

## **Examining the Phenomenon of Menstrual Synchrony at an International Co-educational Boarding High School in Jordan**

*Nadine Jarrar \**

### **ABSTRACT**

Whether or not menstrual synchrony exists has been a topic of debate since 1971, following Martha K. McClintock's first research in the field (McClintock, 1971). By 2006, Dr. Jeffrey Schank finally put a lid on it, declaring synchrony was a perception rather than a phenomenon (Yang & Schank, 2006). This study revisits menstrual synchrony particularly among close friends residing in an all-female dormitory at a coeducational boarding school in Jordan. The conservative culture to which residents adhere suggested a conducive environment for the study. For the first time in the field, the sample only examined 14-18 year old women -a group that previous researchers either excluded or included within a larger sample for fear that their cycles were far too irregular. With 85% participation rate, a group of 59 females were studied across a 181-day period. No significant results proving synchrony or the impact of degree of closeness were found, providing support for previous researchers' conclusions regarding menstrual synchrony.

**Keywords:** Menstrual synchrony; 14-18 years; closeness; dormitory; friendship.

### **Introduction**

Whether menstrual synchrony exists or is merely a myth has been contemplated by researchers since 1971 (Ziomkiewicz, 2006, p.419). Although scientists have examined various factors affecting synchrony in the past (McClintock, 1971, p.244; Jarett, 1984, p.22), this study examines whether synchrony exists while analyzing a major psychosocial factor affecting synchrony: living with a close friend. This study quantitatively examines synchrony in a female dormitory at a co-educational high school in Jordan. The author intends to learn from past limitations and combine previous analytical techniques (Wilson, 199; Schank, 2006) to illustrate correlation rhythm and onset dates between female close friends within an unprecedented age group: 14-18 years. The first set of data will compare mean onset initial and final differences for pairs to detect synchrony. The second set of data will be compared with the first set to examine if close friends' degree of closeness affects synchrony. Additionally, the methodology used in this study can be replicated in future studies investigating the effects of other factors on synchrony. In this literature review, menstrual synchrony will be reviewed depending on the effects of psychosocial factors, biological variables, and conservative cultures on menstrual synchrony in order to analyze the relationships between previous research papers, which represent multiple perspectives useful to the purpose of this paper.

### **Defining Menstrual Synchrony**

Menstrual synchrony is defined as the decrease in onset difference over a period of time (Quadagno et al., 1981, p.239; Graham & McGrew, 1980, p.245), and once it is established, it should continue (Ziomkiewicz, 2006, p.421). An onset is the day a period begins, or the first day of bleeding (McClintock, 1971, p.244; Goldman & Schneider, 1987, p.244).

Three of many biological variables affecting synchrony mentioned in this study are irregular cycles, pheromones, and cycle variability. Irregular cycles are cycles that are less than 25 days and more than 32 days long (Wilson et al.,

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1991, p.357; Jarett, 1984, p.27). Pheromones “can be thought of as external airborne hormones” (Goldman & Schneider, 1987, p.244) that “affect the behavior or physiology of another” (Weller & Weller, 1997, p.143). Cycle variability is the length of the cycle from the first onset to the next onset in one woman differing from the cycle length of another woman (Wilson et al., 1991, p.358; Yang & Schank, 2006, p.436).

## **Background**

McClintock instigated decades of research regarding menstrual synchrony (McClintock, 1971). Onset dates were compared between roommates and closest friends (in which a pair was considered closest friends if they both listed each other). Her analysis proposed choosing one member of the pair of close friends or roommates and finding the closest initial onset date for the other friend/roommate in October. She would count an equal number of cycles thereafter, and find the final onset date mean subtracting it from the initial onset. She came up with a formula to calculate the mean individual difference from the group onset mean  $\sum_{i=1}^n (x_i - \mu_t) \div n$  where  $\mu_t$  is the mean onset date for each group and the onset dates is  $x_i$ , to be compared with the initial onset (McClintock, 1971, p.244). Her seemingly accurate results showed that roommates and closest friends synchronized their cycles more than closest friends alone, providing evidence that psychosocial factors affect synchrony (Graham & McGrew, 1980, p.249). She recommended that future researchers consider time spent with females and male interaction in more depth. She miscalculated onset dates as well as used random pairs to control her variables (Wilson, 1980; Schank 2002; Schank, 2006).

