



## Costly female appearance-enhancement provides cues of short-term mating effort: The case of cosmetic surgery



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### ABSTRACT

Across three studies, we explore the relationship between cosmetic surgery, which functions as a costly appearance-enhancement tactic, and women's short-term mating effort. Study 1 demonstrates that women who exert increased short-term mating effort are more accepting of costly appearance-enhancement techniques (i.e., cosmetic surgery), but not relatively low-cost appearance-enhancement techniques (i.e., facial cosmetics). Study 2 and 3 further show that both men and women use information regarding a female targets' cosmetic surgery usage to infer increased short-term mating effort. Moreover, Study 3 demonstrates that inferences of short-term mating effort do not differ as a function of whether the target received facial or body cosmetic surgery. The findings of the current research demonstrate that women's engagement in extreme beautification procedures can influence others' perceptions of their short-term mating effort.

### 1. Introduction

Compared to women, men across a wide variety of cultures place higher value on the characteristic of physical attractiveness in their potential romantic and sexual partners (Buss et al., 1990). This sex differences in the preference for potential mate's physical attractiveness is believed to reflect adaptations to sex-specific problems faced in the reproductive domain across evolutionary time (see Buss, 1989, 2016, for review). Specifically, men's preference for physically attractive mates is thought to originate from the adaptive problem of identifying and accessing fertile women (Symons, 1979). Providing support for this perspective, the facial and body characteristics men find attractive (e.g., clear facial complexion, symmetry, lustrous hair, breast size, waist-to-hip ratio) are shown to be reliable indicators of women's health, youth, and fertility (see Arnocky, Bird, & Perilloux, 2014; Cloud & Perilloux, 2014; Fink & Neave, 2005; Law Smith et al., 2006; Sugiyama, 2005).

Given the premium men place on prospective partners' physical appearance (Li, 2007; Li, Bailey, Kenrick, & Linsenmeier, 2002; Li & Kenrick, 2006), attractiveness is vital for women in the mating domain, influencing not only their mate preferences, but also their mate attraction and intrasexual competition behaviors. Women's standards for potential mates increases with their attractiveness, where attractive women report desiring mates who are more attractive, wealthier, better parents, and more devoted partners (Buss & Shackelford, 2008). When

attempting to attract desirable members of the opposite-sex and competing with same-sex others for access to desirable male partners, the most commonly reported female tactic is appearance enhancement (Buss, 1988; Greer & Buss, 1994; Walters & Crawford, 1994). For example, in research examining behaviors used to attract mates and compete with same-sex others for mates, women report engaging in appearance enhancement (e.g., wearing make-up) more frequently than do men (Buss, 1988; Walters & Crawford, 1994). Moreover, both sexes rate appearance enhancement as a more effective mate attraction (Buss, 1988) and intrasexual competition tactic (Walters & Crawford, 1994) when performed by women than men. As the outcome of female appearance enhancement is typically increased attractiveness (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Cash & Horton, 1983; Etcoff, Stock, Haley, Vickery, & House, 2011; Graham & Jouhar, 1981; Mileva, Jones, Russell, & Little, 2016), this strategy successfully serves both mate-attraction and intrasexual competition purposes.

Accordingly, when mating-relevant goals are activated, women's desire to engage in appearance enhancement increases (Arnocky, Perilloux, Cloud, Bird, & Thomas, 2016; Hill & Durante, 2011; Hill, Rodeheffer, Griskevicius, Durante, & White, 2012). For instance, in a study conducted by Hill and Durante (2011), women who were primed to reflect on a time in which they were competing with another woman for a romantic partner expressed greater willingness to consume diet pills and undergo skin tanning, while underestimating the risk involved

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with these appearance-enhancement behaviors. Similarly, Arnocky et al. (2016) examined women's willingness to use various appearance-enhancing products (e.g., facial cosmetics and diet pills) after viewing product advertisements featuring attractive women or products only. Compared to the product-only advertisements, women exposed to ads with attractive same-sex others experienced increased envy, which increased their willingness to use appearance-enhancing products. Taken together, these findings advance the idea that women's desire for appearance enhancement is closely related to their mating-relevant goals.

While prior work demonstrates that experimentally activating mating goals can increase women's desire to engage in appearance enhancement, some research suggests that women's desire to perform appearance-enhancement behaviors is closely related to their sociosexuality (Bleske-Rechek & Buss, 2006; Grammer, Renninger, & Fischer, 2004). Sociosexuality is a construct assessing differences in allocations of mating effort: individuals with unrestricted sociosexual orientations are shown to invest more effort in uncommitted, short-term sexual relationships, while the reverse is true for those with more restricted sociosexual orientations (Penke & Asendorpf, 2008; Simpson & Gangestad, 1991). (This is not to say that engagement in short-term relationships indicates the absence of interest in long-term relationships. Women are thought to sometimes utilize short-term mating opportunities to assess potential mate's suitability for a long-term partnership [see Buss & Schmitt, 1993].) As an unrestricted sociosexual orientation typically denotes increased short-term mating effort, we will be using the phrase *short-term mating effort* when referring to a more unrestricted sociosexual orientation throughout the current paper. Research examining the relationship between women's short-term mating effort and appearance enhancement reveals that women who invest increased effort in short-term mating report engaging in appearance enhancement at higher frequencies than those investing less effort in short-term mating (Bleske-Rechek and Buss, 2006). Other research has investigated this relationship in a more ecologically valid manner by assessing women's motivations for attending a nightclub in conjunction with their clothing choices (Grammer et al., 2004). Women whose motivations for attending the nightclub included short-term sexual liaisons were found to wear sheer clothing that enhanced their sexual attractiveness. Together this work suggests that women's engagement in appearance-enhancement behaviors may also be indicative of their investment in short-term mating.

