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NO EVIDENCE FOR MENSTRUAL SYNCHRONY IN LESBIAN COUPLES

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SUMMARY

Menstrual synchrony was investigated in a sample of 29 cohabiting lesbian couples, ranging in age from 22 to 48 years. One or both partners kept prospective daily records of variables including menses onset dates, intimate contact, and sexual activity. All women reported daily intimate interaction with their partners; none reported intimate interaction with men. Despite these potentially optimal conditions for the manifestation of synchrony, the differences between dyad members in menses onset dates were distributed randomly, and there was no evidence of convergence. In fact, most dyads exhibited divergence of onset dates. Reasons for lack of synchrony in this sample are discussed; one conclusion is that there is no solid evidence that menstrual synchrony is a stable attribute of past or contemporary human populations.

INTRODUCTION

THE PHENOMENON OF menstrual synchrony, in which women who associate closely with each other tend to have co-occurring menses, has received a great deal of attention in both the popular and scientific literature. An example of the uncritical acknowledgment of synchrony is seen in a recent review, which concludes that the phenomenon is "well established" (Graham, 1991). This acceptance, however, may be premature. There are several reports of studies that do not find menstrual synchrony among pairs of women (Jarett, 1984; Pfaff, 1980; Wilson et al., 1991) in addition to the accounts supporting it (Goldman & Schneider, 1987; Graham & McGrew, 1980; McClintock, 1971; Quadagno et al., 1981). Further, recent methodological criticisms have undermined seriously the validity of the supporting field studies (Wilson, 1992).

The most commonly proposed mechanism for menstrual synchrony is through olfactory signals, and two experiments supporting this possibility have been reported (Preti et al., 1986; Russell et al., 1980). However, these experiments have also been criticized (Wilson, 1987, 1992). An additional problem is that it has been difficult to formulate clearly how menstrual synchrony could have evolved. In the evolutionary past, hominid females would most often have been pregnant or lactating, rather than having successive

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menstrual cycles during which synchrony could develop (Kiltie, 1982; McClintock, 1981; Short, 1976).

Wilson (1992) provides an extensive critical review of most of the published menstrual synchrony literature. He argues that the studies and experiments purporting to find synchrony suffered from inappropriate research design and analysis, and therefore none has conclusively demonstrated menstrual synchrony. According to Wilson, three errors were commonly committed by the researchers. First, a lack of understanding of the nature of cyclical data led them to assume implicitly that the differences in menses onsets between members of dyads would vary randomly at the beginning of the observation period; thus any convergence during the study was interpreted as increasing synchronization. Wilson demonstrates how the cyclical characteristics of the data, even in the absence of any change in cycle lengths, would cause the initial convergence of cycle onset dates to occur by chance in at least half of the dyads. He suggests that researchers use a sample size of at least 20 pairs and include at least nine cycles in the analysis to rule out chance menses onset convergence.

Second, Wilson points out that the designated initial onset difference for a given dyad was calculated incorrectly in most studies. The correct onset difference should be calculated using the least absolute difference obtained from comparing first and second cycle onset dates for both members of the dyad. Because there is no a priori reason to expect that synchronizing influences between the members of a dyad are unidirectional, there is no justification for omitting any of these onset differences from consideration. In most studies, the initial onset difference was obtained by taking the first onset date of one member of a dyad and subtracting from it the first or second onset date for the second member of the dyad (whichever yielded the smallest absolute difference). This method left out the essential comparison between the first onset date for the second member and the second onset from the first member, resulting in an upwardly biased estimate. Because increasing menstrual synchrony is defined as a smaller difference between final than between initial menses onsets, the overestimate of the initial differences causes the initial mean onset difference to be greater than it actually is, thus, increasing the probability that the initial mean onset difference will be greater than the final mean onset difference.

Third, most of the studies that reported synchrony excluded from the sample any subject whose cycles during the study were deemed to be highly irregular. This artificially reduced the spread of final onset differences, resulting in apparent menses onset convergence. Wilson maintains that cycle irregularity should be dealt with through the initial selection of women who self-report regular cycles, or through other design features.

