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MAKEUP AND MENSTRUAL CYCLE: NEAR OVULATION, WOMEN USE MORE COSMETICS

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Research has demonstrated that women near ovulation change their appearance in order to look more attractive. I hypothesized that, near ovulation, women would use more cosmetics. In a first study, female participants received an LH test in a laboratory setting to determine their fertility risk. Participants estimated the time they had spent putting on makeup, and two female professional makeup artists evaluated the level of makeup use. Results showed that, near ovulation, women spent more time putting on makeup and makeup artists evaluated their level of use to be higher and of better quality. In a second field study, the level of cosmetics use by women in nightclubs and bars on a Saturday night was measured. Near ovulation, the level of cosmetics use was higher.
Key words: cosmetics, women, menstrual cycle, attractiveness

Several studies have shown that a woman's physical appearance changes across the menstrual cycle. Women's clothing choices are also affected by their menstrual cycle. Saad and Stenstrom (2009) found that women reported engaging in greater appearance-related product usage on fertile phase days than on luteal days. Durante, Li, and Haselton (2008) found that, near ovulation, women preferred clothing that was more revealing and sexy, whereas Haselton, Mortezaie, Pillsworth, Bleske, and Frederick (2007) found that, during their high-fertility period, women showed more skin. Recently, Durante, Griskevicius, Hill, Perilloux, and Li (2011) reported that, at peak fertility, women chose products that enhanced appearance (e.g., choosing sexy rather than more conservative clothing). Similarly, Grammer, Renninger, and Fischer (2004) 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. In the same way, Kim and Tokura (1998) found that preference for warm or cool colors was also affected by the menstrual cycle, and research has found that warm- or cool-colored clothes are associated with variations in women's attractiveness. For example, recent research has found that women with red clothes are more attractive to men. Guéguen (in press) found that women hitchhikers wearing red, compared to the same women wearing black, white, blue, green, and yellow, solicited a higher response in the number of male drivers who stopped to offer a ride, whereas no color effect was found when considering the behavior of female drivers. In the same way, Niesta Kayser, Elliot, and Feltman (2010) found that men who conversed with a

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potential female partner asked more intimate questions when the woman was wearing a red versus a green shirt (Experiment 1). These men also sat closer to women with red shirts than with blue ones (Experiment 2). Such studies suggest that clothing style provides a means for women to increase their attractiveness as perceived by men during their fertile phase.

Curiously, no study has examined the use of cosmetics by women in relation to their menstrual cycle. However, research has found that cosmetics use is associated with a high level of female attractiveness. There is evidence that makeup has been used by women throughout history in order to improve their facial attractiveness (Kay, 2005; Malkan, 2006; Marwick, 1988), and the cosmetics industry is one of the most flourishing industries in the world.

The literature examining the role of cosmetics in social perception has found that, overall, makeup is associated with positive evaluations of women. Graham and Jouhar (1981) reported positive effects of cosmetics on judgment. Male and female participants rated color photographs of four female targets of average physical attractiveness on several traits related to appearance and personality. With facial makeup, the targets were rated as being cleaner, tidier, more feminine, and more physically attractive, as well as more secure, sociable, interesting, poised, confident, organized, and popular. Richetin, Huguet, and Croizet (2007) found that women with facial makeup (as opposed to with no makeup at all), presented through color photography, were associated with positive traits and high-status professions. Cox and Glick (1986) examined how average-looking women were perceived after a professional makeover versus when they were cosmetics free and found that cosmetics were positively associated with femininity and sexiness. Workman and Johnson (1991) instructed female participants to view one of three colored photographs of a professional model wearing either heavy, moderate, or no cosmetics. They found that cosmetics significantly enhanced the impression of attractiveness and femininity. Cash, Dawson, Davis, Bowen, and Galumbeck (1989) conducted an experiment in which American college students were photographed while wearing their typical facial cosmetics and again following the removal of their makeup. Participants rated the physical attractiveness of the women. Male judgments were found to be more favorable when the women were photographed with cosmetics than when they were cosmetics free, whereas female judgments were not affected by the presence of makeup. In a recent study, Nash, Fieldman, Hussey, Lévêque, and Pineau (2006) presented facial photographs of four women either with or without cosmetics. Women with cosmetics were perceived as healthier and more confident than when presented without cosmetics. Participants also awarded women who were wearing makeup greater earning potential and more prestigious jobs than the same women without cosmetics.

It seems that different levels of cosmetics use are associated with different perceptions. Mulhern, Fieldman, Hussey, Lévêque, and Pineau (2003) asked male and female participants to view a set of five photographs of women volunteers and to rank each set from the most to the least attractive. Volunteers were made up by a beautician in five different ways: no makeup, foundation only, eye makeup only, lip makeup only, and full facial makeup (foundation, eyes, and lips). Fully made-up faces were judged to be more attractive than the same faces when makeup free. The researchers also found that eye makeup alone yielded higher levels of mean attractiveness ratings than foundation makeup alone, and the latter yielded higher levels of mean attractiveness ratings than lip makeup alone.