Following McClintock’s study, 38 years of research measuring various effects on synchrony were conducted. Menstrual synchrony was found to have psychosocial, biological, and cultural implications.

## **Psychosocial Factors Affecting Menstrual Synchrony**

From a psychosocial perspective, scientists hypothesized that friendship would affect synchrony depending on their degree of closeness; time spent together, different personality traits, and emotional attachment (McClintock, 1971, p.244). The purpose of this research paper is to examine close friends’ ability to synchronize. It is therefore imperative to examine the first five research papers conducted from a psychosocial lens, where four out of the five collectively proved synchrony among close friends. The first five papers used an exploratory, experimental, mixed-method, grounded theory methodology to conduct their studies.

In their 1980 paper, Graham and McGrew conducted a study investigating synchrony and found that synchrony existed even in a coeducational environment in Scotland as opposed to an all-female campus studied by McClintock (1971, p.244). They studied close friends, but neighbors replaced roommates since Graham & McGrew (1980) tested women living in single rooms. The authors collected menstrual cycle dates monthly and distributed a questionnaire at the end of the study. They followed McClintock’s (1971) first onset difference calculations, but continued to measure onset differences for the second, third, and fourth onsets. Synchrony was found in friends, but not in neighbors or random pairs.

Quadagno et al. conducted an additional study in 1981 that also provided evidence for synchrony in a coeducational campus between close friends. The authors found that synchrony existed not only in pairs, but also in groups of two, three, and four. Their study examined groups of women living together while considering the effects of male interaction and physical activity on synchrony. The authors conducted the study for two months longer than Graham and McGrew (1980). The authors measured close friendship depending on time spent together (Quadagno et al., 1980, p.246). They concluded that both roommates and close friends synchronized, but that the degree of synchrony was higher between close friends.

Expanding on the concept of synchrony amongst close friends from the three previous papers, Jarett (1984) conducted a study that considered the degree of affiliation and emotional attachment to female roommates over a nine-month period. Each female was given a menstrual calendar twice a month and was told to list whether she took

contraceptives.

Participants were also asked to fill out a personality test. She used McClintock's (1971) but did not conform with equal number of onsets because many of her participants had irregular periods. High social desirability was associated with irregular and longer cycles. This paper was the first study to question the validity of synchrony, which contributed to the field by posing a need to further investigate irregular cycles.

Similarly, Goldman & Schneider (1987) published an article that investigated personality factors and synchrony. Based on one of Jarett's (1984) suggestions that stress affects synchrony, Goldman & Schneider (1987) decided to collect their data before May exams. They examined the effects of social contact, personality characteristics, and male interaction on synchrony. The results showed that close friends and roommates both synched and also indicated that similar personalities had a higher synchrony score. Low neuroticism showed high synchrony. Once again, close friends tended to synchronize.

The research reviewed above demonstrates that degree of closeness; time spent together, personality traits, and emotional attachment impact synchrony. Limitations of the studies included the overlapping of subjects under different categories, such as females who were both close friends and neighbors and having too many irregular cycles. Roommates or friends who spent time together experienced synchrony as McClintock (1971), Quadagno et al. (1981), and Goldman & Schneider (1987) all claimed. Neighbors in Graham & McGrew's

(1980) study and roommates in Jarett's (1984) study did not find synchrony. This demonstrates that the psychological attachment rather than physical distance is essential to synchrony, as being close friends "allows for emotional contagion which may influence physiological factors including the onset of menstrual cycle" (Goldman & Schneider, 1987, p.249).

### **Biological Variables Affecting Menstrual Synchrony**

By the beginning of the 1990s and with some papers providing evidence against menstrual synchrony, cycle irregularity, the effect of pheromones, and cycle variability within and amongst women needed to be closely examined (Wilson, 1991, p.356). Since this research paper investigates an age group that has been notorious for having irregular cycle lengths, the following research utilized a biological lens and set precedence for data analysis and biological explanations that are vital for this research. These were conducted through an explanatory, non-experimental (with the exception of Morofushi, who had a control, and therefore was experimental), mixed-data, grounded theory method.