Our own analysis of prior research has given rise to additional criticisms and suggestions for improvement. First, even though sociosexual contact with men has been associated with changes in women's menstrual cycle length variability (Burleson et al., 1991; Cutler et al., 1979, 1985), and most of the authors of previous works on synchrony have suggested that the amount of contact with men affected the occurrence of synchrony, the quality and quantity of "time spent with men" have not been assessed carefully. Similarly, the amount and type of interaction between the women whose cycle onset dates were being compared has not been evaluated carefully. Thus, we recommend better definition of the degree of contact between the members of the dyads, as well as between those women and the men in their environments.

Most of the research has employed young women as subjects, both limiting its generalizability and increasing the likelihood of cycle irregularity (Vollman, 1977). The use of a sample of older women whose cycles are less likely to be as variable as those typical of college-aged women would alleviate these problems. Finally, some of the studies did not use daily prospective data recording for cycle onset dates, which is essential for accuracy.

In order to address the issues described above, we used prospective daily recordings of menstrual status to examine menstrual synchrony among a moderately large group of cohabiting lesbian couples who were older than those who participated in most of the other studies reviewed. We believed that the expected high levels of social interaction and physical closeness between the women in these dyads would provide the conditions most favorable for synchrony to occur, and that a low level of contact with men would minimize possible disruptive effects.

METHOD

One or both partners of the 29 lesbian couples in this study were drawn from a larger sample of 245 women (98 lesbians and 147 heterosexuals) who kept daily records for at least three complete menstrual cycles as part of a study of sociosexual effects on ovarian functioning. Participants in the larger study were recruited nationally through advertisements, and were paid $50 each for complete data. To be eligible for participation a woman could not 1) be taking oral contraceptives or have an IUD; 2) be pregnant, lactating, or menopausal; 3) have had a hysterectomy; or 4) be less than 7 years past menarche. Additional criteria for inclusion in the current (lesbian synchrony) study included 1) at least two menses onset dates for each woman in the couple; 2) evidence of intimate contact between the members of the dyad (sleeping in the same bed or sexual interaction as reported on the daily checklists); and 3) no sleeping or sex with men reported on the daily checklists.

The participants were told that the study concerned "factors affecting the menstrual cycle" and were asked to keep a daily record of the following for three complete menstrual cycles: menses, sleeping with a woman or man (co-sleeping), sexual activity with a woman or man, sexual self-stimulation, orgasm, menstrual cramps, breast pain, basal body temperature (BBT), stress events, illness, 20 or more minutes of aerobic exercise, alcohol consumption, hours of sleep, and moods. Each woman also completed an initial questionnaire covering age, height, weight, age of menarche, pregnancies of more than 6 months duration, premenstrual symptoms, household composition, tobacco and other drug usage, normal duration of sleep, food restriction, and dietary composition. In addition, participants living in the same household with other cycling women who were not participating in the study also kept daily records of menses for the other women. For 12 of the lesbian dyads, both partners were full participants in the study. The other 17 couples comprised one woman who was fully participating and keeping menstrual records for her partner, who was not a participant.

The addresses of the couples were distributed widely across the United States. The participants were between 22 and 48 years old (mean = 31.1, SD = 6.1). Their age of menarche ranged from 10 to 16 years (mean = 12.8, SD = 1.6); the number of years postmenarche (gynecological age) ranged from 10 to 33 (mean = 18.4, SD = 5.6). Eight participants had at least one child. All had completed high school.

Mean cycle length for the women was 29.6 days (SD = 8.5). Eleven of the 58 women reported cycles that varied by more than 6 days; five had cycles that varied by more than 10 days.

Reported co-sleeping patterns were as follows: 20 of the couples regularly shared the same bed, indicating that they slept with their partner virtually every night of the study; 7 indicated that they slept in the same bed three to five times per week, while 2 only rarely slept together. Five couples engaged in sexual activity as frequently as two or more times per week; 7 averaged once a week; 13 indicated sexual contact one to three times per cycle. Four of the couples engaged in sexual activity only one or two times during the entire study period, although all four slept together regularly. Thus, all 29 couples met our definitions of intimate daily interaction as determined by co-sleeping or sexual activity.

