



# An Evolutionary Perspective on Appearance Enhancement Behavior

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## Abstract

Researchers have highlighted numerous sociocultural factors that have been shown to underpin human appearance enhancement practices, including the influence of peers, family, the media, and sexual objectification. Fewer scholars have approached appearance enhancement from an evolutionary perspective or considered how sociocultural factors interact with evolved psychology to produce appearance enhancement behavior. Following others, we argue that evidence from the field of evolutionary psychology can complement existing sociocultural models by yielding unique insight into the historical and cross-cultural ubiquity of competition over aspects of physical appearance to embody what is desired by potential mates. An evolutionary lens can help to make sense of reliable sex and individual differences that impact appearance enhancement, as well as the context-dependent nature of putative adaptations that function to increase physical attractiveness. In the current review, appearance enhancement is described as a self-promotion strategy used to enhance reproductive success by rendering oneself more attractive than rivals to mates, thereby increasing one's mate value. The varied ways in which humans enhance their appearance are described, as well as the divergent tactics used by women and men to augment their appearance, which correspond to the preferences of opposite-sex mates in a heterosexual context. Evolutionarily relevant individual differences and contextual factors that vary predictably with appearance enhancement behavior are also discussed. The complementarity of sociocultural and evolutionary perspectives is emphasized and recommended avenues for future interdisciplinary research are provided for scholars interested in studying appearance enhancement behavior.

**Keywords** Physical attractiveness · Self-promotion · Appearance enhancement behavior · Mating effort · Evolutionary psychology

## Introduction

Body dissatisfaction, denoting negative thoughts surrounding one's physical appearance, pervades contemporary society (Bakhshi, 2011; Cash, Morrow, Hrabosky, & Perry, 2004; Fiske, Fallon, Blissmer, & Redding, 2014; Harris & Carr, 2001). This is troubling given that appearance concerns increase the risk for mental and physical health problems, particularly among adolescent girls and young adult women who are, on average, more dissatisfied than boys and men with their appearance (Lee & Vaillancourt, 2018; Morin, Maïano, Scalas, Janosz, & Litalien, 2017; see also Vaillancourt, 2013). Researchers have

highlighted many important sociocultural factors that influence appearance enhancement behavior including: physical ideals in the media (e.g., “thin ideal” for European American women; Barlett, Vowels, & Saucier, 2008; Stice, Spangler, & Agras, 2001), pressure from parents, siblings, and peers (Webb et al., 2017), social norms (Randazzo & Solmon, 2018), patriarchal cultures (Leve, Rubin, & Pusic, 2012), conceptions of beauty (Grogan, 2008), sexual objectification (Strelan & Hargreaves, 2005), and gender role conformity (Lennon & Rudd, 1994). Fewer investigators have approached the psychology of appearance enhancement from an evolutionary perspective. In the current paper, following other scholars (e.g., DelPriore, Prokosch, & Hill, 2017) we argue that evidence from the field of evolutionary psychology can help to provide a more comprehensive understanding of appearance enhancement practices by shedding insight into: (1) the ubiquity of competition over aspects of physical appearance to embody what is preferred by desired mates, (2) the motivating factors and individual differences underlying appearance enhancement (e.g., mating effort),

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(3) sex differences in appearance enhancement practices and (4) the social–ecological parameters predicted to interact with evolved mating psychology, such as relationship status, culture, resource scarcity, and level of pathogen stress. We emphasize how evolutionary thinking can complement existing sociocultural models and describe avenues for future interdisciplinary research to further elucidate the psychology of appearance enhancement.

### Complementarity of Evolutionary and Sociocultural Frameworks

Research on human appearance enhancement would benefit from assuming both evolutionary and sociocultural perspectives (Arthur, Brooks, & Blake, 2020; Blake & Brooks, 2019; Frederick et al., 2007a). Nonetheless, several perennial misconceptions of evolutionary approaches to human behavior continue to stymie interdisciplinary collaboration and consilience (Confer et al., 2010; Davis, 2020; Saad, 2013; Takács, 2018; Varella, Santos, Ferreira, & Bussab, 2013; Winegard, Winegard, & Deaner, 2014). Evolutionary researchers are commonly charged with perpetuating the idea that human psychology, if evolved, must be immutable and unaffected by sociocultural or environmental factors (i.e., genetic determinism). Or that if something has evolved then it must be personally or societally good (i.e., the naturalistic fallacy), which ostensibly justifies abhorrent behavior that may serve an adaptive function across taxa, such as rape (Vandermassen, 2011). These criticisms are, however, misguided. Using an interactionist framework, evolutionary scholars make salient the necessity of environmental inputs to activate evolved mechanisms and emphasize the enormous flexibility of adaptive responses (Brown & Richerson, 2014; Buss, Haselton, Shackelford, Bleske, & Wakefield, 1999; Confer et al., 2010; Sng, Neuberg, Varnum, & Kenrick, 2018; Uller, 2008). Because of this phenotypic plasticity (i.e., the capacity of one genotype to produce multiple phenotypes), adaptations are predicted to vary according to local cultural and ecological parameters. Even so, because ancestral humans likely recurrently encountered the same adaptive problems over evolutionary time, we expect to see consistency in how and when adaptations manifest.

The guiding paradigm in evolutionary psychology, therefore, involves an explicit consideration of the complex interplay between nature and nurture, including phylogeny, genetics, hormones, developmental experiences, the local ecology, personal values and beliefs, and cultural circumstance (Buss et al., 1999; Davis, 2020). This perspective lends itself well to challenging the more traditional sociological viewpoint that culture is decoupled from biology and evolution (Walsh & Yun, 2016). An interactionist paradigm facilitates an understanding of the interwoven processes of evoked (e.g., genetic and triggered in response to environmental conditions) and transmitted culture (e.g., the non-genetic spreading of ideas,

meaning, and values; Gangestad, Haselton, & Buss, 2006). This requires contemplating the roles of both proximate (i.e., immediate) and ultimate causal factors (i.e., distal; Laland, Sterelny, Odling-Smee, Hoppitt, & Uller, 2011; Saad, 2013; Scott-Phillips, Dickins, & West, 2011). In examining appearance enhancement preferences and practices that reliably develop in apparently sex-differentiated ways across different cultures, it is fruitful to contemplate both how these preferences and tendencies manifest (a proximate question) in addition to why they manifest (an ultimate question).