Wilson et al. (1991) published a study that examined the relationship between synchrony and time spent with other females. The authors observed social interaction and menstrual onsets. The study failed to replicate McClintock's findings. Wilson (1991) dropped the irregular cycles and contraceptive pill users from his results and reanalyzed, but failed to find synchrony amongst women who spent time together. This study had huge implications on the field. Firstly, Wilson set the criteria for calculating the initial and final onset dates. Additionally, the expected rate at which onsets converge or diverge was calculated, and Wilson (1991) proposed that on a 28-day cycle length, the probability of two women coinciding would be 50%. For synchrony to happen, periods must coincide significantly below the 7-day period. He also argued that if two women do not have the same cycle length, then their cycles would continue to diverge and converge by chance. Wilson's (1991) criteria for assessing biological rhythms became the standard in this line of research.

McClintock (1971), Graham & McGrew (1980), Quadagno et al. (1981), and Goldman and Schneider (1987) recommended that the biological study of pheromones be examined.

Consequently, Morofushi et al. (2000) conducted a study analyzing pheromones and synchrony. Those who could not smell pyridine (a chemical used to test the ability to smell) were excluded. Those who smelled it were exposed to 3 $\alpha$ -androsthenol (a pheromone). All those who smelled the 3 $\alpha$ -androsthenol synchronized, providing evidence that pheromones alter women's cycles. This study identified another biological concept in synchronization: pheromonal exchange.

The next biological leap was cycle variability. Yang & Schank (2006) tested women who live together. The authors developed several bootstrap techniques to analyze group onset dates. Next, they found the mean cycle length of the period according to McClintock's (1971) formula, and the pairwise onset date mean deviation in a group using a formula developed by Yang and Schank (2006, p.436). Due to cycle variability, no synchrony was found. The authors proposed that different cycle lengths will converge and diverge but will never truly synchronize.

The limitations of these papers were that some values of cycle variability were far too large, and cycle dates were collected retrospectively, which is inaccurate.

Likewise, Ziomkiewicz (2006) conducted a study to examine the social and biological factors influencing synchrony. Menstrual calendars and questionnaires were distributed. Following Wilson's (1991) initial and final absolute onset difference calculation, the author used paired t-tests. While the results found no significant synchrony, the author found that cycle irregularity caused the value of the initial onset to be higher, and higher body mass made the value of the initial onset difference lower. The study also found that social factors had no effect on onset differences. Ziomkiewicz's (2006) study supported findings of Jarett (1984), Wilson (1991) and Yang and Schank (2006). These authors' findings on cycle irregularity and variability suggested, "Perhaps it is time to say goodbye to menstrual synchrony" (Ziomkiewicz, 2006, p.430). However, research on this topic is far from conclusive, and additional studies should be conducted to either provide support for this claim or investigate the complexity and heretofore-unidentified factors related to menstrual synchrony.

### **The Effects of Culture on Menstrual Synchrony**

This research paper will examine high school students living in a dormitory in Jordan where the culture is predominantly conservative. With this in mind, it is necessary to examine previous research that was conducted in conservative cultures. The following studies followed an exploratory, non-experimental, mixed-method, grounded theory methodology.

Weller et al. (1995) published a study investigating whether menstrual synchrony occurs among roommates, 97% of which reported they were religious, traditional, and conservative. The authors followed Wilson's (1991) guidelines on computing group synchrony and onset dates. The results suggested that being part of a conservative culture led the females not to take pills or engage in premarital sex, two factors that seemed to positively impact synchrony. Participants in a culturally conservative environment showed synchrony with close friends, yet roommates who were not close friends did not synchronize.

Following their study in 1995, Weller & Weller (1997) studied 27 nuclear Bedouin families over a three-month period to examine the existence of synchrony amongst sisters who are roommates, sisters who are roommates and close friends, and amongst families. The study was claimed to have environmental conditions optimal for synchrony as families had been living together for many years in a sexually segregated society with minimal use of oral contraceptives. Each woman was asked to fill in her menstrual cycle dates on a calendar prospectively and complete a questionnaire. Contrary to the previous study, a regression analysis did not present any significant results because there was a mistake in statistical analysis.

