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Gait and menstrual cycle: Ovulating women use sexier gaits and walk slowly ahead of men

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ABSTRACT

Previous research has demonstrated that women's physical appearance or sexual interest is different across the menstrual cycle. However, the nonverbal behavior of women toward men according to their menstrual cycle has not been previously explored. In this study, the gait of women walking ahead a male confederate was recorded with the help of a spy-camera. The amount of time that women spent walking was the first dependent variable whereas the extent to which the women were perceived to be sexually attractive by two judges was the second dependent variable. Comparisons were performed according to the women's ovulation phase measured with an LH salivary test. Near ovulation, it was found that women walked slower and their gait was subjectively rated as sexier. Such behaviors were interpreted as unconscious desires of women near ovulation to reinforce their attractiveness in order to attract more men and to increase their choice of a partner.

Several studies have shown that women's physical appearances change across the menstrual cycle. Saad and Stenstrom [26] found that women reported engaging in greater appearance-related product usage on fertile phase days than on luteal days. Durante et al. [3] found that near ovulation, women preferred clothing that was more revealing and sexier, whereas Haselton et al. [9] found that during their high fertility period, women showed more skin. Similarly, Grammer et al. [5] showed that mated women attending discotheques without their partners tended to dress more provocatively when they had higher sex hormone levels, as is the case during the fertile phase. These studies suggest that women show greater interest for social contact with men in the fertile phase of their menstrual cycle and they need to appear more attractive in order to attract more men. As Danel and Pawlowski [2] stated, a woman with more men around her should have more chances of choosing a relatively higher quality mate than when the panel-size is small.

Unconscious processes were also found to be displayed by women to increase their attractiveness for men. Karremans and Verwijmeren [11] found that romantically non-involved female participants displayed higher levels of mimicry toward a male confederate than romantically involved female participants. Guéguen [6,7] found that women near ovulation mimicked men more favorably than during their luteal or their menstrual phases. In a speed dating context, women who mimicked the men stopping at their table were perceived by those men as more attractive than women who did not mimic them [8]. These studies suggest that mimicry, which increases women's attractiveness for men, is displayed more favorably during their fertile phase. Laeng and Falkenberg [34] found an increase in the mean pupil diameter for sexually significant stimuli during the fertile phase by using an infrared eye-tracking device. Hess [10] found that men described a picture of a woman with her pupils made larger to be "more feminine", "prettier", and "softer" when viewing the picture with maximally dilated pupils. Such results were confirmed by Tombs and Silverman [31] who showed that subtle changes in women have the ability to increase their attractiveness for men. Again, becoming more attractive is a way to attract more men in order to make a better choice. From an evolutionary point of view, the pressure to chose a good partner increases near ovulation when the possibility of pregnancy associated with intercourse is high.

Several studies have found that women more than men used subtle nonverbal behaviors such as nodding, leaning forward, self touching, hair flipping, and hair tossing in courtship and flirting relationships [6,33,17,23]. Moore and Butler [19] found that the frequency of such nonverbal behaviors predicted the interest that a woman had for a male target with a high degree of accuracy. Men, on the other hand, expressed more verbal behaviors than women such as laughter, exclamation, high voice level, and direct verbal contact. Moore [18] argues that women are socialized in such a way to express their interest in a man in a less provocative and explicit manner, and that is why they use nonverbal behaviors more frequently. In the studies cited above, women were observed while they were seated in university cafeterias, bars or night-clubs.

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However, none of these studies examined women's behavior when they walked and particularly when they walked in front of men. In such circumstances, it is not possible for a woman to express classic nonverbal behaviors such as a gaze or a smile. However, it would be possible for a woman to use her gait in order to be noticed by the men around her or to become more sexually attractive for them. As we found that the menstrual cycle can modify women's behavior, it could be assumed that women's gait is also influenced by their fertility risk.

Thus, congruent with previous research, we hypothesized that the extent to which the women's gait is perceived by men to be sexually attractive and the amount of time they spend walking ahead of a man will be higher when the women are in the fertile phase of their menstrual cycle.