Female appearance enhancement is not a new phenomenon. For centuries, women have used a variety of methods—ranging from moderate to extreme—to enhance their physical attractiveness. Women's cosmetic usage dates back to 10,000 BCE; Egyptian women used a plethora of oils and ointments to alter the appearance and odor of their skin, including henna to stain fingernails, natural substances to rouge cheeks, and kohl (a dark colored powder made from burnt materials and metals) to define their eyes and eyebrows (Chaudhri & Jain, 2009). Notable, more extreme historical beautification efforts are exemplified by the uncomfortable corsetry used by Victorian women to narrow their waists and foot binding practiced by Chinese women to achieve a demure feminine appearance and desirable social status (Erbguth, 2008; Marwick, 1988; Nigam & Nigam, 2010; Russell, 2010). Today, the beauty industry is booming worldwide with an estimated worth of over 532 billion dollars in 2017 (Reuters, 2018). Included in this lucrative industry is cosmetic surgery, an extreme beautification technique that exists due to advances in medical technology.

Unsurprisingly, men and women differ regarding their interest in cosmetic surgery procedures. That is, women report being more likely to consider receiving cosmetic surgery procedures than do men (Brown, Furnham, Glanville, & Swami, 2007; Frederick, Lever, & Peplau, 2007; Swami et al., 2008). For example, research conducted on a sample of over 50,000 participants revealed that 48% of women and 23% of men reported that they would consider receiving cosmetic surgery (Frederick et al., 2007). Women's motivation to receive cosmetic surgery is driven by a number of important psychologically-relevant needs

(Locatelli et al., 2017). For example, women applying for cosmetic surgery procedures report that the impetus to seek these procedures included establishing a positive self-image, changing others perceptions, and pleasing themselves or others. Not only are women more interested in cosmetic surgery, they also comprise the majority of cosmetic surgery consumers. For instance, 92% of cosmetic surgery consumers are women (American Society of Plastic Surgeons, 2016). The most common procedures received by female consumers include breast augmentation (i.e., breast implants), liposuction, rhinoplasty (i.e., nose reshaping), and tummy tucks. Although some cosmetic procedures are less invasive (e.g., lip filler injections, eyebrow microblading) and therefore carry fewer physical complications, undergoing more invasive cosmetic surgery procedures may pose significant health risks and can, at times, be fatal (Grazer & de Jong, 2000; Yoho, Romaine, & O'Neil, 2005). Despite these risks, cosmetic surgery is becoming increasingly common. For example, in 2016, American women received over 15.5 million total cosmetic procedures, representing a 124% increase since the year 2000 (American Society of Plastic Surgeons, 2016). Moreover, after receiving cosmetic surgery, women report increased self-esteem and satisfaction with their bodies (von Soest, Kvalem, Roald, & Skolleborg, 2009).

Because cosmetic surgery enhances cues of perceived youthfulness and fertility, which serves to increase women's attractiveness (Cash & Horton, 1983; Etoff et al., 2011; Porcheron, Mauger, & Russell, 2013; Russell, 2009), receiving cosmetic procedures has important mating-relevant implications. Indeed, recent research supporting this perspective demonstrates that women's consideration of cosmetic surgery plays an important role in regulating women's mate preferences and mate retention behaviors (Atari, Barbaro, Sela, Shackelford, & Chegeni, 2017; Atari, Chegeni, & Fathi, 2017). For instance, Atari, Chegeni, and Fathi (2017) show women's preferences for important mate characteristics, such as status and attractiveness, are positively related to their interest in receiving cosmetic surgery. That is, women who are more interested in receiving cosmetic surgery report desiring higher levels of status and attractiveness in a mate. Although the correlational nature of these findings limits directionality assumptions, the authors propose that women who desire high quality mates might be more willing to receive cosmetic surgery, which would increase their attractiveness, and thus, their chances of attracting such a partner. Other research shows a positive relationship between women's benefit-provisioning mate retention behaviors (i.e., behaviors that serve to increase partner's satisfaction, thus enticing a partner to stay in the relationships) and their interest in cosmetic surgery (Atari, Chegeni, & Fathi, 2017). This finding suggests that women's consideration of cosmetic surgery may arise from their desire to retain a partner. Research supporting this perspective shows that female cosmetic surgery applicants (compared to non-applicants) report higher levels of marital satisfaction (Davai, Ganji, Kalantar-Hormozi, & Abbaszadeh-Kasbi, 2018). Even cosmetic surgery advertisements focus on the mating benefits of such procedures, as found by Hennink-Kaminski and Reichert (2011). That is, these advertisements blatantly present increased sexual attractiveness as an expected outcome of the procedure. This may not be inaccurate—after receiving cosmetic surgery women commonly report improvements in their sexual relationships (Niehaus, Kovacs, Machens, Herschbach, & Papadopulos, 2017; Papadopulos et al., 2014). Interestingly, women who receive cosmetic surgery report lower marital satisfaction than cosmetic surgery applicants, indicating that cosmetic surgery may have important implications for women's long-term relationships (Davai et al., 2018). Taken together, this research indicates that women's interest in cosmetic surgery is closely related to their mating goals.