RESULTS

Menses onset data were available for 29 couples. Due to omission of one or more of four possible onset dates, various subsets of these 29 pairs were used in the analyses that follow. Based on the rationale provided by Wilson et al. (1991) and extended by Wilson (1992), a sign test (Siegel, 1956) was employed to test the hypothesis that cycle onsets for the couples would converge over time. To avoid miscalculation of the initial intracouple difference in onset dates, this difference was operationally defined as the lowest absolute value of the three differences recommended by Wilson: S1-Onset1 minus S2-Onset1, S1-Onset1 minus S2-Onset2, and S1-Onset2 minus S2-Onset1, where S1 represents the first member of a dyad and S2 the second. Table I lists the differences in menses onset dates and the cycle lengths for each of the dyads reported here.

For the 24 couples providing four onset dates, the sign test comparing changes in onset dates from the couple's first to their third reported cycle yielded a significant result of $N = 24, x = 7, p < .032$, but in the direction opposite to that expected if synchronization had occurred. That is, more couples had onsets that diverged ($n = 17$) than converged ($n = 7$). A similar analysis conducted on the 28 couples who provided three onset dates yielded a similar result, $N = 26$, $x = 7$, $p < .011$ (N for the sign test includes only those pairs that show a change). Again, more couples diverged ($n = 19$) than converged ($n = 7$). Figure 1 illustrates the pattern of divergence across cycles.

However, since all of the couples were living together, and had most likely been intimate for some time, we reasoned that convergence might have occurred prior to initiation of the study. To examine this possibility, the existing frequencies of intracouple differences in onset dates were compared to the expected frequencies of differences using the Kolmogorov–Smirnov one-sample test (Siegel, 1956). Since the average cycle length was 29.6, this number was rounded to 30, yielding expected differences in cycle onsets ranging from 0 to 15. The 29 couples reporting both their first and second onsets were used in the analysis. The maximum difference between the frequencies of observed and expected values occurred at 2 days difference in onset dates (11 of the 29 couples had onsets between 0 and 2 days apart), yielding $D_{max} = .213$, $p > .05$. Since this D_{max} value did have a probability of .11, suggesting a possible weak effect, the same analysis was applied to the 24 couples reporting both their second and third onset dates. This resulted in $D_{max} = .192$, $p > .20$, suggesting that the distribution of onset days was random. An analysis of the 18 couples who reported a third and fourth onset date yielded $D_{max} = .156$, $p > .20$, again suggesting a distribution that does not differ significantly from a random one. Taken together, the sign and Kolmogorov–Smirnov tests suggest that menstrual synchrony is not a stable attribute of this sample.

Wilson (1992) has noted that some studies revealing a synchrony effect have eliminated

Table I. Cycle lengths of both partners and menses onset differences for each dyad (all units days)

Dyad	Partner	Onset diff 1	Cycle len 1	Onset diff 2	Cycle len 2	Onset diff 3	Cycle len 3	Onset diff 4
1		9		13		26		37
	S1		33		30		23	
	S2		37		43		34	
2		16		15		15		
	S1		29		28		27	
	S2		28		28			
3		0		9		11		17
	S1		31		26		30	
	S2		22		24		24	
4		1		−2				
	S1		30		30			
	S2		27					
5		6		5		7		2
	S1		28		29		25	
	S2		29		27		30	
6		1		3		7		9
	S1		27		24		23	
	S2		29		28		25	
7		10		−62		−102		−134
	S1		101		67		60	
	S2		29		27		28	
8		2		8		17		31
	S1		26		26		23	
	S2		32		35		37	
9		14		12		9		
	S1		28		28			
	S2		30		31			
10		5		7		10		17
	S1		25		24		25	
	S2		27		27		32	
11		1		−2		−10		−40
	S1		29		30		28	
	S2		32		38		58	
12		6		8		12		16
	S1		25		24		24	
	S2		27		28		28	
13		8		9		5		
	S1		27		26			
	S2		26		30			
14		4		−4		−6		−19
	S1		32		28		29	
	S2		24		26		16	

(*Continued*)

TABLE I. (CONTINUED)

