Makeup usage in women as a tactic to attract mates and compete with rivals

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ABSTRACT

Appearance alterations are an important part of human history, culture, and evolution that can serve many functions. Cross-culturally, women more than men use makeup as a specific, temporary, personalized, and relatively accessible technique for appearance alteration. Women wear makeup to attract attention and/or to mask their imperfections, and indeed, made-up women are on average perceived as more attractive, healthy, promiscuous, and as having higher prestige. Makeup use can thus be related not only to potential partner attraction but also to a rival competition. We aimed to test whether makeup usage in women is predicted by evolutionary relevant factors such as self-reported mate value or intrasexual competition. In total, 1344 Brazilian women responded online about frequency of makeup usage, money spent on makeup per month, and time spent applying makeup per day. They further reported their mate value, intrasexual competition, age, relationship status, reproductive status, sociosexuality, and income. Exploratory correlations and the final regression models indicate that age, intrasexual competition, and mate value positively predict makeup usage. Thus, makeup usage may have a dual evolutionary utility, serving as a behavioral tactic of both intersexual attraction –including alteration of age perception– and intrasexual competition.

1. Introduction

Appearance alteration is an important bio-psycho-socio-cultural behavior found in non-human and human animals (Jones, Russell, & Ward, 2015). During the Middle Pleistocene, evidence of body paintings and ornamental use of pigmented marine shells were found at two sites of Neanderthals (Zilhão et al., 2010). During the Middle Paleolithic, the earliest artifacts made by our species were perforated and pigmented marine shells that were probably used for body decoration (d'Errico et al., 2009). More recently, in ancient Egypt, natural substances, such as Kohl's powder and clay were used to decorate and protect the skin from the sun (Dugas, 1999).

In modern human society, people perform elaborated grooming behaviors, such as wearing clothes, perfumes, accessories, and cosmetics (Pointer, 2005; Sherrow, 2001). Among cosmetic products, those focused on skin care have the largest market share. Facial makeup is an example of a widely used non-permanent cosmetic alteration that can quickly change perceived facial appearance (Dantcheva, Chen, & Ross, 2012). Facial appearance, in general, is an extremely sophisticated communication tool that provides important social signals that are detected, interpreted, and responded to by others (Rumsey & Harcourt, 2005).

Cosmetic use is influenced by an array of contexts. Although cosmetics are used by both men and women, women are the most frequent users (Corson, 1972; Gunn, 1973). Western women spend almost 10 times more on cosmetic products per year than men (Arnocky, 2016). Moreover, in contexts of intrasexual competition (Arnocky, Perilloux, Cloud, Bird, & Thomas, 2015), women spend more time doing makeup, purchasing beauty products, and engage more in beauty-enhancement behaviors. Cross-culturally, men report high importance of physical attractiveness in their potential female mates (Buss, 1989; Mafra, 2019). Female facial attractiveness is associated with higher reproductive success (Pflüger, Oberzaucher, Katina, Holzleitner, & Grammer, 2012) and attractiveness is also an armament used by women in intrasexual competition (Fisher & Cox, 2011; Varella, Valentova, & Fernández, 2017). Arguably, makeup is a tactic that alters perception by others in order to increase attractiveness, social prestige, attract potential mates, and compete with rivals.

Proximate reasons suggest that appearance alterations can serve many functions. Although women report a variety of motives to use makeup (Korichi, Pelle-de-Queral, Gazano, & Aubert, 2008), one of their prominent goals is appearance and specifically attractiveness

improvement. From the distal perspective, female fertility is connected to age more than male fertility, and is supposedly cued by physical traits, such as bodily and face proportions that partly develop under the influence of sex hormones and change during aging (Pawlowski, 2000). Indeed, cosmetics and specifically makeup are able to exaggerate some biological dimensions important in mate selection and change perception of these traits– for example, facial sexual dimorphism (Russell, 2009) and age (Russell et al., 2019). Makeup and other cosmetic procedures can thus create supernormal stimuli, which significantly influence perception through sensory bias and affect interpersonal communication, including intimate relationships.