Limitations of these studies included a university strike in the middle of the study causing the women to fall out of synchrony, as they had to leave campus, and an overlapping of different group subsets, which might have led to an inaccurate calculation of synchrony. It is interesting that across both studies, only 6% irregular periods were reported. This suggests that perhaps irregular periods were not as common in conservative cultures. Additionally, a lack of research investigating the impact of culture on synchrony suggests further investigation is needed in this area.

### **Limitations and Knowledge Gaps in Prior Research**

Previous research tested the phenomenon of menstrual synchrony amongst different sample sizes across multiple countries. However, researchers have been unsuccessful in observing the phenomenon amongst all groups of

individuals and amongst different housing arrangements. A specific limitation in these studies is that most researchers focus mainly on targeting families or college-aged students living in dormitories, or a combination of both, but not solely on high school students or high school students in a conservative culture. For example, Weller et al. (1995) tested 20 university housing units, and Weller & Weller (1997) tested 27 Bedouin families living in a rural setting, and McClintock (1971) studied females living on an all-girls' college campus. Although these papers yielded similar results regarding the existence of synchrony, they can only conclude that it exists within specific age-ranges of individuals. Groups with other demographics were not studied or were inconclusive due to their cycle irregularity (Jarett, 1984, p.27; Ziomkiewicz, 2006, p.420), making the proposed high school aged group a necessary one to be tested.

Another limitation is that previous research took place in non-conservative cultures that did not control the effect of premarital sex on synchrony, with the exception of Jarett's (1984) study, Weller et al.'s (1995) study, and Weller and Weller's (1997) study. Recognizing the importance of this, Weller and Weller (1997) studied Bedouin families as their culture was highly sexually segregated. It is therefore imperative to conduct a study within a different conservative culture that does not allow for premarital sex. Considering prior limitations and knowledge gaps, the following research question was derived: to what extent do close friends living in a dormitory housing 59 females ages 14-18 years at a coeducational boarding school in Jordan demonstrate menstrual synchrony?

### **Literature Review Summary**

This research paper will attempt to replicate the measurement of closeness and time spent together among friends, as these factors have been identified as critical in impacting synchrony (McClintock, 1971; Graham and McGrew, 1980; Quadagno et al., 1981; Goldman and Schneider, 1987; and Weller et al., 1995). Moreover, Jarett (1984) proposed a strategy for asking about the use of contraceptive pills by embedding the question within a list of pills to accommodate for the conservative culture of her sample (p.22). Goldman & Schneider (1987) proposed announcing the study to recruit a sample within "floor meetings" (p.246). Additionally, Ziomkiewicz (2006) started her calendars September 1st through February 28th over 181 days with winter break in between and used the degree of interaction test. Graham & McGrew (1980) had single rooms but the Wellers' friendship and roommate study had a limitation of one variable affecting the other (1995, p.886). In this research, only friends will be relevant. Quadagno et al. (1981) was disqualified for using the final onset dates and counting the same number of onsets backwards. This study will learn from these findings and utilize Wilson, Schank, & Ziomkiewicz's (1991, 2006, 2006) data analysis techniques.

### **Methodology**

#### **Overview**

An exploratory and non-experimental design was conducted to gather quantitative and qualitative data relating to menstrual synchrony in a grounded theory study amongst 14-18 year-old females living in a dormitory. A calendar was distributed to participants to identify the menstrual cycle dates. Additionally, an anonymous questionnaire regarding closeness between friends and oral contraceptive use was distributed to participants. Data mean analysis and one tailed t-tests were used to determine synchrony between close friend pairs using the calendar dates provided, and a multiple regression analysis was conducted to examine the correlation between degree of closeness and synchrony.