Given the relationship between women's short-term mating effort and their appearance-enhancement desire (Bleske-Rechek & Buss, 2006; Grammer et al., 2004), women's willingness to undergo such costly mate-attraction behavior should be related to the effort they invest in short-term mating. There has been, to our knowledge, no research directly assessing the association between women's short-term mating

effort and their desire to engage in costly mate-attraction tactics. However, related research shows that women seeking cosmetic surgery report having a higher sexual drive than women not seeking cosmetic surgery (Didie & Sarwer, 2003). Further research examining the characteristics and contexts that influence the decision to undergo such costly appearance-enhancement tactics finds that women's acceptance of and desire for cosmetic surgery is related to increased investment in physical appearance, competitiveness with other women, and low agreeableness (Arnocky & Piché, 2014; Arnocky et al., 2016; Mohammadpanah, Yaghoobi, & Yusefi, 2012; Nicolas & Welling, 2017; Sarwer et al., 2005; Thornton, Ryckman, & Gold, 2013; Yun, Na, Jin, Hur, Heo, Lee, & Lee, 2015). For instance, women with higher levels of intrasexual competitiveness are willing to spend larger amounts on cosmetic surgery procedures (Arnocky & Piché, 2014), and when intrasexual competition goals are activated, women report being more interested in receiving cosmetic surgery (Arnocky et al., 2016). Together, this research shows that women's desire to engage in costly mate-attraction tactics is closely associated with their mating goals, laying the groundwork for the hypothesized association between women's short-term mating effort and their acceptance of cosmetic surgery procedures.

If, as hypothesized, there is an association between women's acceptance of costly appearance-enhancement behaviors and short-term mating effort, others may use information regarding women's engagement in costly mate-attraction expenditures as a cue of their short-term mating effort. Prior research examining how potential mates and rivals view women who have engaged in appearance enhancement has mostly focused on perceptions of women wearing cosmetics, a relatively low-cost mate-attraction expenditure (Batres et al., 2018; Mileva et al., 2016). While women are evaluated as being more promiscuous (Mileva et al., 2016) and as investing more effort in short-term mating (Batres et al., 2018) when presented wearing facial cosmetics (as opposed to bare-faced), the relationship between women's cosmetic usage and others' perceptions of short-term mating effort can be entirely accounted for by perceptions of increased attractiveness resulting from cosmetic usage. When controlling for increased attractiveness, the relationship between cosmetic usage and perceptions of short-term mating effort disappears (Batres et al., 2018). This result makes sense in light of other research showing that, compared to less attractive women, women who are more attractive are perceived to invest increased effort in short-term mating (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008). Accordingly, such findings illustrate the difficult nature of determining whether increased perceptions of short-term mating effort arising from female appearance enhancement are due to increased attractiveness or engagement in appearance enhancement.

Moreover, given the widespread usage (Statista Survey, 2018) and relatively minimal required effort of using facial cosmetics as an appearance-enhancement tactic, it seems unlikely that women's use of facial cosmetics would be interpreted as denoting increased short-term mating effort. Rather, information regarding engagement in costly mate-attraction tactics, such as receiving cosmetic surgery, should correspond to increased inferences regarding women's investment in short-term mating. Why would information regarding women's engagement in costly appearance-enhancement behaviors provide others with cues of their short-term mating effort? Prior research suggests that the costs one is willing to incur in pursuit of mate attraction and intrasexual competition typically provides a cue of the effort they invest in short-term mating (Hennighausen, Hudders, Lange, & Fink, 2016; Kruger & Kruger, 2016; Kruger & Kruger, 2018; Sundie et al., 2011). As women who undergo elective cosmetic surgery expend substantial effort on appearance enhancement despite risks to their physical health, as well as considerable cost via financial resources, others might view these women as being more invested in short-term mating.

Research examining how engagement in costly mate attraction tactics influences inferences of targets' mating effort has mostly focused on the perceptions of men who enhance their mate value via

conspicuous displays of wealth. For example, Sundie et al. (2011) showed that, all else being equal, men who drive conspicuous luxury vehicles are perceived to be more invested in short-term mating than are men who drive inconspicuous non-luxury vehicles. Similar results were found by Hennighausen et al. (2016). Together, this research demonstrates that inferences about targets' short-term mating effort should arise based on information regarding their engagement in costly, effortful, mate attraction tactics, with costly tactics resulting in higher perceived short-term mating effort.

In the current research, we conducted three studies to examine the relationship between costly mate attraction tactics and women's short-term mating effort. In Study 1, we examined whether women's short-term mating effort was related to their acceptance of high-cost (i.e., cosmetic surgery) and low-cost (i.e., facial makeup) appearance-enhancement techniques. As was found in Batres et al.' (2018) research, we did not expect a significant relationship between women's willingness to use facial cosmetics—a relatively low-cost, widespread, appearance-enhancement tactic—and their short-term mating effort. However, because cosmetic surgery is both expensive and carries significant health risks, we predicted that women who are most accepting of cosmetic procedures as a means of attractiveness enhancement would also score higher on a measure assessing short-term mating effort.