### Sexual Selection, Adaptations, and Exaptations

Like other sexually reproducing species, humans mate non-randomly to obtain direct (e.g., parenting, nuptial gifts, physical protection, and status) and indirect reproductive benefits (e.g., “good genes,” health, sperm quality in males, and fecundity in females; Buss & Schmitt, 2019; Clutton-Brock, 1991, 2007; Darwin, 1871; Gangestad & Scheyd, 2005; Miller, 1998; Singh, 1993; Symons, 1995). Prudent mate choice helps to avoid costs associated with indiscriminate mating (e.g., acquiring sexually transmitted illnesses, infidelity, being abandoned, passing genes on to offspring with a high mutation load, or reputation damage). Consequently, over evolutionary time, preferential mate choice has emerged as a mating strategy across sexually reproducing animals, such as mammals (Buss & Schmitt, 2019; Clutton-Brock, 2007). Individuals vary greatly in the degree to which they embody or can provide reproductive benefits, which makes some members of a population more desirable than others (Buss & Schmitt, 2019; Miller, 1998). From the perspective of sexual selection theory (Darwin, 1871), adaptations, such as morphological features (e.g., ornaments), physiological systems, and behavioral inclinations, can be selected because they benefit sexual reproduction (Andersson, 1994; Barber, 1995; Clutton-Brock, 1991, 2007). These adaptations are selected through the interrelated action of intersexual selection (the choosing of preferred opposite-sex mates expressing desired phenotypic qualities) and intrasexual competition (same-sex competition for access to, or to retain, opposite-sex mates; Darwin, 1871). Since intersexual selection functions to render oneself more attractive than rivals to opposite-sex conspecifics, it also qualifies as a form of intrasexually competitive behavior (Fisher & Cox, 2011).

The process of sexual selection may seem to imply that there will eventually be a single “most attractive” phenotype among members of a population (Andersson, 1994; Janif, Brooks, & Dixson, 2014, 2015). However, attractive characteristics display high genetic variability, and the attractiveness of particular sexually selected traits may depend on the distribution of phenotypes among rival conspecifics within a population (i.e., frequency-dependent selection). Some traits may become more attractive either as the phenotype becomes normative (positive frequency-dependent selection) or less common (negative

frequency-dependent selection). For example, male guppies (*Poecilia reticulata*) with rare coloration are preferentially selected by females and are conferred a mating advantage (Hughes, Houde, Price, & Rodd, 2013).

It is also important to stress that not all traits that are regarded as attractive constitute adaptations. Heritable traits that increase reproductive success can evolve because they have co-opted existing adaptations to perform roles other than their original purpose (i.e., exaptation; Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998; Havlíček, Cobey, Barrett, Klapilová, & Roberts, 2015). Furthermore, presently useful traits can develop because they are by-products of adaptations (i.e., spandrels). Nonetheless, sexual selection plays a central role in understanding the origins of both adaptations and exaptations.

### Costly Signaling and Good Genes

The process of intersexual selection is readily observable across species. For instance, in house finches (*Carpodacus mexicanus*) males with bright red plumage are preferred as mates by females (Hill, 1990). More vibrant males are thought to be attractive because bright plumage is an “honest” signal of underlying vitality and viability (Brommer, Ahola, & Karstinen, 2005). From the viewpoint of signaling theory, certain members of a species are considered more attractive because they have attributes that signal good genes, greater health, parental ability, and/or reproductive potential (Arnocky, Bird, & Perilloux, 2015; Hamilton & Zuk, 1982; Zahavi, 1975; Zahavi & Zahavi, 1997). Similarly, using the good genes hypothesis, researchers argue that female animals tend to be attracted to and choose males who possess and signal traits connoting genetic quality that can be passed along to offspring (see Gangestad & Thornhill, 1997).

A heritable trait, like vibrancy of plumage color, can become attractive because it is “costly” to produce, perhaps in terms of energy/resource expenditures or the negative influences it may impose on health and longevity (Zahavi, 1975; Zahavi & Zahavi, 1997). Costly traits are therefore attractive because they are honest signals of an organism's underlying health, meaning that not all members of a species are equally capable of producing the trait in question. For example, using the immunocompetence handicap hypothesis (Folstad & Karter, 1992), scholars argue that secondary sexual characteristics under the influence of sex steroid hormones are regarded as attractive because they impose a negative impact on immune functioning. Vocal masculinity (a testosterone-dependent trait), for instance, has been positively linked to biomarkers of immune functioning in Canadian men, supporting the idea these men are healthier and more capable of producing the costly trait in question (Arnocky, Hodges-Simeon, Ouellette, & Albert, 2018). In previous work, testosterone and estrogen have both been shown to produce immunosuppressing effects (see Foo, Nakagawa, Rhodes, &

Simmons, 2017 for meta-analysis). However, other researchers have failed to uphold the relation between testosterone and immune suppression in several mammals and among humans, which casts some doubt on the idea that hormonally mediated sex traits are necessarily costly to produce (Nowak, Pawłowski, Borkowska, Augustyniak, & Drulis-Kawa, 2018).

### Fisherian Selection, Supernormal Stimuli, and Sensory Exploitation

Evolutionary scientists have had a difficult time determining the origins of sexual signals used in courtship (e.g., morphological ornaments), if sexual signals are honest indicators of fitness, and whether these signals impose a cost on the organism. For example, male long-tailed widowbirds (*Euplectes progne*) have remarkably elongated tails that are evidently preferred by females (Andersson, 1982), but it is uncertain whether producing longer tails imposes a cost on health, flight, increased predation, or decreased foraging ability (Husak & Swallow, 2011).

Compounding things is the observation that many sexual reproducing animals use signals that do not connote phenotypic quality to court and attract mates (Buss, 2017; Cronk, 2005; Laidre & Johnstone, 2013). In fact, a range of mate competition tactics employed by humans function to dishonestly render oneself more attractive relative to same-sex rivals (e.g., cosmetic surgery, makeup, and clothing that artificially shapes the body; DeLPriore et al., 2017; Johnsen & Geher, 2017). Moreover, novel traits may become attractive because they exploit particular sensory biases that evolved in a non-mating context (i.e., the sensory exploitation hypothesis; see Arnqvist, 2006). For example, female guppies (*P. reticulata*) are attracted to males with bright orange spots, a sensory bias that originally arose for food detection (Rodd, Hughes, Grether, & Baril, 2002). A male trait and an accompanying female preference can also become genetically correlated even if the trait does not connote health (i.e., Fisherian selection; Prum, 2017). This covariance, if strong enough, can produce exaggerated traits that must be balanced by selection in terms of costs to survival (i.e., Fisher's runaway process). An exaggerated feature may also constitute a “supernormal stimulus” (discussed in Gray, Heaney, & Fairhall, 2003), eliciting a stronger response than the stimulus for which it evolved. For example, male chacma baboons (*Papio ursinus*) express stronger sexual interest toward females with exaggerated perineal swellings (Bielert & Anderson, 1985). Researchers have similarly argued that high heels exaggerate features of women's gait (decreasing stride length and increasing pelvic tilt) and posture (increasing lumbar curvature) creating a supernormal stimulus that men find attractive (Lewis et al., 2017; Morris, White, Morrison, & Fisher, 2013; Prokop & Švancárová, 2020) although Morris et al. stated

that a more appropriate metaphor for high heels may be the extended phenotype.