#### **Method Choice**

Prior to the experiment, participants were asked to sign a consent form to identify any risks that may come with participation and to confirm their anonymity (see Appendix A). Close friends were paired according to McClintock's (1971) methodology, where two girls could only become a close friend pair if they both mutually listed one another (p.244). The duration of the study lasted 181 days beginning on September 1st (Ziomkiewicz, 2006, p.423). A quantitative analysis was used to extract the exact initial and final onset differences between each pair following Wilson's (1991) absolute difference method:  $|A1-B1|$ ,  $|A1-B2|$ ,  $|A2-B1|$  where A is the first woman and B is the second

woman, and the number 1 refers to the first onset days, while the number 2 refers to the second.

The smallest value of these three equations was selected as the initial onset difference. Similarly, the final onset dates followed this formula. The onset difference was calculated by subtracting the final from the initial onset days (Wilson, 1991, p.356). For synchrony to occur, the final difference should be significantly below the initial onset day, and significantly below 7.5 days (Yang & Schank, 2006, p.436). The mean cycle length for both women was divided by four and used as the expected difference. To obtain the synchrony score, the difference between final and initial onsets was subtracted from the expected difference (Weller & Weller, 1997, p.147). The synchrony scores were compared using one-tailed t-tests where a value  $p \leq 0.05$  would indicate synchrony (Ziomkiewicz, 2006, p.424).

Questionnaires were distributed that rated subjects' interactions with their closest friend on a scale from 1-5 (five being high interaction, and one being no interaction) across seven questions: sharing secrets, studying together, wearing each other's clothes, watching TV together, ordering meals and eating together, playing sports together, and hugging each other. The mean for each pair was then reported as the degree of closeness score (Ziomkiewicz, 2006, p.423). Multiple regression analysis was used to compare the relationship between the degree of closeness versus synchrony score where the  $r\text{-squared} \geq 0.7$  demonstrates a significant correlation. A question on oral contraceptive use was embedded within a list of other medications (Jarett, 1984, p.23). The results from including and excluding both contraceptive users and those with irregular cycles were compared to examine the effect they both had on synchrony score (Wilson, 1991, p.357).

### **Sample Size**

One female dormitory at the coeducational boarding school in Jordan housing a total of 59 students was chosen to participate in the study, 53 of whom agreed to take part in the research.

Two females were excluded because they did not list a mutual friend in their questionnaires, and one female was excluded because she did not fill out her menstrual cycle calendar. This brought the number of participants to 50, with 25 pairs. The individuals were chosen based on purposive sampling. The sample was predominantly Jordanian. The total of 50 females represents 85% of the dormitory, which is the amount needed to assess synchrony as indicated by Weller et al. (1995, p.883).

### **Procedures**

During a dorm meeting, the researcher announced the purpose of the research to all residents (Goldman & Schneider, 1987, p.249). Calendars were distributed (see Appendix B), and participants filled in their dates starting on September 1st. During the study period, the researcher reminded participants twice a month to record their onsets as they happened. In mid-March, another dorm meeting was held with 53 residents. Previous studies listed the participants according to room number (Graham & McGrew, 1980, p.246). However, this research ensured greater anonymity. Cards labeled 1-53 were placed in a bowl and participants drew a random card. Then, the participants showed their cards only to allow close friends to identify each other's number on the questionnaire. That way, the researcher through an anonymous number identified every girl. Each participant wrote their number on the consent form, the questionnaire (see Appendix C), and the calendar. The three papers were collected, and participants were assured they would be informed of the results.