In Studies 2 and 3, we utilized an experimental paradigm to investigate how others perceive women who have undergone cosmetic surgery to enhance their physical attractiveness. We predicted that the conceptual linkage between willingness to engage in costly attractiveness-enhancement strategies and short-term mating effort would be reflected in men's and women's perceptions of a female target described as having undergone cosmetic surgery. Specifically, we predicted that a female target described as having undergone cosmetic surgery would be perceived as investing more in short-term mating effort than an identical control female target. Study 3 also sought to examine whether perceptions of a female target's short-term mating effort differs based on whether the alleged cosmetic surgery procedure was received on the face or body. We predicted that, as prior research suggests bodily attractiveness matters more to men in short-term mating contexts (Confer, Perilloux, & Buss, 2010), a female target described as having enhanced her body would be perceived as investing more in short-term mating effort than a female target described as having enhanced her face.

## 2. Study 1: Acceptance of appearance enhancement and short-term mating effort

Study 1 was designed to serve as an initial test of the relationship between women's acceptance of appearance-enhancement tactics that varied in costliness and short-term mating effort. To this end, we included measures assessing women's short-term mating effort, acceptance of facial cosmetics (a low-cost appearance-enhancement tactic), and acceptance of cosmetic surgery (a high-cost appearance-enhancement tactic). Based on prior research showing that men's short-term mating effort corresponds to their desire to engage in costly-mate attraction tactics (Sundie et al., 2011), we hypothesized that women's short-term mating effort would correspond to their desire to engage in high, but not low, cost appearance-enhancement tactics.

### 2.1. Method

#### 2.1.1. Participants

Ninety-one female undergraduate students ( $M_{\text{age}} = 19.70$  years,  $SD_{\text{age}} = 1.47$ ) participated in exchange for nominal course credit. This sample consisted primarily of White women (81.3%). All participants were recruited from the psychology undergraduate SONA pool at a private, midsized, southern university in the U.S.

### 2.1.2. Design and procedure

Participants completed this research in an experimental laboratory containing individual computer terminals separated by privacy partitions. After providing informed consent, participants completed measures assessing acceptance of cosmetic surgery and mating effort. Participants also responded to standard demographic items and other measures unrelated to the current research question before being debriefed and dismissed.

### 2.1.3. Acceptance of cosmetic surgery

The intrapersonal subscale of the Acceptance of Cosmetic Surgery Scale (ACSS; Henderson-King & Henderson-King, 2005) was used to measure participants' acceptance of cosmetic surgery. This 5-item subscale assesses participants' attitudes regarding self-oriented benefits of cosmetic surgery. An example of an item from this scale is "Cosmetic surgery can be a big benefit to women's self-image." Participants were instructed to indicate the extent to which they agreed with each item using a 7-point Likert-Type scales (1: *strongly disagree*; 7: *strongly agree*). A mean composite ( $\alpha = 0.89$ ) of the 5 items was then created where higher values indicated higher acceptance of cosmetic surgery.

### 2.1.4. Acceptance of cosmetics

We created a 5-item scale to measure participants' attitudes regarding the self-oriented benefits of using cosmetics that was analogous in content and structure to the intrapersonal subscale of the Acceptance of Cosmetic Surgery Scale. An example of an item from this scale is "Women who are very unhappy with their physical appearance should consider using makeup as one option." All items were responded to using a 7-point Likert-Type scales (1: *strongly disagree*; 7: *strongly agree*), and a mean composite ( $\alpha = 0.88$ ) of the items was then created where higher values indicated higher acceptance of facial cosmetic usage.

### 2.1.5. Short-term mating effort

The Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008) was used to assess participant's short-term mating effort. The SOI-R consists of 9 items encompassing past sexual behavior, attitudes, and desire for short-term relationships. A sample item from this scale is "I can imagine myself being comfortable and enjoying 'casual sex' with multiple partners." Participants were instructed to respond to the items using a 9-point Likert-type scale where higher values indicated a more unrestricted, or short-term mating strategy. A mean composite ( $\alpha = 0.89$ ) of the 9-items was created where higher values indicated an increased tendency to invest effort in short-term mating.

## 2.2. Results and discussion

Zero-order correlations were used to examine the relationship between acceptance of high- and low-cost appearance-enhancement techniques and short-term mating effort. Results revealed short-term mating effort was significantly related to acceptance of cosmetic surgery,  $r(91) = 0.21$ ,  $p = .043$ . That is, women who reported having higher short-term mating effort also reported increased acceptance of cosmetic surgery, a form of appearance enhancement that functions as a costly mate attraction tactic. As predicted, no such relationship was revealed between women's acceptance of facial cosmetics and their short-term mating effort,  $r(91) = 0.07$ ,  $p = .523$ . Together, these findings suggest that women's acceptance of high-, but not low-, cost appearance-enhancement techniques is associated with their investment in short-term mating. That is, women who invest more heavily in short-term mating effort (i.e., women with a relatively unrestricted sociosexuality) are more accepting of costly appearance-enhancement methods.

