Lesbian and bisexual women reported greater same-sex attraction overall than did fluid women, but it did not appear that lesbian and fluid women were more exclusive (less variable) than bisexual women in their desires and attractions for women (Table 1). Lesbian women were less variable in their intensity of attraction to men than bisexual and fluid women; fluid women were less variable in their intensity of attraction to women than were bisexual and lesbian women. Overall, variability in attractions and motivations for women was similar. There was more variability in attractions and motivations than actual sexual behaviors across the entire sample (Table 1). Lesbian and fluid women were more exclusive than bisexual women in their sexual behaviors. In fact, lesbian

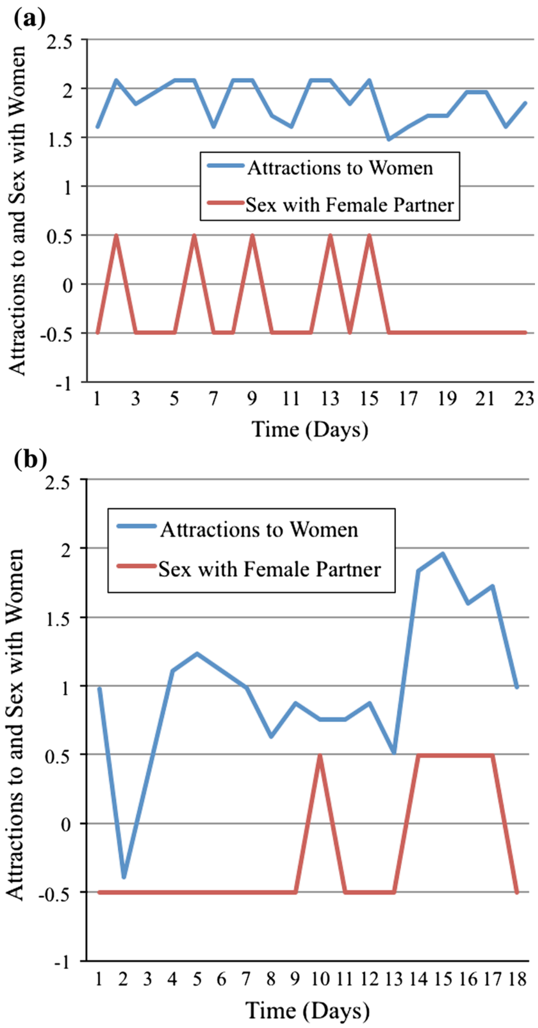

Fig. 1 **a** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (lesbian individual #1). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner). **b** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (lesbian individual #2). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner)

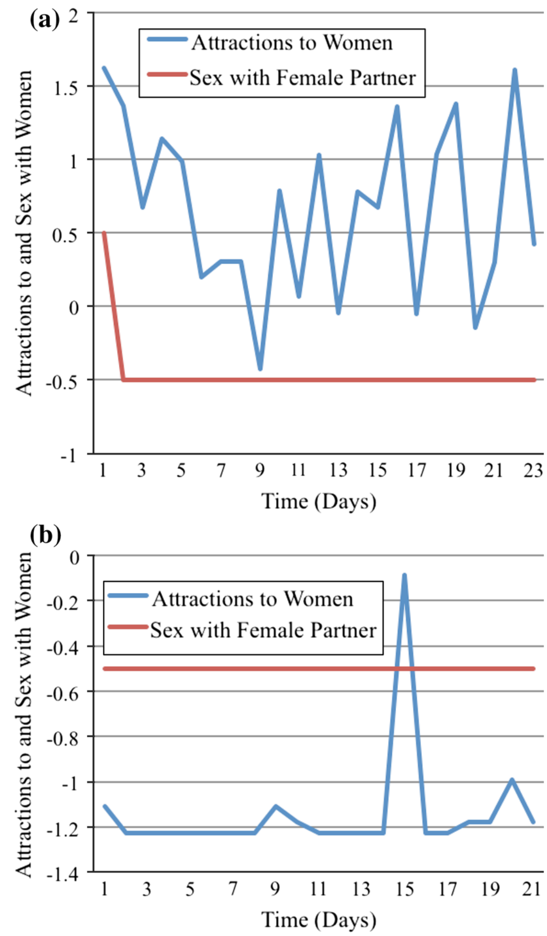

Fig. 2 **a** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (bisexual individual #1). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner). **b** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (bisexual individual #2). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner)

women reported only female partners and fluid women reported only male partners while bisexual women, as a group, reported sexual activity with both female and male partners (Table 1).