Dyad	Partner	Onset diff 1	Cycle len 1	Onset diff 2	Cycle len 2	Onset diff 3	Cycle len 3	Onset diff 4
15		11		10		12		
	S1		30		26		29	
	S2		29		28			
16		5		8		8		0
	S1		31		28		27	
	S2		28		28		35	
17		7		5		3		
	S1		25		30		26	
	S2		27		32			
18		18		4		−5		
	S1		45		35			
	S2		31		26			
19		1		−7		−7		0
	S1		32		27		30	
	S2		24		27		37	
20		18		9		7		6
	S1		41		30		29	
	S2		32		28		28	
21		4		5		10		
	S1		28		27		33	
	S2		29		32			
22		2		−2		1		2
	S1		30		33		28	
	S2		34		30		27	
23		1		−2				
	S1		24		26		24	
	S2		29					
24		2		4		3		
	S1		27		25		28	
	S2		25		26			
25		1		10		13		13
	S1		29		27		25	
	S2		20		24		25	
26		1		5		−14		−11
	S1		24		46		27	
	S2		28		27		30	
27		8		24				
	S1		22		23		25	
	S2		38					
28		13		7				
	S1		25					
	S2		19					
29		11		16				
	S1		27		30		26	
	S2		32					

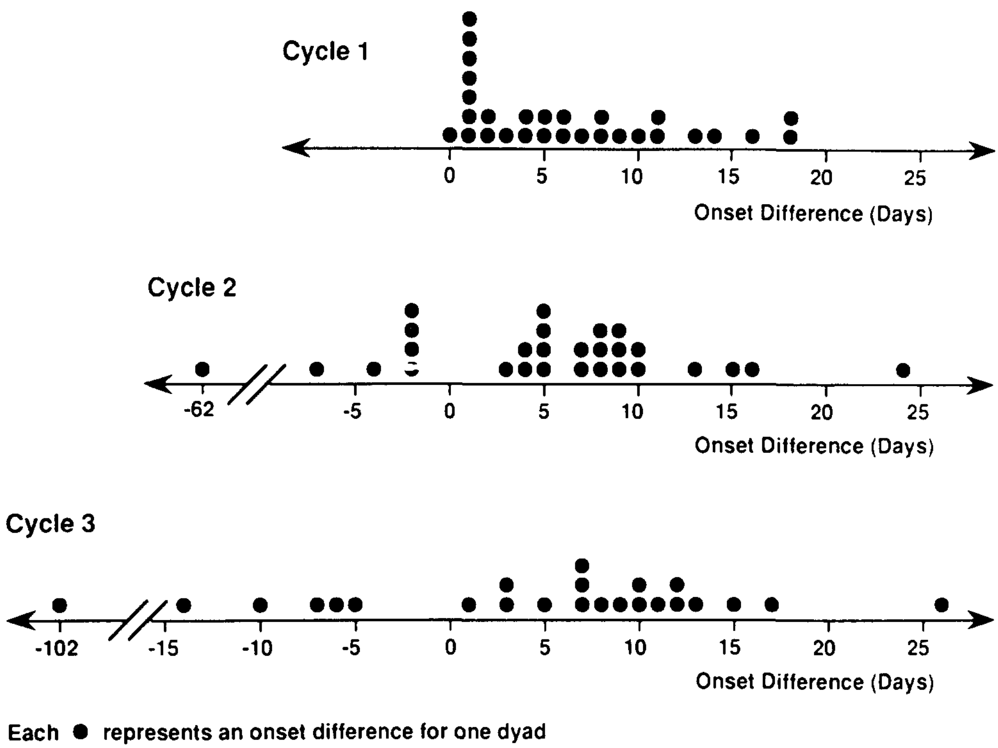

FIG. 1: Distributions of menses onset differences for dyads across three consecutive menstrual cycles.

women with highly variable cycles. Therefore, both the sign tests and the Kolmogorov–Smirnov tests were repeated after splitting the current sample on cycle variability. All of the previously described analyses were performed on the nine couples in which both members reported four onset dates and the three corresponding cycles varied by 6 days or less. Both sign tests were marginally significant (both p's $< .09$), with both suggesting the occurrence of divergence. None of the D_{max} tests were significant (all p's $> .15$). Repeating all of the analyses on the 10 couples who reported all four onset dates but had at least one cycle that was 7 days longer than another yielded no significant results (all p's $> .15$). Lastly, in the present sample, only 5 of the 58 women had cycles that varied by more than 10 days. The exclusion of these five women and their partners from the previously described analyses do not alter the findings. None of the D_{max} statistics were significant (all p's $> .20$), while both sign tests suggested divergence (onset 1 to onset 3, $N = 19$, $x = 6$, $p < .084$, with 13 diverging and 6 converging; onset 1 to onset 2, $N = 21$, $x = 6$, $p < .039$, with 15 diverging and 6 converging).