### Extended Phenotype and Niche Construction

Signaling and ornamentation are not solely restricted to the physical body, such as morphological ornaments (e.g., vibrancy of plumage), but can also extend into the environment itself (i.e., the extended phenotype; Dawkins, 1999). For instance, male bowerbird's (family *Ptilonorhynchidae*) decorate their bowers (hut-like structures or walls made with sticks and twigs) with a variety of colorful and shiny objects to court mates. The complexity of bower construction has led some to argue that bower quality may honestly signal enhanced cognitive and physical ability (discussed in Schaedelin & Taborsky, 2009). However, it is unclear whether bowers honestly convey phenotypic quality or whether this behavior is the product of Fisherian selection (Borgia, 1993). Larger exaggerated bowers may also function as a supernormal stimulus (Tinbergen, 1951).

Examples of human extended phenotypes are plentiful, including makeup, purchasing extravagant clothing, cars, and houses, as well as tattoos and piercings (Borau & Bonnefon, 2019a; Carmen, Guitar, & Dillon, 2012; Etcoff, Stock, Haley, Vickery, & House, 2011; Luoto, 2019). These can function to facilitate mate competition, by honestly or dishonestly signaling phenotypic quality to the receiver, by taking advantage of preexisting sensory biases (sensory exploitation), through a genetic trait–preference correlation (Fisherian selection), or through exaggerating stimuli for which there is already an evolved response (supernormal stimuli). The concept of niche construction is also relevant when discussing the extended phenotype. Animals modify their local environments, which in turn produces new selection pressures on the organism (Laland, Matthews, & Feldman, 2016). Niche construction has likely played a particularly important role in human gene–culture coevolution which can shape trait–preference dynamics and behavioral inclinations involved in mate competition.

### The Mating Market

From the perspective of the “mating market,” individuals high in mate value (i.e., those possessing desirable traits) have more bargaining power and can be more selective in their mate choice (Pawłowski & Dunbar, 1999). Therefore, more physically attractive people are predicted to have stronger “bargaining hands” and a higher probability of competitive success against same-sex rivals (Fales et al., 2016; Frederick & Jenkins, 2015). Evidence supporting this argument comes in several forms: the considerable cross-cultural agreement in who is considered to be attractive (Sugiyama, 2005, 2016; Langlois et al., 2000; Little, 2014; Singh, Dixson, Jessop, Morgan, & Dixson,

2010), the importance ascribed to physical attractiveness in both long-term (romantic) and short-term (sexual) partners across different countries (Buss, 1989; Chang, Wang, Shackelford, & Buss, 2011; Fales et al., 2016; Kamble, Shackelford, Pham, & Buss, 2014; Li & Kenrick, 2006; Li, Valentine, & Patel, 2011), the “choosiness” (i.e., heightened mate preference standards) of people who perceive themselves to be more attractive (Arnocky, 2018; Buss & Shackelford, 2008; Pawłowski & Dunbar, 1999; Todd, Penke, Fasolo, & Lenton, 2007), and the greater mating success of those with physically attractive characteristics (Jokela, 2009; Perilloux, Cloud, & Buss, 2013; Sunderani, Arnocky, & Vaillancourt, 2013; Walster, Aronson, Abrahams, & Rottman, 1966).

### Appearance Enhancement as a Self-Promotion Strategy

In the context of heterosexual mating, the preferences of one sex become what opposite-sex members compete to embody (Andersson, 1994; Arnocky & Vaillancourt, 2017; Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Symons, 1995). Consequently, in the domain of mate competition, same-sex members are salient rivals who are vying for the same resources to overcome similar adaptive problems (i.e., those obstacles that impinge on survival and/or reproductive success; Buss, 1989). It is also evident that competition for same-sex mates occurs among humans (i.e., bisexual and homosexual mating) and in a range of other species; however, these dynamics differ in nuanced ways which leads to unique hypotheses from the perspective of sexual selection theory (Brewer & Hamilton, 2014; VanderLaan & Vasey, 2008). Because opposite-sex mating is more common in humans and across sexually reproducing animals, the majority of the research discussed herein refers to heterosexual mate competition. To date, two dominant intra-sexual competition strategies have been studied (Buss & Dedden, 1990; Schmitt & Buss, 1996; Walters & Crawford, 1994). The first is called self-promotion, which involves amplifying characteristics to increase one's appeal to potential mates. The second is competitor derogation, which involves attempts to reduce the mate value of rivals.

Appearance enhancement behavior can be understood as a form of self-promotion which serves to competitively increase one's mate value relative to same-sex rivals (Buss & Dedden, 1990; DelPriore et al., 2017; Fisher & Cox, 2011; Schmitt & Buss, 1996; Varela, Valentova, & Fernández, 2017). From an evolutionary perspective, people are predicted to self-promote over characteristics normatively deemed to be attractive. Therefore, self-promotion behavior is expected to vary in unique, but patterned ways across culture and time. For example, the “idol effect” describes how people imitate the appearance of those they admire in culturally- and sex-specific ways. Boys and men tend to mimic male role models, such as athletes and

actors in more traditionally masculine roles (e.g., action movies), whereas girls and women tend to imitate female teachers and celebrities, such as pop stars and actresses (Read, 2011). By imitating the characteristics possessed by desirable same-sex peers, individuals may be better able to augment their mate value in the eyes of potential mates (Varella et al., 2017). This example illustrates the potential synergy between evolutionary and sociocultural perspectives in understanding varied appearance enhancement practices among humans. The ultimate reason for appearance-linked mimicry in the context of mate competition is to increase one's mate value and competitive success, but the varied ways in which people mimic the appearance of others are expected to be influenced by a host of proximate culturally specific factors (Laland et al., 2011).

Among the varied ways in which humans compete for mates, self-promotion appears to be the most common strategy (Fisher & Cox, 2011; Fisher, Cox, & Gordon, 2009). There is, however, a notable difference in the ways in which women and men self-promote (Buss & Dedden, 1990; Schmitt & Buss, 1996; Walters & Crawford, 1994). From an evolutionary perspective, sex differences in mate competition strategies are argued to be the result of the different adaptive challenges that ancestral women and men have faced over evolutionary time, which has led to the development of sex-specific design features.

### Why Physical Attractiveness Generally Matters More for Females

Across the majority of mammals, females bear the bulk of obligatory parental investment in the form of gestation, child-bearing, and post-partum care (Trivers, 1972). The combination of pregnancy, a small number of gametes (ova), and an explicit age-related cessation in fertility (menopause) translates into lower lifetime reproductive potential for women compared to men (Arnocky, 2016; Arnocky & Vaillancourt, 2017; Clutton-Brock, 2007, 2009). Unlike women, men's reproductive output is mainly constrained by their capacity to outcompete same-sex rivals for access to reproductive opportunities. Across species, the sex that invests the most in their offspring is predicted to be more "choosy" in their mate selection, while the other engages in more overt intrasexual competition to gain access to opposite-sex mates (Trivers, 1972).