## 3. Study 2: Do people infer short-term mating effort from costly mate-attraction tactics?

The results of Study 1 provided evidence of a relationship between women's short-term mating effort and their acceptance of costly appearance-enhancement methods. Study 2 was designed to build on these results by examining whether people infer a female target's mating effort from her willingness to undergo a costly procedure as a means of mate attraction. Specifically, we predicted that a female target that was described as having undergone cosmetic surgery would be viewed as investing more in short-term mating effort than control targets.

### 3.1. Method

#### 3.1.1. Participants

One hundred and sixty participants were recruited from recruited from the undergraduate psychology SONA system of a midsized, private university in the U.S. All participants were compensated with nominal course credit. We anticipated that several participants would fail the manipulation check, as the experimental manipulation was subtle. Our a priori inclusion criteria consisted of: passing the manipulation check, self-reporting a heterosexual sexual orientation, and not having undergone any cosmetic surgery procedures themselves. Based on these inclusion criteria, participants were excluded prior to data analysis for failing the manipulation check ( $n = 17$ ),<sup>1</sup> reporting having undergone a cosmetic surgery procedure ( $n = 1$ ), or failing to report a heterosexual sexual orientation ( $n = 2$ ). Our final sample consisted of 140 heterosexual undergraduate students ( $n = 70$  women;  $M_{\text{age}} = 18.70$  years,  $SD_{\text{age}} = 1.74$ ). This sample consisted primarily of White participants (75%).

#### 3.1.2. Design and procedure

The design of the current study was a 2 (participant gender: men vs. women)  $\times$  2 (target cosmetic surgery: yes vs. no) between subjects' design. Participants came into the laboratory in small groups of 4–10, ostensibly to participate in a study examining whether perceptions of individuals differed based on type of social media they use. The informed consent relayed the cover story that the researchers had collected social media profiles from an individual in the surrounding area and that they would be randomly assigned to view a Facebook or a dating website profile before responding to items examining their perceptions of this individual. In actuality, all participants viewed a dating website profile created for the current study.

Participants were randomly assigned to view the target described as having had cosmetic-surgery or the control target. See supplemental materials for stimuli. The same female target was used in both profile pictures (had cosmetic surgery vs. not). The target was pre-rated by a separate sample of participants ( $n = 19$ ) to be above average attractiveness ( $M = 6.89$ ,  $SD = 1.05$ ) on a 9-point Likert-type scale (1: *extremely unattractive*; 9: *extremely attractive*). The dating profiles were based on the format of the online dating website OkCupid. In both profiles, the target, named Casey, was described as a 19-year old student attending a university in the surrounding area. Additional neutral information was provided in the profiles regarding the target's job, favorite movies, TV shows, books, and hobbies. All of this information was identical across profiles. Each profile featured a column on the

<sup>1</sup> In Study 2, data analysis including those who failed the manipulation check revealed a pattern of results similar to the main analysis, where the artificially enhanced target ( $M = 5.19$ ,  $SD = 1.36$ ) was rated as having higher mating effort than the control target ( $M = 4.78$ ,  $SD = 1.11$ ),  $F(1, 153) = 4.34$ ,  $p = .039$ ,  $\eta^2 = 0.03$ . As such, this result indicates that our manipulation may have been picked up by participants and influenced their judgments of targets without entering their conscious awareness.

right side with five comments allegedly from other individuals who had viewed this profile. The fourth comment comprised the experimental manipulation [modifications for the artificially enhanced target in brackets]: “I’ve known her since high school [and her plastic surgeon has done far more for her body than puberty ever did]!”

While viewing the profile, participants then completed the “other-oriented SOI-R” (details below) to assess their perceptions of the targets’ short-term mating effort. All participants then completed distractor items assessing their use of social media before completing a manipulation check about the target’s artificial enhancement (e.g., “According to the profile, has Casey [the target] had plastic surgery?” [1: Yes; 2: No]). Participants then provided information regarding whether they themselves had undergone any cosmetic surgery procedures and completed standard demographic items. Finally, participants were debriefed and dismissed.

### 3.1.3. Perceptions of short-term mating effort (“other-oriented SOI-R”)

To examine perceptions of the targets’ short-term mating effort, participants completed a version of the SOI-R (Penke & Asendorpf, 2008) modified to assess participants’ perceptions of the target. Participants were instructed to respond to the items based on perceptions of the target in the profile. For example, participants were asked, “How many partners do you think this person has had sex with, within the past 12 months?” All items were responded to using a 9-point Likert-type scale, with higher values representing increased short-term mating effort, or an unrestricted sociosexuality. A mean composite ( $\alpha = 0.90$ ) of the 9-items was created where higher values indicated perceiving the target to have higher short-term mating effort.

## 3.2. Results and discussion

To examine whether perceptions of short-term mating effort differed based on target’s history of cosmetic surgery, a 2 (participant gender: men vs. women)  $\times$  2 (target cosmetic surgery: yes vs. no) between-subjects analysis of variance (ANOVA) was conducted on the short-term mating effort composite. The results revealed a significant main effect of target cosmetic surgery condition on perceptions of the target’s short-term mating effort  $F(1, 136) = 4.18, p = .043, \eta^2 = 0.04$ , with the target described as having undergone cosmetic surgery ( $M = 5.24, SD = 1.45$ ) perceived as having higher short-term mating effort than the control target ( $M = 4.79, SD = 1.11$ ; see Fig. 1). No effect of participant gender was found ( $p = .963$ ). Further, no interaction between target cosmetic surgery condition and participant gender was found ( $p = .692$ ).