In most cases, women's attractions and behaviors appeared congruent. Lesbian women appeared to lean toward exclusively same-sex attractions and behaviors, fluid women appeared to lean toward exclusively other-sex attractions and behaviors, and bisexual women often were intermediate to lesbian and fluid women in their attractions and behaviors (Table 1). There were, however, numerous instances in which sexual attractions and behaviors did not mirror one another, when examined across all women. Figures 1, 2, 3 depict example plots of daily fluctuations in same-sex attractions and behaviors contrasted among the same-sex attracted women in this sample. To represent individual variation in daily patterns of same-sex attractions and behaviors, Fig. 1 depicts two lesbian individuals, Fig. 2 depicts two bisexual individuals, and Fig. 3 depicts two fluid individuals.

Evaluation of Dynamical Systems Models

Preliminary Autocorrelation Analyses

Plotting autocorrelations among variables in a particular dataset yields important information about whether a dynamical systems model is appropriate for fitting the data. To do so, the first step was to center the variable means at an estimated

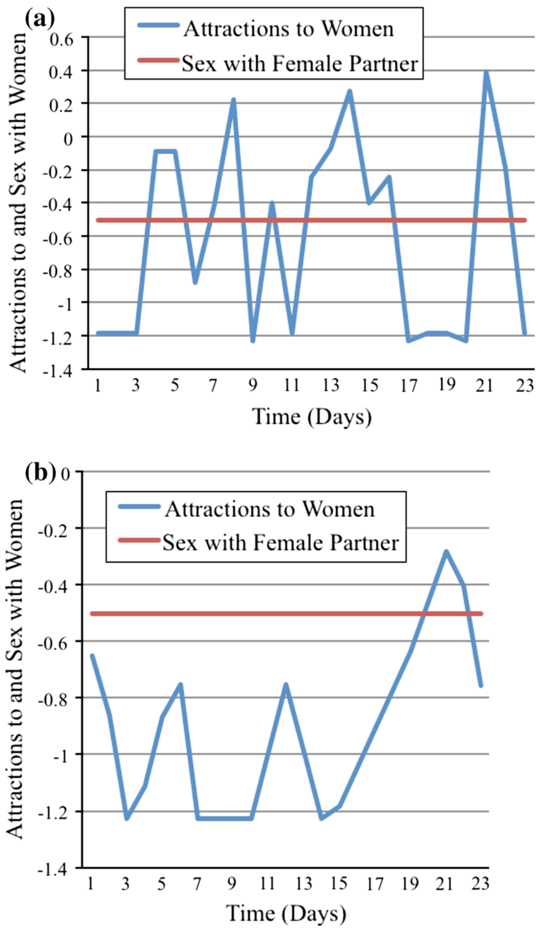

Fig. 3 **a** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (fluid individual #1). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner). **b** Example of daily fluctuations in same-sex attractions and sexual activity with a female partner over 21 days (fluid individual #2). The attraction variable is scaled as a z-score for the sample. The sex with women variable is scaled from −.5 (no sex with female partner) to .5 (sex with female partner)

equilibrium value by using the residuals from linear trends, which were fit individually through each participant's time series. Preliminary analyses of the autocorrelation plots of participants' daily attraction to women revealed that the data crossed and fell below the 95 % confidence interval describing the autocorrelation. When the data demonstrate such a pattern, this suggests that there is a periodic or cyclic structure to the data and that dynamical systems modeling is appropriate to use. Here, the autocorrelation data indicated that using a second order linear oscillator model would be important in evaluating women's daily sexual attractions. Since the data spanned a time period of 21 days, time-delays were chosen so that the total interval covered across all columns of our time-delay embedding matrix was about one-half of the period, or 10 days. Previous simulations have shown that there is minimum bias in the frequency parameter when the coverage of the embedding matrix is near one-half of the period (e.g., Boker & Nesselroade, 2002).