Undeniably, cosmetic use enhances positive perceptions by others. Female faces with makeup are perceived as more attractive (Batres, Russell, Campbell, Hansen, & Cronk, 2018; Cox & Glick, 1986; Mileva, Jones, Russell, & Little, 2016; Mulhern, Fieldman, Hussey, Lévêque, & Pineau, 2003) – although makeup level does not increase attractiveness linearly (Tagai, Ohtaka, & Nittono, 2016). Made-up women are also perceived as healthier, more confident, and as having greater earning potential (Mileva et al., 2016; Nash, Fieldman, Hussey, Lévêque, & Pineau, 2006). Women judged other made-up women as more dominant while men evaluated them as having higher prestige (Mileva et al., 2016). Furthermore, made-up women receive more positive evaluations in diverse personality traits (Carrillo, Coleman, & Hack, 2014) and appear to be younger when 40 years or older (Russell et al., 2019). Interestingly, women who wear makeup are also rated as more promiscuous and more likely to incite jealousy in other women (Batres et al., 2018; Mileva et al., 2016). Indeed, women wearing more makeup reported higher sociosexuality than women who use less makeup (Wagstaff, 2018, but see Batres et al., 2018).

Women are more prone than men to use self-promotion as an intrasexual competition tactic (Buss & Dedden, 1990; Fisher & Cox, 2011) and to use cosmetics as a self-promoting tactic (Wagstaff, 2018). Hence, enhancement of physical attractiveness is one of the ways that women compete among themselves for high-value mates (Varella, Valentova, & Fernández, 2017). Previous studies have investigated the relation between intrasexual competition and use of luxury items (Hudders, De Backer, Fisher, & Vyncke, 2014), indirect aggression (Vaillancourt, 2013), high heels (Prokop & Švancárová, 2020), and makeup usage (Wagstaff, 2018). In an experimental study, women were shown to attribute a strategic beautification penalty to other women for wearing cosmetics; they perceived made-up women as dishonest and did not want to affiliate with them (DelPriore, Bradshaw, & Hill, 2018). Besides intrasexual competition, cosmetic usage in women was also associated with social comparison and dispositional envy (Arnocky, 2016).

The aim of the current study is to explore associations between evolutionary relevant factors (self-perceived mate value, and intrasexual competition) and makeup usage (frequency of makeup usage, money spent on makeup per month, and time doing makeup per day). Specifically, we aimed to test whether self-reported mate value and/or intrasexual competition predict makeup usage in women. Further, we analyzed other factors that are relevant for mate choice and intrasexual competition, such as age, relationship status, reproductive status, sociosexuality, and income. We predicted that makeup usage would increase with mate value, intrasexual competition, age, and sociosexuality. Following the evolutionary reasoning, women in a relationship or with children could be less prone to wear makeup since they had guaranteed a romantic partner and reproductive success. However, given the frequency with which makeup is used, it probably has multiple functions. Thus, it might be used just as frequently in partnered versus unpartnered women, but for different reasons, and our analyses are rather exploratory.

2. Material and methods

2.1. Participants

From the total of 1344 women, 1157 were predominantly heterosexual (position 0–2 on the Kinsey scale) and 187 non-heterosexual (positions 3–6), and 19 participants reported being transsexuals or gender non-binaries. Heterosexual women reported spending more money on makeup and higher frequency of makeup usage than non-heterosexual participants (See Tables S1-S4 in Supplementary material for further details). Only predominantly heterosexual cisgender women who were not pregnant (N = 1157; M_{age} = 31.88; SD = 11.23) entered the final analyses. Majority of the sample self-identified as white (73.8%), 17.9% as mixed race (*pardo*), 3.5% black, 2.9% oriental, and 1.6% other. Most participants (88.6%) were university students or had a completed university degree and earned approximately between USD 730 and 1470 (26.7%) (Table S5). The majority of participants were from South East Brazil.

2.2. Instruments

Participants filled out the following four instruments, translated (translation/back-translation) into Brazilian Portuguese. The study was part of a larger project aimed at appearance in women, and only questionnaires relevant for this study are presented below.

2.2.1. Sociodemographic questionnaire

It included questions about age, gender, sexual orientation, ethnicity, relationship status and length, number of offspring, and current socioeconomic status (education, and income).

The participants replied if they had children or not, and answered if they were single or in a relationship (e.g. dating, married). They further indicated their earning status using the following categories: No earnings, Up to USD 240 (R$ 937), USD 240–730 (R$ 937 to 2.811), USD 730–1470 (R$ 2.811–5.622), USD 1470–2200 (R$ 5.622–8.433), USD 2200–2930 (R$ 8.433–11.244), USD 2930–3660 (R$ 11.244–14.055), and Above USD 3660 (above R$ 14.055).

2.2.2. Self-perceived mate value

This questionnaire included four items that were answered on a 7-point scale that measures self-perceived mate value of the participant (Edlund & Sagarin, 2014). Higher scores computed by averaging the items correspond to higher levels of mate value. Question example: "Overall, how would you rate your level of desirability as a partner".