Greater gynecological maturity is associated with increased cycle regularity (Vollman, 1977); thus, separate analyses were performed on the 15 couples in which the participating member was above the median in gynecological maturity (greater than 18) and the 14 couples in which she was below the median. Again, the Kolmogorov-Smirnov D_{max} statistics were not significant, while the sign tests were either significant in the direction of divergence or suggestive of divergence.

Because of the possibility of disruptive influences from other persons present in the home environment, all analyses were performed separately for the 20 couples who lived together and had no other roommates. The Kolmogorov–Smirnov analysis of the first cycle yielded a significant result, $D_{max} = .333$, $n = 20$, $p < .03$, with 10 of the 20 couples having onsets within 2 days of each other. However, the 17 couples reporting a second cycle displayed a random distribution of onset dates, yielding a nonsignificant result, $D_{max} = .104$, $p > .20$. In fact, only 9 of the 17 had onset differences between 0 and 7 days. The analysis of the third cycle also yielded nonsignificant results, $p > .20$. The sign test suggested that the couples diverged (onset 1 to onset 2, $N = 18$, $x = 3$, $p < .004$, with 15 couples diverging, 3 converging, and 2 showing no change; onset 1 to onset 3, $N = 17$, $x = 3$, $p < .084$, with 14 couples diverging, and 3 converging). Thus, the initial apparent synchrony would appear to be due to chance fluctuations, with the women moving out of synchrony over time.

All studies of synchrony in humans have focused on menstrual onset dates with the assumption that menstrual synchrony is an indicator of ovulatory synchrony. There are no reported synchrony studies that directly investigated ovulation (Graham, 1991). The 12 couples for whom both were in the study made daily recordings of BBT over three consecutive cycles. Nine of the dyads exhibited biphasic temperature patterns indicative of ovulation (Moghissi, 1980), and the BBT nadir could be identified. There was no evidence of convergence or co-occurrence of BBT nadir dates. Although BBT is an accurate indicator of ovulation in only 80% of cycles (Moghissi, 1976), this finding suggests that ovulatory synchrony did not occur.

DISCUSSION

Menstrual synchrony was not demonstrated in this sample of cohabiting lesbian couples. We did not find increased cycle convergence over the course of the study; in fact, more cycles diverged than converged. Further, the level of preexisting menses onset convergence did not exceed what could be explained by chance, except when the sample was limited to those women living only with their lovers. Even within that restricted subgroup, the apparent synchrony disappeared after the first cycle.

A number of possible explanations for these findings can be proposed. Some of these are based on methodological concerns, including length of the study and sample size. Others focus on individual and group difference variables, such as emotional involvement between the participants, age and gynecological maturity, length of the dyadic relationships, sexual orientation, and contact with men.

For example, our study was not as long as recommended by Wilson (1992). However, this should have biased it toward finding onset convergence, not vice versa. The fact that we found no synchrony even in such a short study is even more convincing evidence that it was not present, because it is mathematically impossible for cycles to diverge and then converge again in the absence of actual changes in their lengths.

Wilson also suggested that the exclusion of women with irregular cycles could inflate the incidence of onset convergence. However, even when the participants with the most irregular cycles were excluded, our results still did not demonstrate cycle convergence.

Some earlier reports have found synchrony only in certain subsets of their samples, and have hypothesized that various individual or social variables might account for this difference. For example, Jarett (1984) suggested that increased emotional involvement might lead to emotional contagion, which could mediate menstrual synchrony. Our lesbian sample was composed of pairs of self-reported lovers who were very emotionally involved with each other; thus the lack of synchrony cannot be explained by a lack of involvement. Graham (1991) suggests that close physical contact may facilitate synchrony, possibly through exchange of secretions. The women in our sample were either sleeping together or engaging in sexual behavior, but despite this evidence of close contact, synchrony did not occur.