These studies appear to show that women who wear makeup are perceived to be more attractive. Given that sexier (Haselton et al., 2007) or more provocative (Grammer et al., 2004) clothes probably are used by women near ovulation to provoke the interest of men, it could be argued that the use of cosmetics also provides women with a means to heighten their attractiveness to men. Thus, insofar as makeup appears to be a relevant cue by which women can increase their attractiveness to men, it can be hypothesized that women are more likely to spend more time applying cosmetics as well as use more of them near ovulation.

Study 1

Method

Participants. Participants in Study 1 comprised 155 undergraduate female students in social sciences and management ranging in age from 18 to 21 years (M = 19.2, SD = 0.5). The women were first surveyed with a questionnaire about age, sexual orientation, length of cycle, use of oral contraception during the last three months, pregnancy, and the current status of their romantic and sexual relationships. Upon completion of the survey, only those women of heterosexual orientation who had used no oral contraception over the previous three-month period, were not pregnant, were not in a relationship with a man, and had a cycle length of 26 to 32 days were retained as participants, resulting in a total of 64 women. These women were instructed to come to the laboratory at 10:00 a.m. to complete a short survey about their product consumption; however, no mention of cosmetic products in particular was made.

Procedure. Upon arrival at the laboratory, each participant was welcomed by a female experimenter who informed her that she was participating in a survey on cosmetics choices. The participant was first instructed to evaluate the time spent, in minutes, putting on makeup that morning before arriving at the laboratory. After that, the experimenter added that she wanted to take a photograph of the participant's face. All participants accepted the request and a digital high-resolution color photograph was taken of each participant's face. Then the participant was administered an LH salivary test (Saliva Biotester QTest™) in order to determine her fertility. However, in order to avoid any possible suspicions about the purpose of the experiment, the researcher explained that she needed to measure the participant's cortisol level. After that, the participant was asked to indicate what she thought the purpose of the study was and if she had noticed anything unusual about the experiment (none expressed suspicion). After responding, the participant was fully debriefed. Based on the results of the LH test, each participant was allocated into one of the two conditions: fertile or nonfertile. Among the 64 participants, 14 were in their fertile phase, whereas 50 were in their nonfertile phase.

Using the photographs of the participants faces, two professional makeup artists, both with more than 10 years of experience, evaluated each participant's level of cosmetics use. The makeup artists were not informed about the objective of the experiment. Each evaluation was made on a semantic scale with nine steps. The first scale measured the level of cosmetics use with the following statement: "I think that the level of cosmetics use of the target is _____." Ratings ranged from 1 (*no cosmetics used*) to 9 (*high level of cosmetics used*). The second scale measured the attractiveness of the makeup with the following statement: "I think that this woman displayed _____." Ratings ranged from 1 (*poorly attractive makeup*) to 9 (*highly attractive makeup*). A high level of intercoder reliability was found for the level of cosmetics use, $r(64) = .89$, $p < .001$, and for the makeup attractiveness, $r(64) = .78$, $p < .001$. Thus the means of the two coders' counts were used as the dependent variable for statistical analyses.

Results

The mean of participants' time spent putting on makeup, the evaluation of the amount of cosmetics used, and the quality of the makeup as perceived by the professionals according to participants' fertility are presented in Table 1.

Analyses were run on each of the three dependent variables. Differences between groups according to their fertility risk were examined with the help of a Student-Fisher test for unpaired distributions. As the sample sizes were unequal, Levene's test for equality of variance was performed for each dependent variable and revealed no significant difference for time (F = 0.33, p = .57), level of cosmetics use (F = 0.03, p = .85), or attractiveness of the makeup (F = 1.82, p = .18). Thus, a standard t test was used for each comparison.

Table 1
Mean (SD) of Participants' Time Spent Applying Makeup and Evaluation of the Level of Cosmetics Use and Quality of the Makeup by the Professional Makeup Artists in the Two Fertility Conditions

Dependent variable	High fertility (N = 14)	Low fertility (N = 50)
Time spent putting on makeup (in min)	10.5 (3.20)	7.94 (2.57)
Level of cosmetics use (range: 1–9)	7.25 (0.70)	6.69 (0.68)
Attractiveness of the makeup (range: 1–9)	5.86 (0.84)	5.45 (0.60)

For the participants' estimation of time spent putting on makeup, a significant difference was found, $t(62) = 3.12$, $p < .001$, $d = 0.79$, revealing that the women near ovulation spent more time putting on makeup ($M = 10.5$) than the women who were not in their fertile phase ($M = 7.94$). For the level of cosmetics use, a significant difference was found, $t(62) = 2.68$, $p = .009$, $d = 0.68$, revealing that the professional makeup artists estimated that the level of cosmetics use was higher in the group of women near ovulation ($M = 7.25$) than the women who were not in their fertile phase ($M = 6.69$). For the attractiveness of the makeup, a significant difference was found, $t(62) = 2.06$, $p = .04$, $d = 0.52$, revealing that the professional makeup artists estimated that the attractiveness of the participants' makeup was higher for the women who were in their fertile phase ($M = 5.86$) than the women who were not in their fertile phase ($M = 5.45$).