2.2.3. Intrasexual competition scale

This questionnaire included 12 items that were answered on a 7-point scale in which participants report how much applicable to them is the intrasexual competition tendency (1 = not applicable at all, 7 = very much applicable) (Buunk & Fisher, 2009). Higher scores computed by averaging the items mean higher levels of intrasexual competition. Question example: "I wouldn't hire a very attractive woman as a colleague".

2.2.4. SOI-R

Sociosexual orientation was assessed by the revised Sociosexual Orientation Inventory (Penke & Asendorpf, 2008), which is a 9-item instrument that measures individuals' tendency toward engaging in casual sexual variety without emotional investment. Higher scores indicate unrestricted sociosexual orientation.

2.2.5. Cosmetics Use Inventory (Cash & Cash, 1982)

We used a part of an adapted version of the inventory (Worsley, 2015) in which participants rate on a 7-point-scale the frequency to which they use five groups of facial cosmetics (1. base, concealer, BB cream and/or powder; 2. mascara; 3. eyeliner or eye pencil; 4. shade;

and 5. lipstick and/or gloss). Higher scores correspond to higher levels of facial cosmetic use.

Further, participants responded about their monthly expenses with makeup using the following options: USD 0, up to USD 2.50, USD 2.50–6, USD 6–10, USD 10–15, USD 15–20, USD 20–25, USD 25–50, and more than USD 50. Time spent applying makeup per day was responded using the following options: less than 5 min, 5–10 min, 10–20 min, 20–30 min, and more than 30 min.

Most participants use makeup half of the time (25.9%), spend up to USD 6 on makeup per month (38.6%), spend less than 5 min applying makeup per day (45.2%), do not work in the cosmetics business (94.8%), and are not required to wear cosmetics at work (85.7%). See Fig. S1.

All Cronbach alphas were satisfactory. See Table S6 for descriptive statistics.

2.3. Procedure

The anonymous volunteers were recruited through social media and institutional e-mails. The inclusion criteria were to be a Brazilian woman over 18 years old, and to have access to computer/tablet/cell phone for internet use. First, the participants agreed with the consent term, then they responded anonymous online questionnaires via Qualtrics (Qualtrics, Provo, UT). Participants took around 30 min to complete the survey. The study was approved by the local IRB (nr. 90370517.1.0000.5561).

2.4. Data analyses

First, using IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, N.Y., USA), we ran exploratory nonparametric correlations between spent money on makeup per month, spent time applying makeup per day, and frequency of makeup usage, intrasexual competition, mate value, sociosexuality, age, and income. To investigate which variables predict women's makeup usage, we conducted multiple stepwise linear regressions because it calculates automatically the percentage of contribution of each independent variable (1. money spent on makeup per month, 2. time spent doing makeup, and 3. frequency of makeup wear as dependent variables, and mate value, intrasexual competition, age, relationship status -single versus relationship-, reproductive status -with versus without offspring-, sociosexuality, and income), regardless of the order of the independent variables. We controlled if women were required to wear makeup at work or worked in the makeup industry in order to rule out direct extrinsic factors influencing makeup use, but the results were virtually the same, and we report models without these variables.

3. Results

3.1. Non-parametric correlations

Non-parametric Kendall correlations showed a positive and strong association between the three makeup usage measures: money spent on makeup per month, time spent on applying makeup per day, and makeup usage frequency. There were weak positive correlations between money spent on makeup and mate value, income, and age. Further, we found weak positive correlations between frequency of makeup usage and mate value, intrasexual competition, income, and age. Mate value was positively weakly correlated with Income. Intrasexual competition was weakly and positively associated with sociosexuality and negatively with age (Table S7).

3.2. Regression models testing for predictors of makeup usage variables

Multiple linear stepwise regression showed that age ($\beta = 0.195$, SE $= 0.013$, $t = 5.0$, $p < .001$), Intrasexual competition ($\beta = 0.086$,

SE $= 0.082$, $t = 2.1$, $p = .040$), and relationship status ($\beta = 0.079$, SE $= 0.164$, $t = 2.0$, $p = .045$) significantly predicted money spent on makeup per month ($F(3,670) = 10.147$, $p \leq .001$, $R^2 = 0.043$). Women with higher age, higher intrasexual competition, and single women spend more money on cosmetics. Age ($\beta = 0.177$, SE $= 0.008$, $t = 4.6$, p $< .001$), intrasexual competition ($\beta = 0.116$, SE $= 0.079$, t $= 2.0$, $p = .041$), and mate value ($\beta = 0.090$, SE $= 0.045$, $t = 2.3$, $p = .019$) predicted frequency of makeup usage ($F(3,651) = 11.057$, $p \leq .001$, $R^2 = 0.049$). Women with higher age, higher intrasexual competition, and higher mate value use makeup more frequently. No variables predicted time spent applying makeup per day. Parenthood, income, and sociosexuality did not significantly predict any of the dependent variables indicating makeup usage.