1. Method

1.1. Participants

Two hundred and six women, undergraduate business and social science students, ranging in age from 18 to 22, were asked to participate in an experiment on lexical decision. All of them were Caucasians enrolled at the University of Bretagne-Sud in Brittany, France. The women volunteered to participate and received no payment or course credit for their participation. After agreeing to participate, the women were surveyed with a questionnaire concerning age, sexual orientation, the use of oral contraception, pregnancy, and the current status of their sexual relationship.

At the end of the survey, only the women with a heterosexual orientation, who used no oral contraception, and who were not pregnant were retained as participants for further experimentation. To prevent a possible bias, the participants who declared having a relation with a man were excluded because a previous study on nonverbal mimicry behavior found that romantically involved participants displayed lower levels of mimicry toward a confederate of the opposite sex than uninvolved participants [11]. It has also been found that nonverbal mimicry is a way for women to increase their attractiveness for men [8]. In all, a total of 103 women were included in our experiment.

1.2. Procedure

This experiment was approved by the ethical committee of the laboratory (CRPCC-LESTIC EA 1285). Upon arrival at the laboratory office, the participant was first instructed by the experimenter to sit down in the waiting room and to wait until a second participant arrived. Two minutes later, a male confederate presented as a participant entered the room accompanied by the experimenter who instructed them to wait until he had finished preparing the experimental room. As in Karremans and Verwijmeren [11] study exploring mimicry behavior, precautions were taken to select a confederate with a high level of physical attractiveness for women. A separate sample of 31 undergraduate students in literature and sociology previously judged the male confederate to be highly attractive (rating mean of 7.28, SD = 2.38) on a 1 (not at all attractive) to 9 (extremely attractive) scale.

The experimenter informed the participants that they were taking part in a study on computerized lexical decisions and he thanked them for their patience because he had to collect the responses of the two previous participants. The experimenter left the room for 2 min during which the confederate was instructed to interact verbally with the participant in a friendly way. He was instructed to smile, to introduce himself, and to ask the participant some trivial questions about her studies and hobbies. Two minutes later, the experimenter came back to the waiting room and the participants were instructed to walk down to the laboratory at the far end of a long narrow hallway just outside the office. The experimenter said that he had an urgent phone call to make, but that he would meet them by the laboratory when he had finished. He added that the laboratory was easy to find: "the red door on your left just after the bathroom. I'll be there in 1 or 2 min. Wait for me at the door". The confederate was instructed to let the participant walk ahead of him and to stay about one meter behind the participant until they got to the laboratory door. When the participant began to walk, the confederate set off a large focus spy camera with the objective hidden in a coat button. He was instructed to stop the camera when the participant reached the laboratory door. Thus it was possible to record the participant's gait and the amount of time it took her to walk down the hallway. Upon arrival, the experimenter joined the participants and invited them to enter the laboratory. The experimenter said that before beginning, he wanted to evaluate their salivary LH levels. The LH (Luteinizing Hormone) measure was used because research has consistently found that the amount of LH remains at the same level during the cycle except near ovulation when a LH surge occurs [29]. A recent review of the psychological effects of the menstrual cycle on women's sexuality found that measuring LH surges is a reliable method for determining ovulation [1].

The experimenter gave the participants and the confederate a buccal narrow test strip (Saliva Biotester QTest™) and asked them to put it on their tongues for two seconds and to give the strips back to him. The experimenter took them and measured the LH concentration of the participant in order to determine her probability of fertility. This LH test operated as a pregnancy test. The probability of fertility was obtained with the help of a colored reagent associated with the LH concentration. Three levels of fertility risk were associated with three different clear appearances: one for the high risk, one for the moderate risk, and one last for the low risk. The experimenter feigned to act in the same way with the confederate's salivary sample. After that, the participant was asked to indicate what she thought the purpose of the study was and to indicate if she had noticed anything unusual about the experiment (none expressed suspicion). After responding, the participant was fully debriefed. The participants were informed that they had participated in a study that evaluated the relation between their menstrual cycle and their gait, and were given details of the procedure used. They were asked if they would consent to the use of the video of them and the results of their LH test. They were carefully informed that all the data would remain anonymous. All of them consented.