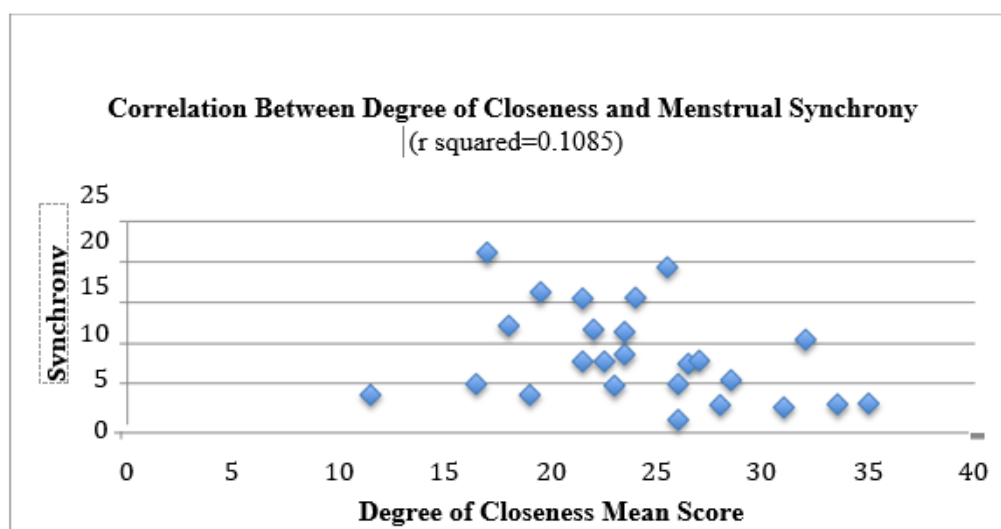
### **Results**

	Pairs (Mean)
Initial Difference (Days)	6.52
Final Difference (Days)	7.04

**Figure 1. Menstrual Onset Differences at the Beginning and End of the Study for Resident Pairs (n=25)**

Pair Number	Initial Onset Difference	Final Onset Difference	Mean Cycle Length A	Mean Cycle Length B	Pair Mean Cycle Length	Expected Difference	Actual Difference	Synchrony Score
1	8	3	29	30	29.5	7.375	-5	2.375
2	7	2	26	31	28.5	7.125	-5	2.125
3	6	1	30	31	30.5	7.625	-5	2.625
4	13	9	31	30	30.5	7.625	-5	3.625
5	5	3	31	29	30	7.5	-2	5.5
6	11	11	31	31	31	7.75	0	7.75
7	6	9	31	28	29.5	7.375	3	10.375
8	12	9	33	31	32	8	-3	5
9	2	8	35	42	38.5	9.625	6	15.625
10	9	5	32	29	30.5	7.625	-4	3.625
11	9	13	31	30	30.5	7.625	4	11.625
12	0	8	29	31	30	7.5	8	15.5
13	0	8	32	34	33	8.25	8	16.25
14	1	14	31	34	32.5	8.125	13	21.125
15	5	2	25	39	32	8	-3	5
16	5	2	31	31	31	7.75	-3	4.75
17	17	9	37	32	34.5	8.625	-8	0.625
18	16	16	38	31	34.5	8.625	0	8.625
19	2	2	31	29	30	7.5	0	7.5
20	8	3	27	33	30	7.5	-5	2.5
21	3	3	32	31	31.5	7.875	0	7.875
22	8	10	45	30	37.5	9.375	2	11.375
23	3	8	30	27	28.5	7.125	5	12.125
24	5	17	27	32	29.5	7.375	12	19.375
25	2	1	30	40	35	8.75	-1	7.75
							Standard Deviation = 5.59	

**Figure 2. The Full Calculation of Synchrony Scores with Standard Deviation**



**Figure 3. Regression Analysis Showing the Relationship Between Menstrual Synchrony and Friends' Degree of Closeness (Insignificant Result)**

### Data Analysis

Twelve pairs had a final onset difference lower than the initial onset difference, indicating synchrony. Nine pairs had a final onset difference larger than the initial onset difference, indicating asynchrony. Four pairs had a difference of zero. However, the mean initial onset was 6.52 days and the final mean onset was 7.04 days with a standard deviation of 5.59 days. For synchrony to have happened in the group, the final mean onset difference should have been significantly under the initial onset difference. The value obtained after conducting the one tailed t-test was  $p=0.32327$ , which is more than the 0.05 threshold for  $p$ , therefore indicating asynchrony (Ziomkiewicz, 2006, p.425).

The relationship between the degree of closeness factor and the synchrony scores indicated an  $r^2$  value of 0.1085, for a correlation to appear  $r^2 \geq 0.7$ . Therefore, no relationship was indicated between the degree of closeness and synchrony.

Amongst the sample studied, six out of 50 residents had irregular cycles, and four residents took contraceptive pills. To test the effect of both irregular cycles and contraceptive pill users, the pairs with both irregular cycles and pills were dropped and the synchrony scores were recalculated (Wilson, 1991, p.358). The results indicated  $p=0.2$ , which indicates no significance for synchrony was found.