Finally, age ($\beta = 0.164$, SE $= 0.007$, $t = 4.3$, p $< .001$) and intrasexual competition ($\beta = 0.087$, SE $= 0.049$, t $= 2.3$, $p = .022$) positively predicted the averaged global score of the three makeup measures ($F(2,671) = 12.245$, $p < .001$, $R^2 = 0.035$).

3.3. Additional analyses

Additionally, we conducted a multivariate general linear model to analyse possible effects and interactions of parenthood (having offspring or not) and relationship status (single or in a relationship). The model was controlled for age and income per capita, because these two variables differ with parenthood and relationship status.

There was a main effect of parenthood ($F = 4.1$; $p = .043$; $\eta p^2 = 0.005$) and relationship status ($F = 6.3$; $p = .012$; $\eta p^2 = 0.007$) on spent value on makeup. It shows that women with offspring and single women spend more money on makeup than women in a relationship and women without offspring. Furthermore, interaction between parenthood and relationship status ($F = 3.9$; $p = .05$; $\eta p^2 = 0.004$) explored in more detail through Generalized Linear Model indicated that single women with offspring spend more money on makeup than women without offspring, being in a relationship or not. See Tables S8-S12 for further details.

4. Discussion

The main aim of this study was to investigate how evolutionary relevant factors –mate value, intrasexual competition, age, relationship and parental status, sociosexuality, and income– are associated with makeup usage in women. In general, age, intrasexual competition, and mate value positively predicted makeup usage in Brazilian women – particularly frequency of makeup usage and monthly amount of money spent with makeup.

Few studies have directly explored associations between evolutionarily-relevant individual variables and appearance enhancement tactics (e.g. Wagstaff, 2018). Russell et al. (2019) reported that women around 40 years old who wore makeup appeared younger than they actually were. On the other hand, women around 20 years old were perceived as older and there was no change in age perception in women around 30 years old. Thus, makeup may make women appear to have relatively high residual fecundity as well as status, experience, and resources that increase offspring survival. Younger women might change their appearance in order to look more competent or dominant. Further, facial color contrast decreases with age, and women with higher contrast are perceived as more attractive (Porcheron, Mauger, & Russell, 2013). Similarly, makeup usage in our study was positively associated with age. This finding suggests that women with higher age tend to wear more makeup in order to mask imperfections/age-related signs, look younger, more attractive, or also more competent and socially desirable. Importantly, this tendency can vary among populations. For example, women in some Asian countries prefer makeup that makes them look very young (baby-look makeup), potentially reflecting local male mate preferences (Hwang & Lee, 2017). The modification of perceived age by makeup or other techniques should be studied more,

because it seems that people's perception of age is more prone to error than machine learning, which relies more on morphological facial shape which changes during aging (Deepa, 2019).

Further, our results pointed out that Brazilian women who pursue more female-female competition wear more makeup. From the distal perspective, makeup usage and other appearance enhancement tactics may function as competitive ornamentation to attract the attention of the opposite sex in social or sexual contexts and also as armaments to outcompete female rivals (Varella, Valentova, & Fernández, 2017). As makeup usage increases perception of dominance among women, it may be used as a way to gain and maintain status. This is in line with a study showing that makeup usage had a negative effect on the expected performance of female applicants for a lower status (secretary) position, but no effect on the expected performance for a higher status (accountant) position (Cox & Glick, 1986). Therefore, makeup usage can affect not only the mating market but also the employment market of women by increasing their perceived prestige, earning potential, and dominance.

A previous study reported that looks was more important to female intrasexual competition attitudes than in male competition (Polo, Munoz-Reyes, Tapia, Wilson, & Turiégano, 2019). We found that along with intrasexual competition, mate value also positively predicted makeup usage. Indeed, men evaluate women wearing makeup as more attractive than non made-up women (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989) and they tend to make more donations to made-up women in comparison to non made-up and women in a placebo condition (Batres, Kramer, DeAngelis, & Russell, 2019). Thus, our results go in the same direction as those found by Wagstaff (2018), suggesting that women tend to use cosmetics as a tactic to attract romantic partners.