These results indicate a female target described as having engaged in costly appearance enhancement via receiving cosmetic surgery was

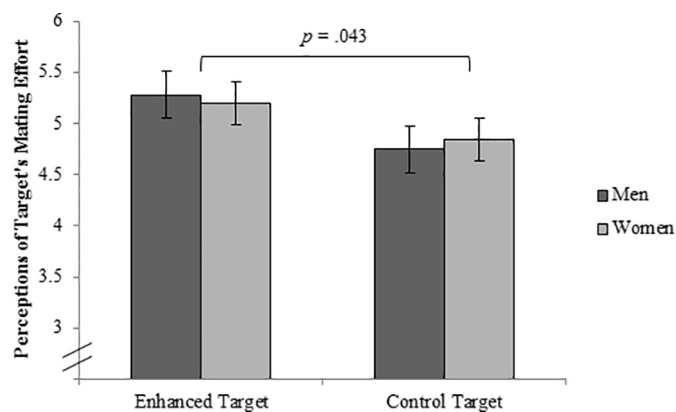


Fig. 1. Ratings of short-term mating effort (other-oriented SOI-R) as a function of whether the target was described as having received cosmetic surgery or not in Study 2. Error bars represent standard error.

perceived as exerting more short-term mating effort than the same target devoid of this information. This effect was found for both men and women, indicating that men and women both view a female target that has allegedly undergone cosmetic surgery, and thus engaged in costly appearance-enhancement behavior, as having higher short-term mating effort than an otherwise identical target.

## 4. Study 3: Do inferences of short-term mating effort differ based on location of costly appearance enhancement?

The results of Study 2 provided evidence that a female target described as having undergone cosmetic surgery was perceived by both same- and opposite-sex others’ as being higher in short-term mating effort than an otherwise identical control target. The current study was designed to replicate and extend this result, examining whether perceptions of a female target’s short-term mating effort would vary based on whether the cosmetic surgery was performed on her face (i.e., nose job or rhinoplasty) or body (i.e., breast implants or breast augmentation). We chose these procedures for three specific reasons. First, research finds women’s faces and bodies are differentially important for short- and long-term mating relationships (Confer et al., 2010; Jonason, Raulston, & Rotolo, 2012). Specifically, men place higher value on women’s body attractiveness in short-term mating contexts. Secondly, women’s bodily attractiveness is related to their sociosexual orientation, where women who exert more short-term mating effort have higher bodily attractiveness than those who exert less (Perilloux, Cloud, & Buss, 2013). As such, women who seek to enhance their bodily attractiveness may be perceived to exert more short-term mating effort. Finally, breast augmentations and rhinoplasty are among the most common cosmetic surgery procedures women elect to undergo (American Society of Plastic Surgeons, 2016). Therefore, we assumed that these procedures would be familiar to our participants and would serve as valid manipulation of targets’ enhancement of their face or body, respectively. Accordingly, we predicted that a female target described as having undergone cosmetic surgery to enhance her body (i.e., receiving breast implants) would be perceived as investing more effort in short-term mating than a target described as having undergone cosmetic surgery to enhance her face (i.e., receiving a nose job). Further, we predicted that, compared to the control target, both the body- and face-enhanced targets would be rated as having higher short-term mating effort.

### 4.1. Method

#### 4.1.1. Participants

Two hundred and sixty-seven undergraduate students were recruited from the psychology SONA pool at a private, midsized university in the U.S. All participants received nominal course credit as compensation. As in Study 2, we anticipated that the subtle experimental manipulation we utilized would result in several participants failing the manipulation check. Our a priori inclusion criteria were the same as in Study 2, consisting of: passing the manipulation check, self-reporting a heterosexual sexual orientation, and not having received any cosmetic surgery procedures. As such, participants were excluded prior to data analysis for failing the manipulation check ( $n = 89$ ),<sup>2</sup> reporting having undergone a cosmetic surgery procedure ( $n = 6$ ), or failing to report a heterosexual sexual orientation ( $n = 9$ ). Our final sample consisted of 169 heterosexual undergraduate students ( $n = 88$  women;  $M_{\text{age}} = 19.13$  years,  $SD_{\text{age}} = 1.90$ ). This sample consisted primarily of White participants (75.7%).

<sup>2</sup> As in Study 2, data analysis including those who failed the manipulation check provided a similar pattern of results as the main analysis,  $F(2, 246) = 4.36, p = .014, \eta^2 = 0.03$ .

#### 4.1.2. Design and procedure

The current study utilized a 2 (participant gender: men vs. women)  $\times$  3 (target cosmetic surgery: face, body, vs. control) between-subjects design. The procedure and materials were similar to Study 2, with one important exception. That is, participants were randomly assigned to view one of three targets (i.e., face, body, or control). The control profile ( $n = 78$ ) was the same as used in Study 2. In the facial cosmetic surgery condition ( $n = 45$ ), the manipulation was the following comment: “I’ve known her since high school, and she’s totally gotten a nose job!” The manipulation in the body cosmetic surgery condition ( $n = 46$ ) was: “I’ve known her since high school, and she’s totally gotten breast implants!” See supplemental materials for stimuli.