### Discussion

No significant synchrony was found amongst females residing in a co-educational campus in Jordan. This finding was consistent with previous research (Jarett, 1984; Wilson, 1991; Yang & Schank, 2006; and Ziomkiewicz, 2006). This study revealed a synchrony  $p$ -value of 0.32 compared to Ziomkiewicz's (2006) 0.55 indicating that neither study found synchrony. Despite the lack of significance, several important implications are identified.

This was the first study to be done on a sample entirely consisting of the ages 14-18. Wilson (1991), Jarett (1984), and Schank (2006) stated women under the age of 17 have highly irregular cycles and avoided studying them. Weller (1995) advised dropping them from studies as they impacted his results negatively (p.884). However, dropping the irregular residents and the contraceptive users made little difference in this study. This provides further evidence for Wilson's (1991) study as he dropped both females with irregular cycles and pills and still found no synchrony (p.389). Additionally, cycle variability amongst women made it mathematically impossible to allow for synchronization. For example, if sample A has a 26 cycle length and sample B has a 29 cycle length, and they start with a two day initial onset difference, the first month they should be 5 days apart, then 8 days apart, then 11 days apart and so forth. So



unless both samples have the same cycle length or one sample has an integer of sample B's cycle length, for instance, sample A has a cycle length of 25, and sample B has a cycle length of 50 then synchrony would be established (Yang & Schank, 2006, p.442). Furthermore, the multiple regression analysis failed to detect a relationship between the degree of friendship and synchrony. This is also consistent with Ziolkiewicz's (2006) finding of  $r^2 = 0.148$  compared to this study's  $r^2 = 0.107$ , both well above the  $P < 0.05$  (p.425).

These results are inconsistent with previous studies, which found significant synchrony amongst friends. Graham and McGrew (1980) had  $p = 0.04$  (p.247) while Quadagno et al. (1981) found  $p = 0.01$  (p.241), as did Goldman and Schneider (1987, p. 246).

The explanation for not finding synchrony amongst this sample could be due to three major factors. First, the onset initial mean was below 7 days leaving little room for decrease to the final onset. For example, one pair started with an initial onset difference of 1 day and ended with 14 days, creating a 13-day gap. Consequently, even when twelve girls reduced their cycle onsets towards the end of the study compared to 9 who increased the difference amongst them, the mean difference could not recover from the high divergence scores caused by the 9 girls.

Second, four girls had zeros as their synchrony score. This data suggests that they were already synched before they returned to school as indicated by McClintock (1971) who stated that "four months with little subsequent change" were necessary to establish synchrony (p. 245). The dormitory consisted of 59 females, 70% of which had lived together for two years prior to the study and might have already synched, similar to Weller and Weller's (1997) study on Bedouin families (p.145).

### Limitations

Data was collected retrospectively in seven samples since 43 of the 50 participants periodically recorded their data. This was a limitation Weller and Weller (1997) addressed in their Bedouin study suggesting some calendars could have affected the results (p.144). But out of the 50 subjects, 86% recorded their dates prospectively, and the 7 who did not had mobile apps that recorded their menstrual cycle dates for them, which were to a high degree of accuracy. Additionally, the sample size was small. Only 53 out of the 59 residents at the dormitory agreed to participate and three had to be dropped. Although the sample size was not large, an 85% participation rate was obtained, which has been the threshold in previous studies (Weller et al., 1997, p.145). Despite the participation rate being high, a larger sample size would have allowed for the dilution of the outliers mentioned above. Furthermore, school was not in session for three weeks from December to January, in which the females were not together in the dormitory, similar to Graham and McGrew (1980), Quadagno et al. (1981), and Weller et al. (1995)'s studies. However, it was still valid to measure synchrony on the sample as the residents lived together for a four-month period prior to the break, which is enough to examine synchrony as determined in previous studies (McClintock, 1971, p.245).