In order to study if there was a positive linear relationship between time spent putting on makeup and level of cosmetics use on attractiveness, Bravais-Pearson correlation analyses were performed between the three dependant variables and revealed that the estimation of time spent putting on makeup correlated significantly with the level of cosmetics use, $r(64) = .54$, $p < .001$, and the attractiveness score of the makeup, $r(64) = .68$, $p < .001$, whereas the level of cosmetics use correlated significantly with the attractiveness score of the makeup, $r(64) = .51$, $p < .001$. Additional correlation analyses showed the same link pattern in the two fertility groups.

Discussion

The results of the first study indicate that the participants estimated that they spent more time putting on makeup near ovulation. In addition, the evaluation performed by professionals revealed that, near ovulation, the estimated level of cosmetics use and the level of attractiveness of the makeup were higher. Thus, these results confirm that women near ovulation spent more time applying makeup and used more cosmetic products than women in the nonfertile phase of their cycle. This result confirms that women near ovulation displayed behavior that would increase their physical attractiveness, probably to appear more attractive to men.

Given these interesting initial results relating cosmetics use and fertility, a second study was conducted. However, in order to increase the ecological value of the initial data, the second study was carried out in a real context and not in a laboratory setting. We examined the cosmetics use of young women in various nightclubs and bars on a Saturday night and compared usage with fertility, as measured by an LH test. In France, nightclubs and bars, especially on Saturday nights, are typical places where young people start their romantic relationships (Mermet, 2010). Furthermore, more than 30% of heterosexual couples who live together or are married in France met in a nightclub or bar (Bozon & Héran, 2006). Guéguen (2007) found that, in France, 73% of young men reported that a nightclub was the best place to meet women, and 65% reported that the second-best place was a bar on a Saturday night or during the summer holidays. Thus it was hypothesized that, in such settings, women would display more cosmetics use.

Study 2

Method

Participants. Participants in Study 2 comprised 1,752 women, ranging in age from 18 to 26 years (M = 22.1, SD = 1.6). The women were approached in different places appropriate, in France, for courtship or mating relationships (e.g., nightclubs, bars on a Saturday night, student parties). The women were first surveyed with a questionnaire about age, sexual orientation, use of oral contraception, pregnancy, and the current status of their sexual relationships. Upon completion of the survey, only those women with a heterosexual orientation who used no oral contraception, were not pregnant, and reported no current relationship with a man were retained as participants. A total of 949 women were included in the experiment.

Procedure. Eighteen two-woman teams of undergraduate students in social sciences, ranging in age from 18 to 21 years, acted as interviewers in this study. None were informed about the real objective of the study or the experimental hypothesis. They were merely instructed to ask the participants some questions and to note some aspects of their cosmetics use. Each team was instructed to approach a young woman and to ask her to participate in a short survey. If the participant agreed, she was immediately asked to respond to the survey. During this time, the two interviewers were instructed to evaluate the level of facial cosmetics use, including the presence or absence of cosmetics displayed on lips, cheeks, and eyelids. One point was counted for the presence of cosmetics on each area; thus, the maximum score possible was 3 and the minimum score was 0. A high level of intercoder reliability was found, $r(903) = .94$, $p < .001$, and the mean of the two coders' counts was used as the dependent variable for statistical analyses.

At the end of the survey, the second interviewer, who had not previously asked the survey questions to the participant, said that she wanted to test the participant's salivary cortisol level. Forty-six participants refused, and they were excluded from the data analysis. In the case of those participants who accepted, the interviewer administered an LH salivary test (Saliva Biotester QTest™) to determine the participants' fertility. After that, the participant was invited to say what she thought the purpose of the research was and whether she had noticed anything unusual about the study (none expressed any suspicion). Based on the results of the LH test, each participant was allocated into one of two conditions: fertile or nonfertile. Of the total participants, 114 women were in their fertile phase and 789 were in their nonfertile phase.

Results

The means of the participants' cosmetics use in relation to their fertility are presented in Table 2.