While viewing the profile, all participants completed the adapted SOI-R ( $\alpha = 0.88$ ) assessing perceptions of the target’s short-term mating effort. Finally, in addition to the manipulation check used in the previous study, participants indicated where the target had received artificial enhancement (e.g., “According to the profile, what kind of plastic surgery did Casey have?” [1: *nose job*; 2: *breast implants*]).

#### 4.2. Results and discussion

To examine whether perceptions of mating effort differed based on location of artificial attractiveness enhancement, a 2 (participant gender: men vs. women)  $\times$  3 (target cosmetic surgery: face, body, vs. control) between-subjects ANOVA was conducted on the composite measure of short-term mating effort (“other SOI-R”). The results revealed a significant main effect of target cosmetic surgery condition on short-term mating effort,  $F(2, 163) = 4.96, p = .008, \eta^2 = 0.06$  (see Fig. 2). Post hoc analyses conducted using Tukey’s HSD indicated that targets who were described as having had facial ( $M = 5.18, SD = 1.34$ ) and body cosmetic surgery ( $M = 5.17, SD = 1.44$ ) were rated as having higher short-term mating effort than the control target ( $M = 4.60, SD = 1.15$ ), ( $ps \leq 0.044$ ). However, contrary to our hypothesis, there was no difference in perceived short-term mating effort between the facial and body cosmetic-surgery targets ( $p = .999$ ). Additionally, a main effect of participant gender on perceptions of short-term mating effort emerged, where men ( $M = 5.09, SD = 1.26$ ) perceived the target as having higher short-term mating effort than did women ( $M = 4.74, SD = 1.33$ ),  $F(1, 163) = 4.94, p = .028, \eta^2 = 0.03$ . However, there was no interaction between participant gender and target cosmetic surgery condition ( $p = .801$ ). Further, the pattern of results remained significant when controlling for participant gender.

Replicating the findings of Study 2, the current results indicate that others use information regarding a female target’s engagement in costly appearance-enhancement tactics to infer increased short-term mating effort. Although we had predicted that inferences of short-term mating

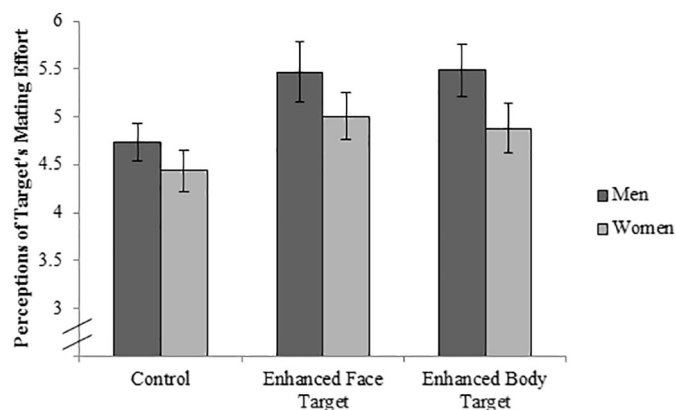


Fig. 2. Ratings of short-term mating effort (other-oriented SOI-R) based on target cosmetic surgery condition in Study 3. Error bars represent standard error.

effort would differ based on the location of cosmetic surgery, the results did not support this prediction. Rather, female targets that were described as having received any cosmetic surgery, regardless of whether it was on the face or body, were perceived as exerting higher short-term mating effort than the control target. These results suggest that women’s engagement in costly appearance enhancement increases perceptions of her short-term mating effort irrespective of whether she enhances her face or body.

Unlike Study 2, the results revealed a main effect of participant sex on perceptions of short-term mating effort, where men perceived the targets as having higher short-term mating effort than did women. While unexpected, this result is not unexplainable. Men’s over-perception of women’s sexual interest is an effect that has been well established in past research (see Haselton, 2003). This tendency could have led the men in our sample to infer increased short-term mating effort from the target females. However, most importantly, no interaction between enhancement condition and participant sex was revealed, indicating that both men and women inferred increased short-term mating effort from information about a target female’s engagement in costly appearance-enhancement behaviors.

#### 5. General discussion

In the current work, we investigated whether women’s engagement in costly appearance enhancement (i.e., cosmetic surgery) was related to both self-reported (Study 1), and other’s perceptions of (Studies 2–3) short-term mating effort. Consistent with Batres et al. (2018), women’s willingness to engage in relatively low-cost appearance enhancement (i.e., using facial cosmetics) was unrelated to their short-term mating effort. However, as predicted, the results of Study 1 found that women’s willingness to undergo cosmetic surgery, a costly appearance-enhancement tactic, was significantly related to their self-reported short-term mating effort. A similar pattern of results has been previously shown in research examining men’s desire to exert costly mate attraction behaviors in domains valued by the opposite-sex. Men’s mating effort is found to predict their willingness to over-spend on luxury products, particularly when mating goals are made salient (Sundie et al., 2011). The results of Study 1 are thus complementary to past research, demonstrating that those exerting increased effort in short-term mating may be more likely to exhibit costly mate-attraction behaviors in domains highly valued by opposite-sex others.