### Implications

This study greatly contributed to the field by studying a sample often dropped by researchers (Graham & McGrew, 1980; Goldman & Schneider, 1987; Quadagno et al., 1981; Weller et al., 1995). Jarett (1984) concluded that irregular cycles "must be generalized with caution," and the age group studied was labeled an "irregular group" (p. 27). However, this study indicated that the sample age of 14-18 had only 12% irregular cycles, whilst Wilson's sample of college-age women had 64% irregularity (Wilson p.357-358). Despite the small sample size of this study, the results indicate that this age group may not be as irregular as researchers have suggested in the past and should be included in future studies.

Moreover, this study contributed new information to the field by investigating a culturally conservative group. The sample studied demonstrates 12% irregularity only in comparison to Weller et al.'s (1995) study with 6% irregularity that was also done in a conservative sample (p.886). These results provide further evidence that being in a culturally conservative environment is more conducive to synchrony. In addition, "minimal use" of contraceptives was noted in

Weller and Weller's (1997) Bedouin study in comparison to 8% contraceptive use in this study (p.146). This indicates a stronger trend towards synchrony due to the minimalist use of contraceptive pills, as contraceptives are not commonly consumed in conservative cultures such as Jordan.

### **Call for Further Research**

Scientific calculations of synchrony do not examine the rhythms between cycles to declare whether or not they have established synchrony. For example, a couple in this study skipped the month of November entirely, and by March reached a final onset lower than the initial onset. However, since the study ended in February, this couple did not reach synchrony according to the mathematical guidelines followed. Women cycling together needs to be studied in pairs without calculating mean averages. A new set of criteria must be developed to allow for rhythms to be properly detected.

### **Conclusion**

Much debate has stretched over four decades of research to see whether or not menstrual synchrony is a "fact or artifact" (Ziomkiewicz, 2006, p.420). This research, despite its non-significant findings, unveiled an array of errors committed in the past by both researchers who found and could not find synchrony. Researchers should develop new mathematical techniques to detect existing synchrony as well as to determine if women experience synchrony when they build closer relationships with women in their lives. Understanding how females affect each other's rhythms in new ways could have significant implications for family planning. The 38 years of research which Schank (2006) closed the door on must be reopened.

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## دراسة ظاهرة الحيض المتزامن في مدرسة دولية داخلية مختلطة في الأردن

نادين جرار\*

### ملخص

اتسم موضوع الحيض المتزامن بالجدل منذ عام 1971 وفي هذا العام الذي قامت به الباحثة (مارثا مكلينتوك) بإجراء أول دراسة في هذا المجال، وأما في العام 2006، فقد قام الباحث (جيفري شانك) بالتوصل إلى نتيجة نهائية حول الموضوع بأن مفهوم تزامن الحيض لا يتعدى كونه نظرية، وليس ظاهرة فعلية كما اعتقد الباحثون من قبله، وتقوم هذه الدراسة بإعادة النظر في مفهوم تزامن الحيض بين الصديقات اللاتي تعشن في سكن طالبات داخلي في مدرسة مختلطة داخلية في الأردن مع الإشارة إلى أن الدراسة اعتبرت بأن المجتمع المحافظ التي تنتمي إليه الطالبات يعتبر عاملاً محفزاً لهذه الدراسة، وقد أضافت الدراسة بعداً جديداً للأسلوب البحثي لهذا الموضوع من خلال إجراء الدراسة على الإناث بالفئة العمرية 14 إلى 18 عام، وهي فئة التي لم يتطرق إليها الباحثون في السابق لاعتقادهم أن دوراتهم الشهرية تعتبر غير منتظمة، وبالتالي ربما تؤدي إلى نتائج غير دقيقة، وعليه تم دراسة مجموعة ضمت 59 طالبة خلال مدة 181 يوماً، ويمثل هذا العدد نسبة مشاركة وصلت إلى 85% وقد استنتجت الدراسة عدم وجود نتائج قوية إحصائياً تثبت تزامن الحيض، أو وجود لأثر ودرجة الصداقة بين الطالبات، مما يعزز عدم وجود تزامن الحيض، وذلك بناء على ما توصل إليه الباحثون في السابق.

الكلمات الدالة: الحيض، الصداقة، المدرسة.

\*كينغز أكاديمي، الأردن. تاريخ استلام البحث 2019/10/3، وتاريخ قبوله 2019/11/5.