Similarly, Matteo (1987) noted that the women in her sample who were most likely to synchronize were those who did not live with a male sex partner. In our sample, none of the participants lived with, slept with, or had sex with men. Therefore, the absence of menstrual synchrony in this group cannot be explained by postulating a countervailing influence of men.

The studies that demonstrated menstrual synchrony in dyads used roommates and friends and measured menses onset convergence over the course of a school semester or year. The implicit assumption throughout these studies was that women who had initially low levels of contact would increase their contact and hence their synchrony during the period of investigation. Thus, most of the dyad relationships were probably new. In contrast, our sample comprised pairs of women who were lovers and had been intimate for long enough to be living together. Therefore, the possibility that synchrony was not found in our group because their relationships were well-established cannot be ruled out, although it seems to contradict most previous explanations of synchrony.

Another possible explanation lies in the difference between the age and gynecological maturity of our subjects compared to those in the earlier dyad studies. Our sample was more mature. It may be that synchrony only occurs in young women. This explanation is made more plausible by the idea that the period of adolescent subfecundity might have been the only time during evolutionary history when enough menstrual cycles occurred successively for synchrony among women to develop. When we split our sample on gynecological maturity and reanalyzed, no tendency toward synchrony was found even in the less gynecologically mature group. All of these women, however, were well beyond the normal period of adolescent subfecundity.

Previous studies reporting synchrony have either not investigated the sexual preference of their participants or have specifically ruled out women in lesbian relationships. Thus, these studies may have been carried out using only heterosexual women, and the possibility exists that the difference in our findings could be explained by some kind of biological difference between lesbians and heterosexual women. This seems unlikely, however, given the fact that various studies have found no hormonal differences between the two groups (Dancey, 1990; see Masters et al., 1988). Further, sexual preference is generally considered to be a continuous rather than dichotomous variable (Kinsey, 1948; Masters et al., 1988), and at least some of our sample reported previous sexual relations with men. However, in light of the recent findings regarding brain differences between heterosexual and homosexual men (Levay, 1991), this possibility cannot be ruled out.

Some of these uncertainties could be resolved in another study with a sample of younger lesbian women whose ages more closely approximate those of the college-based samples used in previous studies. If synchrony is demonstrated in such a sample, it would suggest that the phenomenon is not restricted to heterosexual women, but that it may be much more common in younger women.

Another related explanation for the absence of synchrony in these women is the possibility that a certain type or amount of contact with men is necessary for it to occur. This idea seems somewhat unlikely in view of the results cited earlier in which women who lived with a male sex partner were less likely to synchronize, although it may be that some median level of male contact is optimal. Perhaps lesbian women have too little exposure, whereas the amount of male contact experienced by regularly heterosexually active women is too great.

A final explanation for our lack of findings may be that menstrual synchrony is not a real phenomenon. Our study met many, if not most, of the criteria that have been proposed for maximizing its detection. We monitored the menstrual cycles of dyads who were in close daily contact, both physically and emotionally, and who were not exposed to the possible influence of intimate contact with men. Thus, we believe that if the potential for menstrual synchrony to occur is present in all women, we should have seen evidence of it in this sample.

As Graham (1991) notes, one of the most intriguing questions concerning menstrual synchrony is its possible function or adaptive significance. The development of synchrony would probably require several months of cycling, an uncommon circumstance in the evolutionary past of humans except during adolescence (Short, 1976). Adult females who experienced long periods of cycling were probably subfecund and thus less likely to pass on the characteristic. In his review, Wilson (1992) points out that studies documenting the existence of synchrony are mostly flawed, and concludes that it has not been adequately demonstrated. Our current findings, coupled with Wilson's conclusions and the difficulty explaining its adaptive significance, suggest that menstrual synchrony may not be a typical occurrence in mature women.

In attempting to account for menstrual synchrony, most theorists have concluded that it is probably epiphenomenal, a byproduct of mechanisms which afford behavioral or social regulation of the reproductive cycle in different circumstances (Graham, 1991; Kiltie, 1982; McClintock, 1981). The scarcity of evidence supporting menstrual synchrony per se does not rule out more general behavioral effects on ovarian functioning. Thus, we believe that further investigation of sociosexual regulation of ovarian function is warranted, but the focus on menstrual synchrony may be misplaced.

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