Darwin (1871) noted that many of the traits produced by sexual selection were more conspicuous and well developed in males, such as elaborate ornamentation (e.g., vibrant plumage, large head crests, and brightly colored markings) used to attract females or weaponry used for intrasexual combat (e.g., antlers, horns, and large body size). Courtship displays and signals of underlying phenotypic quality, like energetically expensive ornamentation, can become more pronounced among males as a function of intrasexual competition for

selective female partners (Gilbert & Uetz, 2016). At first glance, this may seem counterintuitive to an evolutionary view of human attractiveness and appearance enhancement, given that, historically and cross-culturally, women appear to allocate more effort toward appearance relative to men (Buss, 1988; Buss & Dedden, 1990). However, in pair-bonding species wherein males and females each invest heavily in offspring, such as in humans (Fletcher, Simpson, Campbell, & Overall, 2015; Geary, 2000), both sexes benefit from mutually selective mate choice and from signaling qualities that are attractive to members of the opposite sex (Kokko & Johnstone, 2002). Importantly, these benefits may be realized in a diversity of romantic and sexual relationships that human beings may occupy in culturally and temporally specific ways, from social monogamy to consensually non-monogamous relationships (e.g., polyandry; Mogilski, Memering, Welling, & Shackelford, 2017).

Ancestral men, like most mammalian males, faced the primary adaptive problems of correctly identifying, courting, and competing with rivals for sexually available and attractive (i.e., fertile and healthy) mates (Buss & Schmitt, 2019). In contrast, ancestral women, like most mammalian females, faced the problems of finding and attracting mates who were willing and able to invest resources, as well as able to provide protection. As a consequence of these differential selective pressures, women are expected to compete more over aspects of their physical appearance, so as to signal youth, femininity, health, and fertility, whereas men are predicted to compete more over cues to resource holding potential (e.g., money and status) and physical formidability (e.g., height and musculature; Buss, 1988; Buss & Dedden, 1990; Buunk et al., 2002; Fink, Klappauf, Brewer, & Shackelford, 2014; Symons, 1995).

Cross-culturally, men have been shown to prioritize physical attractiveness in their mates more than women in dating and long-term romantic relationships (Bech-Sørensen & Pollet, 2016; Buss, 1989; Buss, Shackelford, Kirkpatrick, & Larsen, 2001; Li et al., 2011, 2013; Lippa, 2007; Meltzer, McNulty, Jackson, & Karney, 2014; Thomas et al., 2020; Walter et al., 2020). An important component of what heterosexual men find physically attractive in a mate across cultures is youth. Neoteny (i.e., the retention of juvenile features) may be a supernormal stimulus that when exaggerated in women, particularly facial cues, makes them look more youthful and attractive (Jones et al., 1995). This can motivate women to compete over aspects of their physical appearance that correspond to men's evolved mate preferences (e.g., youth). Additionally, across dozens of nations that vary in gender parity, women have been found to prioritize predictors of status, good economic standing, physical strength, and height in a mate (Buss, 1989; Buss et al., 2001; Li et al., 2011; Thomas et al., 2020). This encourages intrasexual rivalry among men to embody those traits desired by women. Buss and

Dedden (1990) showed that American women were judged to be more likely to derogate same-sex others over their appearance, whereas men were rated as more likely to attack a rival's financial standing, achievements, and strength. Likewise, Schmitt and Buss (1996) found that sexualizing one's appearance and derogating rivals' physical attractiveness were judged to be more effective mate competition tactics for American women, whereas the most effective tactics for men were displaying resources and derogating the resource holding potential of competitors. Bendixen and Kennair (2015) were able to replicate these results in a sample of Norwegian undergraduates. These results support the argument that women's self-promotion and competitor derogation revolve more around aspects of their physical appearance, whereas men's inter and intrasexual rivalry is focused more on indicators of status, economic standing, and physical strength. These evolved sex-linked differences are expected to manifest in a similar fashion concerning women's and men's appearance enhancement behavior.

### Modes of Appearance Enhancement

Because both women and men value physical attractiveness in a mate, modes of appearance enhancement can be used to augment mating success (Gangestad & Scheyd, 2005). Ultimately, those who best conform to the physique and appearance that is most desired by the opposite sex will have greater mating success relative to those with less attractive physiques (Bajos, Wellings, Laborde, & Moreau, 2010; Hughes & Gallup, 2003; Jokela, 2009; Rhodes, Simmons, & Peters, 2005). Women and men have historically and cross-culturally been observed to engage in a host of body enhancement and modification practices; although, often in unique ways and to varying degrees (Chaudhri & Jain, 2009; Dettwyler, 2011; Krukutak, 2015; Ross, 2008; Sherrow, 2001, 2006; Steele, 2001). In modern Western society, women and men similarly employ a variety of modalities to enhance their appearance.

### Cosmetics and Beauty Products

Women and men in ancient Egypt (~3000 BCE) used an assortment of substances (e.g., oils, spices, ointments, and dyes) to create cosmetics and moisturizers for health and hygienic reasons, as well as to accentuate parts of the body (Hunt, Fate, & Dodds, 2011). Kohl, a black powder, was used as eyeliner for protection against sun glare, and as a cosmetic to draw attention to the eyes. Although both women and men commonly wore cosmetics, only ancient Egyptian women possessed extravagant and elaborate makeup chests to store their cosmetic products and equipment (Chaudhri & Jain, 2009; Hunt et al., 2011). Similarly, women in ancient Rome (~600 BCE) used eye paints, dyes to color cheeks, lips, nails, and hair, as well as

teeth whitening products for beauty and hygiene. In contemporary society, the global cosmetic products industry was recently valued at \$532 billion in 2017 (Zion Market Research, 2017).

Several researchers have argued and empirically shown that cosmetic products help to make women appear more youthful, healthy, feminine, and attractive (Batres, Kramer, DeAngelis, & Russell, 2019; Borau & Bonnefon, 2019a; Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Etcoff et al., 2011; Hardon, Idrus, & Hymans, 2013; Jones, Russell, & Ward, 2015; Jones & Kramer, 2016; Kellie, Blake, & Brooks, 2020; Russell et al., 2019). Older women seem to strategically use makeup in order to appear younger (Mafra et al., 2020; Russell et al., 2019). Women wearing makeup are also perceived by same-sex others as more dominant and are viewed by men as higher in prestige (Mileva, Jones, Russell, & Little, 2016). In comparison to men, women have been found to express more interest in, devote more time shopping for, and spend more money on cosmetic and beautification products (e.g., anti-aging creams) and services (e.g., manicures) in North America (Durante & Griskevicius, 2018; Meston & Buss, 2009; Miller, 2009; Saad, 2013), Taiwan (Liu, Lin, Lee, & Deng, 2013), India (Ramshida & Manikandan, 2014), and Ethiopia (Bilal, Tilahun, Shimels, Gelan, & Osman, 2016). A survey of 4273 British people aged 18 years and older showed that 85% of women have worn makeup to go out with friends in the evening compared to 4% of men, and 74% of women say that they have worn makeup to go on a date compared to 2% of men (Waldersee, 2019). Even in an economic recession, women increase their spending on beauty products, while decreasing their spending on other goods (i.e., the lipstick effect; Hill, Rodeheffer, Griskevicius, Durante, & White, 2012).