Further support was found for our hypothesis across two experiments. These experiments found that both men and women use information regarding a female target’s use of cosmetic surgery to infer increased short-term mating effort. This finding is in line with our prediction that the cost one is willing to incur in pursuit of mate attraction and intrasexual competition provides a cue to a person’s investment in mating effort. Our current results are additionally analogous to past research showing that men’s engagement in costly mate-attraction behaviors (i.e., conspicuous consumption) increases others’ perceptions of their short-term mating effort (Hennighausen et al., 2016; Kruger & Kruger, 2016; Kruger & Kruger, 2018; Sundie et al., 2011).

Importantly, the effect shown in Study 2 and 3 was found using stimuli controlling for increased attractiveness that could result from cosmetic surgery. That is, the same target female was used in each version of the stimulus (cosmetic surgery versus control), indicating that this effect is driven by mere information that a woman has engaged in costly appearance-enhancement tactics and not the result of these differences. This is a critical point, as past research has shown that perceptions of increased short-term mating effort arising from engagement in appearance enhancement can be explained by the increased attractiveness that results from such tactics (Batres et al., 2018). Moreover, although we had predicted that inferences of short-term mating effort would differ as a function of whether the cosmetic surgery enhanced facial or body attractiveness, the results did not

support this prediction. Instead, the results of Study 3 demonstrated that receiving any sort of cosmetic surgery increased inferences of female target's short-term mating effort. As such, the results of the current research suggest that mere information regarding a woman's engagement in costly appearance-enhancement tactics influences others' perceptions of the effort she exerts in short-term mating.

While this research is important in establishing a relationship between women's engagement in costly appearance-enhancement tactics and short-term mating effort, there are some limitations inherent in the current research that should be considered. First, in Study 1, when we assessed the relationship between women's short-term mating effort and acceptance of cosmetic surgery, we only included the intrapersonal subscale of the ACSS. In future research, it may be more appropriate to use the consider subscale, or the entire ACSS. Additionally, the ACSS assesses general interest in cosmetic surgery, which precludes from examining whether women's interest in and acceptance of body-part specific cosmetic surgery procedures are related to their short-term mating effort. Future research on this topic may benefit by including measures that assess interest in body-part specific cosmetic surgery procedures (e.g., rhinoplasty; Naraghi & Atari, 2017). Another limitation inherent in Study 1 is the correlational nature of the design. As these results are correlational, it is inappropriate to assume causality, as this relationship could be driven by potential third variables. For example, the relationship between these two constructs could be explained by individual differences in life history strategy, an important factor impacting variation in short-term mating effort (Figueredo et al., 2005). Future research is needed to examine potential confounding third variables, such as life history strategy. Research on this topic would also benefit from directly examining whether women who receive cosmetic surgery experience increased short-term mating success and forego some of the traditional trade-offs associated with a faster life history strategy.

Limitations are also present in Studies 2 and 3. First, we did not assess whether perceptions of the target's attractiveness differed across conditions. This precluded us from examining whether information about a target's engagement in cosmetic surgery affected perceptions of her attractiveness. It is possible that the participants in the cosmetic surgery condition could have perceived the female target to be more attractive, which could have increased their perceptions of her short-term mating effort. Additionally, while the results of these studies provided no evidence of an interaction between target cosmetic surgery condition and participant sex on perceptions of short-term mating effort, this could be due to inadequate power, rather than indicating that the observed effect is not sex-differentiated.

Furthermore, this research was conducted on relatively young, mostly American, college students. As the United States is ranked as the top country for total number of cosmetic procedures (International Society of Aesthetic Plastic Surgery, 2017), and given the prevalence of cosmetic surgery in the media (i.e., *Extreme Makeover, Dr. 90,210*, etc.), it is possible that American college students may hold different associations with cosmetic surgery than do those in different countries where cosmetic surgery is less common. This limitation could be addressed in future studies by collecting a more diverse sample across different countries. Moreover, Study 2 and 3 assessed perceptions of a young, single, reproductively-aged woman that was described as having received cosmetic surgery. It is possible that the association between short-term mating effort and cosmetic surgery would be diminished in older, partnered women, or in women who received cosmetic surgery for reconstructive purposes (e.g., post-accident or post-cancer). Future research would benefit from examining potential boundary conditions such as these that may attenuate the relationship found in the current research.

### 5.1. Conclusions

The current research finds that women's acceptance of cosmetic

surgery is related to increased short-term mating effort, and also demonstrates that others use information regarding a woman's engagement in cosmetic surgery to infer greater short-term mating effort. These results add to the growing body of literature examining the causes and consequences of female beautification tactics, and are also consistent with past literature showing a similar relationship between men's short-term mating effort and conspicuous consumption of luxury products. Our findings provide conceptual clarity for the relationship between women's appearance-enhancement effort and other's perceptions of the target's investment in short-term mating effort. This research has practical implications for better understanding the impact of advancements in medical technology such as cosmetic surgery on human mating psychology, especially as cosmetic surgery consumerism is globally on the rise and normalized within social media platforms.

### Appendix A. Supplementary material

Supplementary material to this article can be found online at <https://doi.org/10.1016/j.paid.2018.09.019>.

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