The first dependent variable was the amount of time in seconds that the participant spent walking down the hallway, starting from the doorway of the waiting room and ending at the laboratory door, 18 m away. The second dependent variable was the extent to which the woman's gait was subjectively rated as sexier. Two coders (2 males), unaware of the experimental conditions and predictions, were instructed to view each of the 103 videos of the participants and to rate the extent to which they found the gaits of the young women to be sexually attractive by using a 5-point Likert type scale (1 = not at all, 5 = extremely). A high level of inter-rater reliability was found, $r = .83$, $p < .001$, $N = 103$; the mean of the two coders' counts was thus used as the dependent variable for statistical analyses. The three groups were controlled for their age. No statistical difference was found ($F(2, 100) = 0.17$, $p = .84$, $\eta^2_p < .005$).

2. Results

The mean of the two dependent variables (amount of time walking and the extent to which the women were subjectively perceived to be sexually attractive by the judges) are presented in Table 1.

With both dependent variables, a one-way intergroup analysis of variance (ANOVA) was performed to compare the three fertility conditions. Post hoc pairwise comparisons were performed using Student's *t*-test for two independent samples. The statistical procedures were computed using SPSS statistical solution.

Fertility probability was found to be a main effect on the amount of time spent walking down the hallway ($F(2, 100) = 6.83$, $p = .002$, $\eta^2_p = .12$). Pairwise comparison revealed that the high fertility probability condition was significantly different from the low fertility probability condition ($t(79) = 3.59$, $p < .001$, $d = 0.81$), but not from the moderate fertility probability condition

Table 1
Means (SD in brackets) of amount of time walking in the corridor and inter-judges evaluation of the sexiness of the women's gait according to their fertility risk.

	Fertility risk		
	High ($N = 14$)	Moderate ($N = 22$)	Low ($N = 67$)
Age (mean and SD)	(20.6, 1.16)	(20.5, 1.22)	(20.4, 1.29)
Amount of time spent to walk in the corridor (in s)	22.14 (3.32)	20.41 (2.7)	19.39 (2.52)
Sexiness of the women's gait	2.96 (0.57)	2.54 (0.48)	2.31 (0.56)
Bravais–Pearson correlation	$r = .57$, $p = .03$	$r = .40$, $p = .06$	$r = -.06$, $p = .62$

($t(34) = 1.72$, $p = .09$, $d = 0.60$). The moderate fertility probability condition and the low fertility probability condition were not statistically different ($t(87) = 1.71$, $p = .09$, $d = 0.37$) from each other.

A main effect of fertility risk was found on the extent to which the women's gaits were subjectively perceived as sexier ($F(2, 103) = 8.77$, $p = .02$, $\eta^2 p = .15$). Pairwise comparison revealed that the high fertility probability condition was significantly different from the low fertility probability condition ($t(79) = 3.97$, $p < .001$, $d = 0.89$) and the moderate fertility probability condition ($t(34) = 2.36$, $p = .03$, $d = 0.81$), whereas the difference between the latter two conditions was not statistically different ($t(87) = 1.48$, $p = .14$, $d = 0.32$).

A correlation analysis (see Table 1) showed a moderate significant relationship between the two dependent variables only in the high fertility probability condition, revealing that as the amount of time spent by the participants walking down the hallway increased, their gaits were perceived as sexier by the male judges.

3. Discussion

In this experiment, we found that women near ovulation spent more time walking down a long hallway and their gaits were perceived to be sexier by males. A positive relationship was also found between the two dependent variables only in the high fertility probability condition. With the help of new behavioral measures, our experiment confirms previous studies that found women near ovulation acted in such a way so as to appear sexier and attractive for men. It has been found that women modify their dress to appear sexier [3] or more attractive [9] during the fertile phase.