The research described above shows that cosmetics have been used for millennia in culturally specific ways, particularly by heterosexual women, to increase attractiveness (i.e., self-promote) and as ornamental armament to compete with same-sex rivals over physical appearance (Arnocky, Perilloux, Cloud, Bird, & Thomas, 2016; DelPriore et al., 2017; Mafra et al., 2020; Meston & Buss, 2009; Varella et al., 2017). Cosmetics can be used to achieve this end by dishonestly manipulating facial features that humans, particularly men, have evolved to find attractive because they may connote youth, greater health, and good genes, such as facial symmetry, sexual dimorphism (e.g., facial femininity), uniformly textured and unblemished skin, and full lips, as well as white teeth and white sclera (Cronk, 2005; Etcoff et al., 2011; Jones, Kramer, & Ward, 2014; Provine, Cabrera, & Nave-Blodgett, 2013; Russell, 2011; Russell et al., 2019; Sugiyama, 2005; Symons, 1995). Makeup can create supernormal stimuli to produce an exaggerated perceptual response in the context of mate choice and intrasexual rivalry. However, mixed evidence has been reported regarding the association between facial attractiveness and a

reduced susceptibility to illness (Cai et al., 2019; for review, see Arnocky et al., 2014), casting some doubt on the link between facial attractiveness and health. Nonetheless, findings suggest that facial cosmetics are a feature of the human extended phenotype that are used to augment mate value and enhance competitive ability in the mating arena in temporally and culturally specific ways.

## Clothing

Clothing practices vary remarkably across time and from one culture to the next (Ross, 2008). Nonetheless, amidst changing clothing styles is a consistent attempt by heterosexual women and men to competitively adorn themselves in a manner that appeals to the desires of opposite-sex individuals (Johnsen & Geher, 2017). For example, high-heeled shoes served a pragmatic function in the tenth century for Persian men in the cavalry to help secure their feet to their horses. Heels were then appropriated by European male aristocrats in the 1700s to connote status and to increase their height (Parmentier, 2016), which likely capitalized on women's cross-culturally consistent preference for relatively taller men of greater status (Atari & Jamali, 2016; Buss, 1989). For over a century in Western society, heels have been primarily worn by women. Some women use heels as a self-promotion tactic to accentuate morphological features that men find attractive, such as greater leg length and lumbar curvature (Etcoff, 1999; Lewis et al., 2017; Prokop & Švancárová, 2020). In the 1700s, Victorian women wore elaborate corsets to achieve an hourglass figure to emphasize their beauty and to indicate their status (Etcoff, 1999; Steele, 2001). Although these garments caused women significant pain and discomfort, they likely appealed to men's preference for women with a small waist relative to broader hips (i.e., a low waist-to-hip ratio (WHR); Singh et al., 2010), which may serve as a cue to current pregnancy status, parity (number of previous pregnancies), health, and/or fecundity (Bovet, 2019). Corsets as luxury items likely also permitted women to competitively display their status, which is an important, and underappreciated, part of women's intrasexual rivalry (Arnocky & Vaillancourt, 2017; Hudders, De Backer, Fisher, & Vyncke, 2014; Liesen, 2013; Vaillancourt, 2013; Vaillancourt & Krems, 2018).

Some studies have found that across different cultures women report more interest in and devote more time shopping for clothing than men online and in-store (Haiyan & Jasper, 2004; Katrodia, Naude, & Soni, 2018; Kim & Kim, 2004; Rahman, Fung, Chen, Chang, & Gao, 2018; Seock & Bailey, 2008). Although mixed findings have been reported. For example, a 2017 survey of 2038 adults from the UK showed that men spend £67.10 and women spend £53.9 on clothing monthly (Sabanoğlu, 2019). Women tend to report more enjoyment in shopping for clothes online than men (Seock & Bailey, 2008), and women

have been shown to engage in more impulsive purchasing for clothing (Coley & Burgess, 2003). Women appear to take a greater interest in fashion and more often purchase fashion as a means of social influence in comparison with men (Cho & Workman, 2014). Generally, women tend to see shopping as a fun social activity, whereas men see shopping in a more goal-directed manner, perhaps reflecting sex differences in ancestral foraging and hunting activities (Kruger & Byker, 2009).

Many women in modern societal circumstances report purchasing and adorning revealing and form fitting clothing to feel confident and attractive, and to communicate sexual intent (Grammer, Renninger, & Fischer, 2004; Johnsen & Geher, 2017; Lennon, 1990; Lennon, Adomaitis, Koo, & Johnson, 2017; Montemurro & Gillen, 2013; Smolak, Murnen, & Myers, 2014). Several studies in a Western cultural context have supported that women are intolerant of same-sex others wearing more sexualized garb (e.g., Arnocky et al., 2019; Borau & Bonnefon, 2019b; Krems, Rankin, & Northover, 2019; Reynolds, Baumeister, & Maner, 2018; Vaillancourt & Sharma, 2011). From an evolutionary perspective, sexually provocative clothing signals to men a potential opportunity for sex and so enhances women's sexual attractiveness (Arnocky, 2016; Arnocky & Vaillancourt, 2017; Vaillancourt, 2013). Consequently, these women are readily identified as intrasexual rivals and become targets for women's jealousy and indirect aggressive behavior (e.g., negative gossip, social exclusion, and emotional manipulation; Davis, Vaillancourt, & Arnocky, 2018; Davis, Vaillancourt, Arnocky, & Doyle, 2019; Dijkstra & Buunk, 2002). Suppressing the sexuality of same-sex rivals allows women to compete more effectively for mates (Baumeister & Twenge, 2002; Vaillancourt, 2013). Examples of female animals suppressing the sexuality of same-sex conspecifics have been documented across several taxa. For example, in captive marmosets and tamarins (family *Callitrichidae*), olfactory cues from fertile females can suppress ovulation in same-sex others (see Snowdon, Ziegler, Schultz-Darken, & Ferris, 2006). Despite good evidence that women suppress each other's sexuality, men are evidently involved in the suppression of female sexual behavior (Blake, Fourati, & Brooks, 2018b; Buss, 1996). Within certain cultural circumstances, such as those high on power distance (i.e., greater social inequality) wherein men control a disproportionate amount of power (i.e., patriarchal cultures), many women are pressured and coerced to wear certain items of clothing. For example, Iranian women by law must wear more conservative garb (e.g., long dark colored dresses and headscarves; Mortazavi & Poelker, 2017). Even at risk of violent discrimination and assault from husbands and law enforcement officials, some Iranian women have been observed competing by wearing makeup, form fitting black dresses, and opting for cosmetic surgery (Nayeri, 2014). These examples make salient the benefit of

assuming both evolutionary and sociocultural perspectives when studying human appearance enhancement practices.