Table 2
Mean (SD) of Women's Level of Cosmetics Use in the Two Fertility Conditions

Fertility risk	
High (N = 114)	Low (N = 789)
1.83 (0.43)	1.56 (0.52)

The difference between groups according to their fertility was examined with the help of a Student-Fisher test for unpaired distributions. As the sample sizes were unequal, Levene's test for equality of variance was performed and revealed no significant difference, $F = 0.37$, $p = 52$. Thus, a standard t test was used. A significant difference was found, $t(903) = 5.30$, $p < .001$, $d = 0.35$, revealing that the women near ovulation used more cosmetics (M = 1.83) than the women who were not in their fertile phase (M = 1.56).

Discussion

Congruent with the initial hypothesis and with the results from the first study, Study 2 showed that, in a field setting, women were likely to wear more cosmetics when they went to a nightclub or a bar on a Saturday night, two places in France typical for initiating romantic relationships (Mermet, 2010). Thus, in real life it appears that high fertility is associated with women changing their physical appearance in order to be more attractive to men.

General Discussion

In both studies, results showed that women near ovulation used more cosmetic products. These results confirm previous research on the menstrual cycle that has found that, near ovulation, women modify their physical appearance to look sexier. Durante et al. (2008), Grammer et al. (2004), and Haselton et al. (2007) found that, during their fertile phase, women preferred more revealing and sexier clothing. The current results extend these preliminary studies by showing that the style of clothing is not the only means of modifying a woman's appearance.

However, the question remains as to why women use more cosmetic makeup products near ovulation. Previous research, and also the variation in cosmetics use found in the current two studies, could help explain this effect. Several studies have found that women who wear makeup are perceived to be more physically attractive or associated with a positive impression (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Cox & Glick, 1986; Graham & Jouhar, 1981; Nash et al., 2006; Mulhern et al., 2003; Workman & Johnson, 1991). Recent studies have also found that people display different behavior toward women depending on whether or not they are wearing makeup. Jacob, Guéguen, Boulbry, and Ardicioni (2009) found that female waitresses wearing makeup received more tips from male customers, whereas no tipping effect was found when examining female customers. The same results were recently observed by Guéguen and Jacob (2011), who also found that the effect of makeup on tipping behavior was mediated by the perception of the physical attractiveness of the waitress, but only with male customers. Further study has found that the way men approach women is also influenced by women's cosmetics use. Guéguen (2008) examined the effect of cosmetics on courtship context. Female confederates with and without makeup were seated in two bars for one hour, and the number of solicitations by men and the latency of the first solicitation were used as dependent variables. Results showed that the makeup condition was associated with a higher number of solicitations by men and a shorter latency between the arrival of the confederates in the bar and the first solicitation of courtship from a man.

Thus, the results of these recent studies seem to show that the attractiveness of women to men increases when the women wear makeup and that women know that makeup increases their physical attractiveness (Kay, 2005; Malkan, 2006; Marwick, 1988). Given this, the pressure to become more physically attractive is probably greater near ovulation; it also explains why women in the current study spent more time putting on makeup (Study 1) and used more cosmetic products (Study 2) when they were in the fertile phase of their cycle.

Research has demonstrated that women's behaviors toward men and their sexual interest are different across the menstrual cycle. Zillman, Schweitzer, and Mundorf (1995) and Slob, Ernste, and van der Werff ten Bosch (1996) reported that human females were more interested in and thought more often about sex during the follicular phase. Sheldon, Cooper, Geary, Hoard, and DeSoto (2006) found that women reported being more prone to fantasize about having sexual intercourse with a man other than their current partner during their fertile phase. Thus, wearing cosmetics is perhaps a way of signaling this interest in sex or mating to men. Moore (2010) argued that women use subtle cues to express their interest in a man or in sex. Wearing cosmetics is probably a way of indicating this kind of interest, and men are receptive to this cue. It could be argued that by wearing

cosmetics, women enhance their attractiveness to men and are then able to attract more men. As Danel and Pawlowski (2006) observed, a woman will have a greater chance of choosing a relatively higher quality mate when there are more men around her than when the panel size is small. Accordingly, displaying cosmetics may be an effective way of increasing attractiveness near ovulation, which in turn attracts more men and allows women to select the best mate.

The results found in the current studies, one carried out in a laboratory setting and one in a field setting, provide evidence that there is a link between women's cosmetics use and menstrual cycle. Further studies are now needed to explore this menstrual-cycle effect more deeply. For example, it would be interesting to examine types of cosmetic products used in relation to a woman's menstrual cycle. Mulhern et al. (2003) observed that women who wore red lipstick were perceived by men to be more attractive, and several studies found that women wearing red clothes are perceived by men to be more physically attractive and sexier (Elliot & Niesta, 2008) and that men approach women wearing red more favorably (Guéguen, in press; Niesta Kayser et al. 2010). Thus, it is possible that, near ovulation, women could use red lipstick, as opposed to any other color, in order to increase their attractiveness to men. The same analysis could be done by examining the color or the extent of cosmetic products used on other areas of women's faces, such as cheeks or eyelids.

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