Autocorrelation plots were also created for several other potential covariates with means centered at equilibrium points, in addition to participants' daily attraction to women. These additional variables were considered relevant to the key variable of interest (same-sex attraction) in the analyses and they included daily sex drive, daily intensity of attraction to women or to men, daily sexual activity (with or without a partner), and daily sexual activity with a female or a male partner. Again, preliminary analyses revealed that all the covariates had autocorrelation patterns that fell below the 95 % confidence interval. This suggested that all these covariates also had some sort of periodic structure, similar to daily attraction to women; thus, the covariates were appropriate to include for testing using dynamical systems modeling.

Generalized Local Linear Approximation

A series of GLLA models were examined that were generated by the second order linear differential equation:

$$x_t'' = \eta x_t + \zeta x_t' + e_t.$$

The results of GLLA estimation were run in R with linear mixed effects modeling (Boker et al., 2010). The data were analyzed using several options of embedding dimensions, including the embedding window (d) and the time delay, or tau (τ). Time delay embedding involves structuring data by constructing a data matrix of overlapping samples before running analyses. As compared with use of standard independent rows of panel data, time delay embedding has been shown to enhance the precision of parameter estimates, which serves to increase statistical power (von Oertzen & Boker, 2010). Our GLLA results are shown in Table 2 with five different choices of embedding dimensions: (1) $d=10, \tau=1$, (2) $d=7$, $\tau=1$, (3) $d=11$, $\tau=1$, (4) $d=12$, $\tau=1$, and (5) $d=13$, $\tau=1$. The results of GLLA estimation for three different choices of tau (τ) are also shown in Table 3: (1) $\tau=1$, $d=12$, (2) $\tau=2$, $d=7$, and (3) $\tau=3$, $d=5$, all which result in a coverage of 12 observations.

Next, the results for fitting data centered at equilibrium points, and sample means, are presented. In addition, results from individually fitting the GLLA model to the two subgroups of women (lesbian and bisexual) to assess differences and similarities in fit are included.

Determining the Embedding Dimensions

The first step in GLLA modeling was to determine and set the model parameters. Tau (τ) was set at 1, since the time delay between observations was one day. DeltaT, or the time between observations, was set at 1, representing one-day intervals. The order of the model was set at 2, representing a model with both

Table 2 Estimates of GLLA model parameters for different window choices (d)

d	Model	N	η	SE	t	p	ζ	SE	t	p	AIC	BIC	LL	df
7	No interaction	497	−.26	.02	−14.32	.000	−.01	.03	−.33	.74	−1128.71	−1111.90	658.36	463
7	Interaction	497	−.25	.03	−9.81	.000	−.01	.03	−.33	.74	−1088.04	−1041.95	555.02	456
10	No interaction	398	−.14	.01	−15.59	.000	−.01	.02	−.55	.58	−1644.18	−1628.25	826.09	364
10	Interaction	398	−.14	.01	−10.23	.000	−.01	.02	−.56	.58	−1595.16	−1551.56	808.58	357
11	No interaction	365	−.12	.01	−17.97	.000	.08	.02	.44	.66	−1696.46	−1673.09	854.23	331
11	Interaction	365	−.12	.01	−11.51	.000	.01	.02	.59	.56	−1642.94	−1592.56	834.47	324
12	No interaction	332	−.10	.01	−19.36	.000	.01	.02	.61	.55	−1725.30	−1702.51	868.65	298
12	Interaction	332	−.10	.01	−12.05	.000	.01	.02	.56	.57	−1668.62	−1619.51	847.31	291
13	No interaction	299	−.09	.004	−20.91	.000	.001	.01	.05	.96	−1694.00	−1679.22	851.00	265
13	Interaction	299	−.08	.01	−12.91	.000	.02	.02	.87	.38	−1642.00	−1594.29	834.00	258