Women in Western cultures also devote considerable energy and spend significant amounts of money on luxury goods, such as expensive jewelry, purses, shoes, lingerie, and designer dresses (Durante & Griskevicius, 2018; Hudders et al., 2014; Meston & Buss, 2009; Miller, 2009). Possession of luxury brands may serve as a costly signal that allows women to drive off intrasexual rivals by showing how invested their romantic partners are and to competitively display their status (Hudders et al., 2014; Miller, 2009; Sundie et al., 2011; Wang & Griskevicius, 2014). For example, Hudders et al. (2014) showed that women displayed a stronger preference for a luxury dress (but not a smartphone) in a competitive mating context versus a non-mating context. Hudders et al. also found that women perceived a hypothetical same-sex other as more attractive, sexy, ambitious, and of higher status who purchased a luxury dress in comparison with a non-luxury item (an alarm clock).

This kind of conspicuous consumption—the purchasing of showy and expensive items to display wealth, power, and status—although practiced by women, is predicted to be more common among men as a strategy to capitalize on women's attraction to indicators of status, resources, and wealth (Durante & Griskevicius, 2016; Saad, 2013; Segal & Podoshen, 2013; Sundie et al., 2011). Importantly, conspicuous displays of status may involve both direct bodily modification, but also appearance enhancement tactics that are part of men's extended phenotype, such as an expensive sports car. For example, Hennighausen, Hudders, Lange, and Fink (2016) showed that American men expressed stronger intentions to purchase a luxury car (Porsche Boxster) over a non-luxury vehicle (Ford Fiesta), in part, because they believed that it would elevate their social standing. In a second study, it was found that German men viewed same-sex others who purchased a luxury car as a rival that was more attractive, flirtatious, intelligent, ambitious, and of higher social status. British women have been found to rate a male model as significantly more attractive when sitting in a high-priced (Bentley) versus a moderately priced vehicle (Ford Fiesta; Dunn & Searle, 2010). Similar results have been found in a sample of American women (Shuler & McCord, 2010). Furthermore, men's conspicuous consumption to signal status, such as the purchasing of expensive name brand clothing, has been shown to increase in the presence of physically dominant same-sex others (a salient intrasexual competition cue; Otterbring, Ringler, Sirianni, & Gustafsson, 2018). Several scholars have shown that adolescent boys and men are invested in purchasing clothing to augment their self-confidence and attractiveness in line with local cultural ideals, such as clothing that makes one appear more popular, as well as more lean and

muscular (Frith & Gleeson, 2004; Hargreaves & Tigge-mann, 2006).

### Physical Activity and Dieting

Researchers have shown that people across different cultures attempt to sculpt their bodies through exercise for aesthetic and athletic reasons, which typically involve motivations to lose weight, gain muscle, increase attractiveness, and/or be healthy (Cash, Novy, & Grant, 1994; Cafri, Yamamiya, Brannick, & Thompson, 2005; Kilpatrick, Hebert, & Bartholomew, 2005; McCabe, Ricciardelli, Waqa, Goundar, & Fotu, 2009; Ricciardelli & McCabe, 2003; Shomaker & Furman, 2010). Adolescent girls' and women's preference for tall, broad shouldered, strong, and toned males drives boys and men to emphasize cues to their masculinity, dominance, and physical formidability (Dixson, Dixson, Bishop, & Parish, 2010; Frederick & Haselton, 2007; Pawlowski & Koziel, 2002; Sell, Lukazsweski, & Townsley, 2017; Štěrbová et al., 2018). Frederick et al. (2007a) found that across three cultures, 61% of American, 69% of Ukrainian, and 49% of Ghanaian men expressed a desire to be more muscular in order to increase their perceived dominance and physical attractiveness to women. A muscular cultural ideal for men also appears to be growing in much of modern society, reflected in the increased musculature of male action toys (Pope, Olivardia, Gruber, & Borowiecki, 1999), superheroes (Knoesen, Thai Vo, & Castle, 2009), images of men in popular magazines (Frederick, Fessler, & Haselton, 2005), and male centerfolds (Leit, Pope, & Gray, 2001). In previous work, men have been shown to overestimate the importance of muscularity for perceived attractiveness and the degree to which women desire a muscular mate (Lei & Perrett, 2020; Zarzycki, Słyk, Price, & Flaga-Łuczkiwicz, 2019). Perhaps this is due to the more salient muscular ideal in Western cultures. Boys' and men's competition to embody these characteristics can lead to risky and dangerous means of increasing musculature, such as the use of illegal and legal steroids (Cafri et al., 2005; Gosse & Arnocky, 2012; Vartanian, Wharton, & Green, 2012).

Across cultures, heterosexual men display a preference for women with a relatively lower body mass index (BMI; Kościński, 2013; Swami, Begum, & Petrides, 2010; Swami & Tovée, 2005), which motivates weight-based competition among girls and women. Girls and women value thinness far more than boys and men (Li, Smith, Griskevicius, Cason, & Bryan, 2010). And unlike boys and men who suffer disproportionately from muscle dissatisfaction, girls and women experience far more anxiety over body fat and suffer more from clinically significant eating disorders, particularly during college (Delinsky & Wilson, 2008; Gadalla & Piran, 2007; Murray, Griffiths, & Mond, 2016; Vaillancourt, 2013). Hill and Durante (2011) found that showing women photos of attractive

same-sex (an intrasexual competition cue) and opposite-sex others (an intersexual courtship cue) made them more likely to take diet pills, among other risky appearance enhancing acts. A thin cultural ideal for girls and women in contemporary society has also increased over time, reflected in popular fashion magazines, television, and movies (Hargreaves & Tiggemann, 2003; Saito, 2017; Stice et al., 2001). And evidence indicates that women overestimate the extent to which men desire thinness in both short-term sexual and long-term romantic partners (Lei & Perrett, 2020). The examples described in this section, again, illustrate the potential synergy between evolutionary and sociocultural approaches. Evidence shows how girls and women in modern society are fiercely competing over bodily attractiveness (Arnocky & Vaillancourt, 2017; Dubbs, Kelly, & Barlow, 2017; Vaillancourt, 2013), which may be amplified by particular social and cultural factors, such as the promotion of a thin ideal in the media (Anderson-Fye, 2012; Saito, 2017; Stice et al., 2001). Competitive tendencies and media portrayals can reciprocally influence one another, similar to the process of gene–culture coevolution (Gintis, 2011).

### Cosmetic Procedures

Non-surgical or minimally invasive cosmetic procedures (Botox, chemical peels, and laser hair removal) are increasing in popularity in many countries around the world that vary in degree of economic development and gender parity (e.g., The U.S., Brazil, Mexico, and India; Elflein, 2019; International Society of Aesthetic Plastic Surgeons (ISAPS), 2019). In 2016, the global cosmetic procedures market was valued at about 26 billion dollars U.S., which is projected to reach 46 billion dollars by 2026 (Mikulic, 2018). In 2018, the U.S. had the highest number of total cosmetic procedures performed (surgical and non-surgical) at 4.3 million, followed by Brazil at 2.2 million (ISAPS, 2019). Both women and men report undergoing, or holding positive attitudes toward undergoing, expensive, invasive, and risky cosmetic procedures to augment their physical attractiveness (Calogero, Pina, Park, & Rahemtulla, 2010; Dubbs et al., 2017; Holliday & Cairnie, 2007). Nonetheless, women account for approximately 86.5% of the total cosmetic procedures performed worldwide (ISAPS, 2019). Despite perceiving a greater risk linked to cosmetic surgery, women express more positive attitudes toward and a stronger intention to pay for cosmetic procedures (Arnocky & Piché, 2014; Frederick, Lever, & Peplau, 2007b). Investigators have highlighted important sociocultural factors underlying women's attitudes and behavior related to plastic surgery, such as the influence of unsolicited body evaluations from peers (i.e., interpersonal sexual objectification; Calogero et al., 2010). From an evolutionary perspective, scholars have argued that cosmetic surgery can facilitate courtship and intrasexual rivalry by helping to augment one's mate value (Arnocky & Piché, 2014; Dubbs et al., 2017; Thornton, Ryckman, & Gold, 2013).