Our results suggest that this effect is not limited to clothing choice but could be extended to nonverbal behavior displayed by women to increase their attractiveness. Moore [18] argues that women use subtle cues and especially nonverbal behaviors to express their interest in a man or for sex. In our experiment, women may have spent more time walking down the hallway because they wanted to be noticed by the confederate or because exhibiting a sexy gait caused them to walk slowly. Such behavioral difference associated with the fertility risk level could explain the results of previous studies in which women's behaviors were not examined. Miller et al. [14] found that men in gentlemen's clubs gave more tips to professional lap dancers during their fertile phase. Thus, perhaps, more tips were given because women near ovulation exhibit changes in their body movements which, in turn, increased the tips they received.

Several theoretical arguments could be put forward to explain our results. In this experiment, the male confederate was rated to be physically attractive by a separate group of women. Several studies have shown that women's preferences for male characteristics change across the menstrual cycle. During the follicular phase of their menstrual cycle, women showed greater preference for facial masculinity traits [22,21], for taller men [20], and for men who expressed dominant behaviors [4]. Thornhill and Gangestad [30] found that women have a specific preference for scent associated with male symmetry during the fertile phase of their menstrual cycle. Such effects of positive physical traits are theoretically explained as a consequence of increased attention to good gene markers at the point in the cycle when conception is possible. For example, symmetry in traits is thought to reveal an ability to resist, during development, the harmful effects of perturbations caused by pathogens, toxins, and mutations [15]. Given that symmetry is partly heritable [16], women are attracted by males with body symmetry, especially during the fertile phase, to transmit such health advantages to their offspring. Thus given the high attractiveness of our confederate, women in their fertile phase were perhaps more attracted to this man and exhibited behaviors to increase his interest in them.

It could also be argued that in doing so, women may have enhanced their attractiveness for men and then could attract more men in order to select a good one. As Danel and Pawlowski [2] stated, a woman with more men around her should have more chances of choosing a relatively higher quality mate than when the panel-size is small. Accordingly, as with apparel, walking slowly and with a sexier gait may be an effective way to increase attractiveness near ovulation which, in turn, attracts more men and allows women to select the best mate. Exhibiting such behavior is, at least, a cue to indicate to men that the woman is fertile. Several studies found that female body odor becomes more attractive for men around ovulation [24,12,28]. It has also been found that fingers, ears, and breasts become more symmetrical in the days leading up to ovulation [13,27]. Facial appearance is also influenced by the menstrual cycle. Van den Berghe and Frost [32] found that female skin color became lighter near ovulation and Roberts et al. [25] observed that photographs of women's faces, taken in the fertile phase, were evaluated by men as being more attractive than those taken during the luteal phase. Congruent with such studies, the behavioral pattern found in our study is perhaps an additional way for women to indicate to men that they are near ovulation.

The processes that influence women's behaviors are probably polygenetic and such behaviors involve multiple processes. The confederate was attractive, but despite this, it is still important for women to enlarge the pool of attractive men to be able to make the best possible choice of a partner. Thus to attract men, women must exhibit cues to indicate that they are in the fertile phase. Given the high risks associated with pregnancy, such evolutionary processes are likely combined to enhance the chances of a woman's good conception.

Our study has certain limitations that need to be taken into account when considering the study and its contributions. The sample sizes were low (especially in the fertile phase) and a replication with larger samples is now necessary to generalize the findings. Only one male confederate was tested in this study. His physical attractiveness was high in this study since during the follicular phase of the menstrual cycle, women show greater preference for physical traits associated with attractiveness [22,21]. However, it has been found that additional physical traits are associated with male attractiveness such as height [20] or symmetry [30]. These results suggest that women, particularly during their fertile phase, are attracted by these physical traits with the aim of transmitting genetic advantages to their offspring. Thus replications using male confederates with different levels of attractiveness would be interesting to study. It could be argued that no difference in women's gait according to their menstrual cycle will be observed with an unattractive male confederate walking behind them.

In summary, it was found in this study that women near ovulation spent more time walking down ahead a male confederate and their gaits were perceived to be sexier when evaluated by males. Such results confirm that subtle behavioral cues are influenced by menstrual cycle. Examining further nonverbal behaviors influenced by menstrual cycle could be an interesting approach for future studies on this topic.

Conflict of interest

No conflict of interest.

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