Table 3 Estimates of GLLA model parameters for different choices of tau (τ)

	$\tau=1$ $d=12$	$\tau=2$ $d=7$	$\tau=3$ $d=5$
N	332	299	299
η	−.10	−.08	−.07
SE	.01	.01	.004
t	−19.36	−18.17	−17.87
p	.000	.000	.000
ζ	.01	−.01	−.01
SE	.02	.02	.02
t	.61	.48	−.50
p	.55	.63	.62
AIC	−1,725.30	−1,581.05	−1,498.78
BIC	−1,702.51	−1,558.89	−1,476.61
LL	868.65	796.53	755.39
df	298	265	265

first and second derivatives. To ensure the appropriate embedding window (d) was used, a linear mixed effects model was run with windows (d) of about 10 days (i.e., a half-cycle, plus or minus a few days) to determine the best fitting model parameters. Estimates of the parameters are shown in Table 2. To determine whether a better fitting model would result from the inclusion of several covariates (mentioned above), possible interactions between same-sex attractions and covariates were evaluated. A window of 12 days was found to fit the data significantly better than would be expected by chance and better than with a window with 7, 10, 11, or 13 days (Table 2). The models with interactions fit less well and the second derivative, as well as the interaction terms, remained nonsignificant. Thus, it appeared that none of the covariates included were fundamental in driving women's patterns of same-sex attraction. In sum, $d=12$ days and $\tau=1$ (estimates of the parameters resulting from different choices of tau (τ) are shown in Table 3) were determined to be the best values with which to embed the data and covariates were left out of subsequent models tested.

The final model, with τ of 1 and $d=12$, provided damping and stiffness parameters of and $\zeta=.01$ and $\eta=-0.10$. A positive damping parameter (ζ), as in this model, suggested the presence of a point *repeller* operating in the linear oscillator model. A damped linear oscillation model with a point *repeller* supported the second hypothesized model, in which women are "pulled" toward either same-sex or other-sex attractions over time. Thus, the fit of this model suggested the presence of a "core" sexual orientation fitting the patterns of attraction for the 33 women in this sample. The slightly negative frequency parameter of the overall model (given by the negative stiffness parameter, η) indicated that the period of fluctuation in women's same-sex attractions slowed over time. The displacement parameter was slightly positive (given by the positive damping parameter, ζ), suggesting that the fluctuations in women's same-sex attractions amplified over time. Figure 4 depicts a trajectory of women's fluctuations in same-sex attractions, based on these determined ζ and η parameters, over a theoretical time period of 90 days (or approximately 3 months).

Centered at Equilibrium vs. Centered at Sample Means

The next step of the analysis, after determining the appropriate embedding dimensions and initial fit of the linear oscillator model, was to evaluate the model fit at equilibrium points versus sample means. Given that the lesbian and bisexual subgroups of women were both similar to and different from each other in terms of attractions and behaviors, it was important to decipher whether the equilibrium point for each of the variables tested was the same for each group of women or whether an alternative model accounting for only the sample means could fit the data better.

First, a linear oscillation model (with embedding dimensions as determined above) was conducted with each variable centered at the grand mean. To do so, the sample mean was set at zero (group means were removed) and this created an equilibrium point for each variable from which each indi-

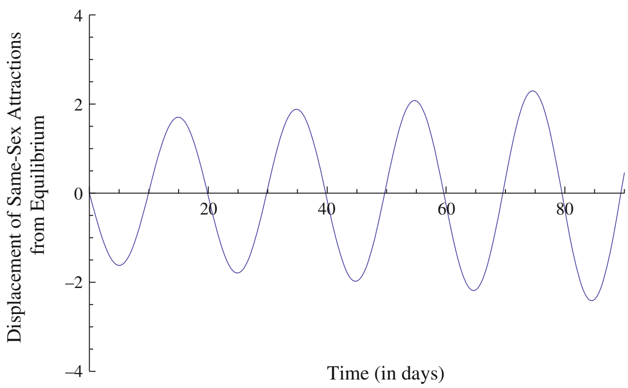

Fig. 4 The trajectory of female same-sex attractions over a hypothetical period of 90 days based on dynamical systems modeling results from 33 women over 21 days, starting at an equilibrium value of zero