If cosmetic surgery is used to compete for mates, then there should be an evident sex-differentiated preoccupation with procedures that target areas of the body that women and men have evolved to find attractive. Worldwide, the most popular cosmetic surgical procedure overall, and for women specifically, is breast augmentation, with 1,841,098 augmentation mammoplasties performed in 2018 (ISAPS, 2019). Another common procedure for women worldwide are breast lifts (i.e., mastopexy), with 710,014 procedures performed in 2018 (ISAPS, 2019). These surgeries may appeal to men's cross-culturally stable desire for medium to large breasts that are symmetrical, perhaps as a cue to fecundity or lactational capacity (Dixson et al., 2011; Fink et al., 2014; Havlíček et al., 2017). Liposuction was a common cosmetic surgical procedure among both women (1,482,395) and men (250,225) worldwide in 2018. These procedures result in emphasizing different aspects of women's and men's bodies (ISAPS, 2019). For women, fat reduction may help to accentuate a small WHR and a more curvaceous body, whereas for men these procedures can help to emphasize a toned and muscular somatotype. For instance, the most common surgery for men worldwide in 2018 was gynecomastia surgery (i.e., breast reduction surgery) with 269,720 procedures performed (ISAPS, 2019), which helps to define pectoral muscularity (Aiache, 1991). Indeed, men commonly report having plastic surgery for the purpose of accentuating a toned and muscular body shape (Sarwer, Crerand, & Gibbons, 2007), which may cater to women's desire for more physically formidable men (Buss, 1989).

If cosmetic surgery is a strategy to increase one's mate value relative to competitors, then those who have had cosmetic surgery should be rated as more attractive. Although limited, the evidence available suggests that this is the case. Singh and Randall (2007) found that American women who underwent micro-fat grafting surgery to reduce their WHRs were subsequently rated as more physically attractive. Iranian women's interest in cosmetic surgery has also been shown to correspond to a heightened preference for a man who is higher in status, intelligence, and physical attractiveness (Atari, Chegeni, & Fathi, 2017). This could suggest that these women believe that they are higher in mate value as a consequence of intending to invest in costly appearance modification and should therefore be able to elevate their mate preference standards. Collectively, the empirical work described in this section supports the argument that women and men opt for cosmetic surgery to appear more attractive and to increase their bargaining hand on the mate market. Despite the potential attractiveness enhancing benefits of cosmetic surgery, these medical procedures can be dangerous and involve a high level of risk for the client (Dubbs et al., 2017).

## Tanning

In previous work, investigators have supported a positive link between a desire to appear physically attractive and women's and men's natural and artificial skin-tanning behavior (Cafri et al., 2008; Prior, Fenwick, & Peterson, 2014; Yoo & Kim, 2014). The tanning salon market (i.e., indoor tanning and spray tan services) in the U.S. is currently valued at 4.6 billion dollars and has grown positively over the last decade (IBISWorld, 2020). Since tanning is associated with many negative health outcomes (e.g., several forms of skin cancer), it may appear counterintuitive that it is attractive because it ostensibly serves as a cue to youth and health. Yet, skin coloration high in carotenoid is perceived as being healthy and attractive (see Lefevre, Ewbank, Calder, von dem Hagen, & Perrett, 2013), and tanned skin also helps to hide imperfections (e.g., masking cellulite; Buss, 1989). In a Western context, moderately tanned skin is often perceived as being the healthiest and most attractive (Broadstock, Borland, & Gason, 1992; Chung, Gordon, Veldar, & Chen, 2010; Fink, Grammer, & Thornhill, 2001; Smith, Cornelissen, & Tovée, 2007). Although, mixed findings have been reported regarding the desirability of varying skin tones, which may also interact with hair color to influence attractiveness judgments (Fink et al., 2018). Interestingly, diet-based skin coloration from carotenoid in fruits appears to be more attractive than melanin skin coloration, perhaps because it is a more honest signal of current health status (Lefevre & Perrett, 2015). Many people are also switching to sunless tanning alternatives (i.e., self-tanning), including lotions and creams, which is predicted to reach 5.5 billion dollars US globally by 2026 and to be dominated by female consumers (Transparency Market Research, 2018). In the U.S., it is estimated that about 23.3–35.1% of young women and 6.3–6.5% of young men tan indoors (see Julian, Bethel, Odden, & Thorburn, 2016). In a recent systematic review of college tanning behavior, several sociocultural factors that significantly influence tanning were described, such as pressure from peers and the media (Gambla, Fernandez, Gassman, Tan, & Daniel, 2017). An evolutionary perspective can supplement this sociocultural framework by emphasizing the sex-differentiated nature of the behavior, its developmental trajectories, and the counterintuitive nature of the perceived costs and benefits of the tanning (Saad & Peng, 2006). From this viewpoint, young adult women are predicted to tan in order to render themselves more attractive than rivals to mates, despite potential long-term costs to their health.

## Tattoos

Tattoos, body piercings, and scarification have been practiced across various cultures throughout human history (Deter-Wolf, Robitaille, Krutak, & Galliot, 2016; Ludvico & Kurland, 1995). In regard to tattooing (i.e., permanently inscribing exogenous pigmented inks into the dermis), the oldest

archeological evidence suggests that the mummified remains of Ötzi (3300 BCE) found in present day Italy shows the earliest concrete evidence of ancient tattoo artwork. Researchers have become increasingly interested in the psychology of tattoos, particularly because of their rising popularity across modern society (Carmen et al., 2012; discussed by Salmon, 2018). For example, a 2015 survey of 1669 British people showed that about 30% of those between the ages of 25–39 had been tattooed (Statista, 2015). Similarly, a 2015 survey of 2225 Americans showed that 47% of Millennials (aged 18–35) and 36% of Gen X adults (aged 36–50) had at least one tattoo (Shannon-Missal, 2016).