We further found that particularly single women with offspring tend to spend more money on makeup than women without children, being in a relationship or not. We do not know whether the single mothers in our study were searching for a partner, but we can speculate that a higher tendency to enhance appearance might have been at least partly aimed to improve self-esteem and a general social impression, including attracting a potential partner and a step-father for their offspring. Future studies should investigate the different functions of makeup in partner retention and mate attraction to verify if single and partnered women, and women with and without offspring wear makeup for different reasons or in different ways.

Previous studies also showed associations between cosmetic usage and financial status (Mafra, Castro, & Lopes, 2015) and sociosexuality (Batres et al., 2018; Bradshaw, Leyva, Nicolas, & Hill, 2019). In our study, income was weakly correlated with frequency of makeup usage and money spent on makeup; however, this variable did not enter as significant predictor in the regression models. Mafra et al. (2015) found that Brazilian women who evaluated themselves as having better financial condition invested more money in makeup, but higher investment on makeup did not make them feel prettier or more desirable as a romantic partner. Thus, other factors seem to be at play, such as mate value and intrasexual competition. Indeed, even in a financial crisis, women reported wanting to spend more money on beautification products (Hill, Rodeheffer, Griskevicius, Durante, & White, 2012). Further, Batres et al. (2018) found that men and women tend to consider women wearing makeup as more sociosexually unrestricted. However, they also found that it is a false cue to sociosexuality, because among the rated women there was no correlation between self-reported sociosexuality and makeup usage (but see Wagstaff, 2018). Another study showed that women's short-term mating effort was predicted with costly (cosmetic surgery) and not low-cost (makeup) procedures (Bradshaw et al., 2019).

Although the present research is a rare attempt to study cultural traits from a holistic, bio-psycho-cultural evolutionary perspective, there are some limitations. First, the survey was cross-sectional and not experimental, and thus we cannot determine the causality. Further, we

do not know whether women wore makeup when responding to the questionnaires. This may affect the results because makeup use can alter how women feel about themselves when wearing it (Cash et al., 1989). Also, we did not ask about the quantity of the makeup used, and arguably different measures can lead to varying results. Future studies may adopt an experimental study design, controlling for possible effects of makeup on self-perceptions, and use a more complete makeup usage measure as well as investigate effects of different makeup levels or styles on perception of others. Also, we did not ask about using makeup in specific situations, such as a date with a potential partner, dinner with a stable partner or going out with female friends, which might shed some light on the function role of makeup in mate acquisition, mate retention or intrasexual competition. Finally, our regression models explained only little of individual variance in makeup usage, suggesting that other variables not investigated in the present study may present more explanatory power. Some studies, for example, showed stronger associations between makeup usage and self-esteem and personality traits (Korichi et al., 2008; Korichi, Pelle-de-Queral, Gazano, & Aubert, 2011). Future studies could focus on the link between personality traits, makeup usage, and motivations for its usage.

In summary, this research shows that makeup usage has a dual evolutionary utility: it serves both as a behavioral tactic of intersexual attraction as well as intrasexual competition. Age, intrasexual competition, mate value, and relationship status were positive predictors of women's makeup usage corroborating the competitive ornamentation model (Varella, Valentova, & Fernández, 2017). It suggests that women use makeup as an instrument to alter appearance, in order to look younger, more attractive or competent, and better partners than rivals. In fact, makeup seems to be an efficient intrasexual competition tool, not only an instrument of mate attraction or retention. These results offer a fresh perspective on individual differences in makeup usage, helping to understand the multiple selective processes acting on appearance modification tendencies during human evolution, and what are its current functions. This study also shows there is still much ground to be covered and highlights the importance of further comparative studies about appearance modifications and its effect on = behavior and psychological traits.

Credit authorship contribution statement

Anthonieta Looman Mafra: Investigation, Data curation, Formal analysis, Writing - original draft, Writing - review & editing, Project administration, Visualization. **Marco Antonio Correa Varella**: Conceptualization, Methodology, Writing - review & editing. **Renata Pereira Defelipe:** Conceptualization, Methodology, Writing - review & editing. **Natália Machado Anchieta:** Methodology, Investigation, Writing - review & editing. **Caroline Aparecida Grecco de Almeida:** Methodology, Writing - review & editing. **Jaroslava Varella Valentova:** Conceptualization, Methodology, Project administration, Formal analysis, Resources, Supervision, Funding acquisition, Writing - review & editing.

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Appendix A. Supplementary data

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