vidual's data were subtracted. Second, a linear oscillator model was examined that instead centered the variables at the group means (in which each individual's data is subtracted from only the sample means). The model with group means removed and centered at equilibrium resulted in a better fit (AIC = −1,725.301) than did the model centered at the group means (AIC = −1,332.491). The model centered at the group means preserved individual variation more so than did the model centered at equilibrium. The model centered at equilibrium constrained some of this variance, which explained why it resulted in a better fit than the model centered at the group means. Thus, the model involving the variables centered at estimated equilibrium values were utilized in the subsequent steps of analysis.

Between-Group Analysis

The next step of analysis was to assess whether the second-order model, with variables centered at equilibrium and with embedding dimensions of $\tau = 1$ and $d = 12$, would fit differently between lesbian and bisexual women. Thus, the damped linear oscillation model was fit separately for each group.

To evaluate whether the first hypothesis, or the bisexual orientation hypothesis, based on a point attractor with an equilibrium point midway between same-sex and other-sex attractions, would provide the best fit for bisexual women, the linear oscillator model accounting for the subgroup of bisexual women was considered first. The model parameters for bisexual women were $\eta = -0.11$ and $\zeta = -.001$. This meant that the frequency of the overall model was slightly negative, moving away from zero, and the displacement parameter was very slightly negative, suggesting that fluctuations in bisexual women's same-sex attractions dampen over time—in contrast to the model considering all women simultaneously. Given these parameters, it appeared that the linear oscillator model for bisexual women's same-sex attractions was indeed based on a point attractor. These results supported the first hypothesis, suggesting a "true" bisexual orientation. In addition, only one interaction term (intensity of attraction to men) was significant in the model fit for the subgroup of bisexual women. However, the model with interactions fit worse (AIC = −989.78) than the model without interactions (AIC = −1,036.85). The model with interactions would not converge unless the random effect of the first derivative was removed, but since this term was not significant in impacting the second derivative, it was unlikely to have impacted the overall result. In neither case was the second derivative significant. Overall, the results supported Hypothesis 1 as the best fit for bisexual-identified women in the sample.

To evaluate whether the second hypothesis, or the core orientation hypothesis, with an unstable equilibrium point for a saddle attractor that results in being pulled toward either same-sex or other-sex attractions, would provide the best fit for lesbian women, the next linear oscillator model tested separately considered the subgroup of lesbian women in the sample. The model parameters for lesbian women were similar to those of the overall model, with $\eta = -0.10$ and $\zeta = .01$. Since the frequency was slightly negative moving away from zero, and the damping parameter was slightly positive, these parameters suggested that fluctuations in same-sex attractions were cyclic and amplified over time. Moreover, given that the damping parameter was positive, this indicated that the linear oscillator model for lesbian women's daily sexual attractions was based on a point *repeller*. These results supported the second hypothesis that lesbian women's same-sex attractions would be based on a "core" lesbian sexual orientation. The model for lesbian women fit better without interactions (AIC = −509.53) than with interactions (AIC = −474.71). In neither case was the second derivative significant. However, unlike the overall model considering all women's data simultaneously, several of the interaction terms were significant with lesbian women, including the intensity of attraction to men, frequency of sex, frequency of sex with a female partner, and frequency of sex with a male partner. Therefore, the results indicated that Hypothesis 2, the core orientation hypothesis, provided the best fit for lesbian-identified women in the sample and several covariates were unique to lesbian women in influencing their patterns of same-sex attraction.

Discussion

The results indicated that dynamical systems analysis is an appropriate and useful statistical tool for modeling and better understanding female same-sex sexuality. The findings suggested that non-heterosexual women demonstrate a "core" sexual orientation, regardless of whether they identify as lesbian, bisexual or fluid. The results specifically support the notion that self-identified bisexual women appear to have a "core" bisexual orientation, with respect to day-to-day variability in their attractions. In contrast, lesbian women appeared to demonstrate a "core" lesbian orientation. Fluctuations and variability in all women's same-sex attractions, on average, were supported by the data. Parameters of a second order differential equation model supported the notion of oscillations in same-sex attractions and, thus, dynamical systems analysis appeared to be a successful approach to modeling these cyclic attractions. The results largely supported the original hypotheses, but also brought forth new insights about the existence of a "core" sexual orientation among same-sex attracted women despite differing patterns of sexuality. The results supported the utility of using a dynamical systems approach to modeling variability in female sexual attractions, desire, and behavior, over and above insights offered by traditional models comparing "homosexual" versus "heterosexual" sexual orientations.

Across all women, there was greater variability in reported same-sex attractions, desires, and motivations than in actual sexual behaviors. This finding implies that the discrepancy between desires and behaviors is not unique among lesbian, bisexual or fluid women and is similar across sexual minority women. Lesbian and fluid women were more exclusive in their intensity of attractions to same-sex and other-sex individuals, respectively, than were bisexual women. Lesbian women reported higher sexual attraction to and more sexual activity with women than did bisexual and fluid women. However, interestingly, the variability in overall attractions and desires to same-sex individuals was similar for nonheterosexual women in this sample, as demonstrated by the descriptive statistics as well as the similarity in parameters in the GLLA modeling. These findings have important implications for distinguishing between reported sexual identities (e.g., lesbian, bisexual, heterosexual) and reported attractions, since these two variables may not appear congruent even across a relatively short period of time. Previous research has examined the variability in attractions and behavior of women over longer stretches of time (i.e., years) and results have generally indicated that lesbian women appear more "stable" in their attractions and behaviors than do bisexual women. However, in this study, the results suggested that when studied across a shorter timeframe, similar fluctuations in same-sex attractions are observed among lesbian, bisexual, and fluid women—despite differing initial conditions in the degree to which these women experience same-sex attractions. These results support the notion that some degree of plasticity may be a fundamental component of female same-sex sexuality (e.g., Baumeister, 2000; Diamond, 2005).

The results of this study also revealed that women's sexual behaviors were not always reflective of daily fluctuations in attractions. Lesbian, bisexual, and fluid women frequently reported daily attractions to women, but daily sexual activity with a female partner was far less common—findings that were consistent with earlier research (Diamond, 2003a, 2005; Weinberg et al., 1994). There could be several reasons for discrepancies between sexual attractions and actual sexual behaviors. One clear reason is related to the availability of female sexual partners. Some of these women were likely in romantic relationships with women while others were in romantic relationships with men, and, finally, some may not have had a current romantic partner. Thus, sexual activity, when it occurred, may have been constrained for some women to their current partner (whether female or male). Same-sex attractions, on the other hand, would not have been subject to the same constraints. Reported attractions likely represented a wide range of possible attractions—to current partners, friends, coworkers, acquaintances, or strangers. Furthermore, attractions to others often do not automatically lead to sexual behavior and not with the particular individual to whom the attraction occurs.

The results of GLLA modeling suggested that a second order linear oscillator fit the data reasonably well with embedding dimensions of a 12-day half cycle and a 1-day time delay. These findings add further evidence to earlier research that women do experience fluctuations in same-sex attractions, which can be modeled even over a relatively short period of time (21 days). Fluctuations in same-sex attractions may differ for lesbian and bisexual women, as distinct model parameters were discovered when each group of women was modeled separately. The results not only demonstrate that differences among "subtypes" of sexual minority women exist in the intensity or degree of attraction to women, but in how these attractions change over time.

Hypothesis 1 was supported, in that bisexual women's patterns of same-sex attraction appeared to fit a "true" bisexual orientation in which attractions are possible to members of the same sex and other sex. These results may help debunk myths that bisexuality is "just a phase" or a "transition step" to becoming lesbian; rather, it is possible that bisexual women have a "core" orientation that allows for both same-sex and other-sex attractions. However, the results also suggested that not all women are "born bisexual," as alternate models were found to fit patterns of same-sex attraction for lesbian women. Hypothesis 2 was supported, in that lesbian women's patterns of same-sex attractions appeared to be based on a "core" lesbian sexual orientation, in which same-sex attractions were predominate, but some variability in other-sex attractions were possible. Hypothesis 3, that non-heterosexual women may demonstrate a "non-orientation" and instead show patterns of ongoing fluctuations in attraction, was not supported by the findings. In sum, it appears that despite differing initial conditions and differing fluctuations in same-sex attractions, women in this sample seem to share in common having an underlying sexual orientation. While this core sexual orientation differs among lesbian and bisexual women, the results did not indicate the presence of a "non-orientation" nor did they indicate "universal bisexuality" among the same-sex attracted women in this sample.

Rather, the results were indicative of a unique core sexual orientation for different groups of same-sex attracted women that could depend on a whole host of factors ranging from biology, genetics, and physiology, to environmental factors and social circumstances. A unique core sexual orientation among same-sex attracted women is aligned with other sexuality research that has suggested greater category specificity in arousal among self-identified lesbian women as compared with self-identified heterosexual women (Chivers et al., 2007). In this study by Chivers et al., respondents viewed videos of women having sex with women, men having sex with men, and men having sex with women. Women's self-reported subjective responses revealed that lesbian women reported more arousal to the female videos and heterosexual women reported more arousal to the male videos. Their genital responses, however, showed a completely different pattern: Regardless of women's self-described sexual orientation, they showed roughly equivalent genital responses to the male and female sexual stimuli. In other words, their genital responses were *nonspecific* with respect to gender. Importantly, this was not equally true across women: On average, lesbian women showed somewhat greater gender-specificity (i.e., greater genital arousal to the female than the male videos) than did heterosexual women, but not nearly as much as the heterosexual and gay men. It also bears emphasizing that women did show specificity with regard to their self-reported arousal, meaning that women's genital and subjective responses often diverged from one another, a finding that has consistently emerged across different studies (for a review, see Chivers, Seto, Lalumiere, Laan, & Grimbos, 2010), although the specific degree of divergence varies widely from woman to woman (Rellini, McCall, Randall, & Meston, 2005).

Thus, oscillations around a unique core sexual orientation may be common for many women and research on female sexuality supports this notion. For instance, women are much more likely than men to indicate sexual attractions to both men and women and to report being "nonexclusive" in their attractions (Bailey, Dunne, & Martin, 2000; Laumann et al., 1994). Indeed, and as mentioned above, physiological evidence indicates that most women demonstrate "nonspecific" genital arousal patterns, meaning that they become aroused to stimuli of the same- and other-sex, regardless of their reported sexual orientation (Chivers et al., 2004). In subjective reports discussing their sexual identities and orientation over the lifespan, women are more likely than men to specifically note the roles of circumstance, chance, and choice (Golden, 1996). Over years of research on male and female sexuality, Gagnon (1990) noted that women's same-sex sexuality sometimes came about "by accident," sharply influenced by nonsexual factors that could act as catalysts for unexpected and new same-sex attractions, desires, and experiences, such as involvement in feminism, strong same-sex friendships, and having sexual minority peers (Golden, 1996). Thus, as Diamond (2012) posited, even with "local variability" in sexual attractions and behaviors over shorter time frames, a woman's core sexual orientation functions as a type of "true north" on a compass across the lifespan.

Due to the result that no interaction terms were significant for the linear mixed effects model considering all women in the sample, this could imply that variables that were not directly measured in the current study were involved in driving women's same-sex attractions. However, when each group of women was uniquely considered, there were several significant interactions that emerged. For lesbian women, intensity of attraction to men, frequency of sexual activity, and frequency of sex with a female or male partner appeared to moderate the degree to which same-sex attractions fluctuated over the 21 days. For bisexual women, only the intensity of attraction to men appeared to moderate the degree to which same-sex attractions fluctuated over the 21 days. Furthermore, the frequency and damping parameters differed slightly when the lesbian and bisexual women were considered in separate models. With a relatively small sample size, we hesitate to draw specific conclusions about the unique impact of these variables for lesbian and bisexual women. However, these findings imply that uniquely considering covariates and model parameters separately across different groups of same-sex attracted women may be important.

Limitations

Although there were several strengths of this study, some limitations should be noted. The methodology of using GLLA to model women's same-sex attractions involve several possible threats to validity. For example, the dynamic was assumed to be stationary over the time interval of measurement, meaning that each woman's dynamic process was assumed to have constant parameters. However, it may be that a woman's sexual attraction dynamic changes in response to the context in which she finds herself (e.g., having or not having a partner, sharing an intimate partnership with a man or a woman, etc.). Thus, more intensive measurements and non-stationary models would be needed to test this assumption. In addition, the GLLA method assumes that there is one embedding dimension that is best for all participants. However, if women's cycles have widely varying frequencies, this assumption could mean that some effects present in the data were not detected. Women whose frequency was greatly different than the mean frequency for the sample would not contribute as strongly to the estimates of fixed effects as they should have. Future advances in dynamical systems modeling techniques are likely to improve the estimation techniques employed here.

The small sample size and relatively short period of data collection were also limitations. The sample was relatively self-selected, comprising a group of women who have been long-term participants in a longitudinal study of sexual identity development and who were willing to endure the intrusive, time-intensive nature of the study procedures. Thus, this sample cannot be considered representative of all sexual minority women. The sample comprised predominantly White, middle-class, and highly educated women, and a critical priority for future research is longitudinal investigation of larger and more diverse populations of sexual minorities, particularly ethnic minorities, individuals living in rural or isolated environments, and individuals of lower SES (as noted above, sample size is also an important issue, given the power considerations involved in comparing small subgroups). On the other hand, the availability of longitudinal data on these women's patterns of sexual behavior and identification dating back to 1995 was a unique strength of the study. The longitudinal study from which these data were collected is, to our knowledge, the first and only long-term prospective investigation of sexual minority women's sexual attractions, behaviors, and identities. Thus, the limitation of relying on a small and self-selected sample is offset by the benefits offered by the availability of long-term longitudinal data on these women's sexual identifications and histories.

Although this relatively small sample size is common in studies of sexuality and in diary studies, it will be important that future research includes larger numbers of lesbian, bisexual, and fluid women, as well as heterosexual women, who were not represented in this study. More research is necessary to examine patterns of female same-sex attraction and behavior over a longer time period and using different dynamical systems models, such as the nonlinear oscillation model, which was not tested here. Future research should also include additional variables, such as time of ovulation or current romantic relationship status, which could be possible covariates in the cyclical nature of women's same-sex attractions and behaviors.

Conclusion

Dynamical systems analysis appears to be a promising approach for modeling the dynamics of female same-sex attractions and behaviors. The findings demonstrate that fluidity in female same-sex sexuality exists even over a short time period and across women who identify as lesbian, bisexual, and heterosexual (but who were fluid over a period of 10 years in attractions and behaviors). The results also point to the existence of a core sexual orientation that may differ for women who identify as lesbian or bisexual. These results have direct implications for theory and research about human sexual orientation, providing additional evidence that female same-sex sexuality is unique and warrants further research. Current models about sexual orientation should account for the unique characteristics of female same-sex sexuality that differ markedly from male same-sex sexuality. Future research could elucidate long-term patterns of stability and change in women's same-sex attractions and behaviors and further our understanding of female same-sex sexuality as well as human sexual orientation.

Acknowledgments The authors gratefully acknowledge the participants who generously shared their experiences as part of the longitudinal research project represented here. This work was supported, in part, by Grant 1 R21 HD044398 from the National Institutes of Child Health and Human Development, awarded to Sheri A. Berenbaum.

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