Anthropologists and sociologists have highlighted that among indigenous cultures tattoos have served the purpose of signaling entry into adulthood, individuality, social status, familial and group identity, and spiritual connection (Krutak, 2015). One dilemma that has surfaced in this literature has been some confusion over proximate and ultimate levels of causation (discussed in Carmen et al., 2012). Ludvico and Kurland (1995) argued that their data supported that tattooing is best described as a “rite of passage” rather than the result of sexual selection (i.e., an ultimate mechanism). However, rite of passage rituals impact mate competition dynamics in different ways. For example, rite of passage ceremonies typically function to signal sexual maturity and group membership, which would negatively influence the reproductive success of those failing to successfully participate in such ceremonies (Carmen et al., 2012). Therefore, suggesting that rite of passage rituals are proximate and not shaped by sexual selection is misguided.

Evolutionary researchers have taken interest in the ultimate function of tattoos as a form of bodily adornment because of its temporal and cross-cultural ubiquity, but also due to how painful and risky the practice can be (Carmen et al., 2012; Koziel, Kretschmer, & Pawlowski, 2010). Because tattoos involve trauma to the skin and the introduction of foreign substances into the dermis (the tattoo inks), they stimulate an immune response (Islam et al., 2016). Leukocytes (i.e., white blood cells), particularly macrophages, are involved in the phagocytosis of ink pigments to transport and help clear away these foreign bodies. Beyond the immunologic response, those receiving tattoos risk allergic reactions to the dyes, developing skin infections (e.g., staph infection), and contracting blood-borne diseases (e.g., hepatitis; Islam et al., 2016). For these reasons, tattoos may qualify as a costly signal that only certain members of the population can consistently exploit because they may be healthier or more genetically fit (Koziel et al., 2010; Lynn, Dominguez, & DeCaro, 2016; Lynn et al., 2019; Wohlrab, Stahl, & Kappeler, 2007). In previous work, Polish women, but not men, rated a digital photograph of a man with a tattoo as healthier relative to a picture of the same man without a tattoo (Galbarczyk & Ziolkiewicz, 2017). Similarly, evidence derived from American participants suggests that there is a link

between bodily symmetry and having tattoos and piercings, but only for men (Koziel et al., 2010).

Despite the widespread popularity of tattoos and some positive appraisals afforded to tattooed individuals, people with tattoos, particularly women, are frequently judged negatively in Western societies (discussed in Skoda, Oswald, Brown, Hesse, & Pedersen, 2020). For example, drawings and photographs of women with tattoos have been rated as more promiscuous, less honest, less intelligent, and more likely to have problems with substance abuse (Broussard & Harton, 2018; Swami & Furnham, 2007). Men perceive women with visible tattoos as more receptive to casual sex and are more likely to approach these individuals (Guéguen, 2013). This is despite not finding these women more physically attractive than women without tattoos (Guéguen, 2013; Swami & Furnham, 2007). Sexuality and body enhancement are key reasons as to why individuals in modern society decide to get tattoos (Wohlrab, Stahl, Rammsayer, & Kappler, 2007). Evidence indicates that women with tattoos are more sexually active and open to casual sex than their untattooed same-sex peers (Guéguen, 2012a; Skoda et al., 2020). Therefore, tattooed heterosexual women may be more likely to enact short-term sexual strategies to capitalize on men's proclivity for casual sex, perhaps to obtain genetic or material benefits (Buss & Schmitt, 2019). However, if so women with tattoos may be more likely to incite competitor derogation from same-sex rivals looking to suppress their sexuality and limit their mating opportunities (Baumeister & Twenge, 2002; Vaillancourt, 2013).

### Depilation and Hairstyling

Humans are somewhat unique among mammals in that we appear relatively hairless, which has inspired evolutionary scientists to consider what selective pressures may have driven the evolution of hominin pelage (reviewed in Rantala, 2007). Importantly, humans are not hairless. Most of our adult bodies are covered in vellus hairs that are short, thin, and relatively unpigmented. Certain parts of our bodies, such as the head, face, armpit, and pubic area, have collections of terminal hairs that are long, coarse, pigmented and under the influence of particular hormones (e.g., androgens; Randall, 2008). The evolution of human "hairlessness" has likely provided some important survival benefits, perhaps in terms of more efficient thermoregulation and a greater defense against ectoparasites, such as lice (i.e., the ectoparasite avoidance hypothesis; Rantala, 2007; Ruxton & Wilkinson, 2011; Sandel, 2013).

The retention of terminal hairs in certain parts of body (e.g., face and chest), however, does not seem to provide much of a survival advantage (Dixson, Rantala, & Brooks, 2019; Dixson & Vasey, 2012; Zahavi & Zahavi, 1997). Longer head and body hair may also produce certain costs. Longer hair can be a

hazard during physical confrontation, increase one's susceptibility to disease carrying ectoparasites, and impose on immune functioning, insofar as terminal hair growth is an androgen-dependent characteristic that is immunocompromising (Dixson & Vasey, 2012). Terminal hair growth in the face, chest, abdomen, and back are also highly sexually dimorphic, with men having significantly more hair in these areas of their bodies than women. In addition, amidst changing depilation and hairstyling practices throughout time and across cultures, people have displayed preferences for certain hairstyles in mates and altered and groomed their hair so as to appear more attractive (Butler, Smith, Collazo, Caltabiano, & Herbenick, 2015; Dixson & Brooks, 2013; Dixson et al., 2019; Herbenick, Schick, Reece, Sanders, & Fortenberry, 2010; Ramsey, Sweeney, Fraser, & Oades, 2009). This suggests that sexual selection has helped to shape depilation and hairstyling, perhaps as forms of ornamentation to increase perceived attractiveness and phenotypic quality (i.e., intersexual selection) or as cues to physical formidability, dominance, or status (i.e., intrasexual competition; Darwin, 1871; Dixson & Brooks, 2013; Dixson & Rantala, 2016; Dixson et al., 2019; Dixson & Vasey, 2012; Hinsz, Matz, & Patience, 2001; Meskó & Bereczkei, 2004).

Depilation has been practiced since ancient times, and several studies show that the removal of body hair is commonly practiced by women and men across contemporary society (Butler et al., 2015; Craig & Gray, 2019; Dixson et al., 2019; Herbenick et al., 2010; Ramsey et al., 2009). More than 90% of women living in Western cultures (e.g., New Zealand, the U.S., the United Kingdom, and Australia) indicate that they tend to remove hair from their legs and underarms, and between 65 and 85% report trimming or removing hair from their pubic area (Butler et al., 2015; DeMaria & Berenson, 2013; Herbenick et al., 2010, 2013; Osterberg et al., 2017; Terry & Braun, 2013; Tiggemann & Hodgson, 2008; Toerien & Wilkinson, 2004; Smolak & Murnen, 2011; Stone, Graham, & Baysal, 2017). Women are more likely to remove hair from their legs, armpits, and pubic area than men, particularly those who are younger. Cleanliness, appearing more feminine, enhanced attractiveness, sex appeal, self-confidence, and peer influence are cited by girls and women as the primary reasons for removing and trimming their body hair. A hairless appearance on women is considered to be more attractive by heterosexual men (Butler et al., 2015; Darwin, 1871; Terry & Braun, 2013), perhaps by cueing men's evolved preferences for youth (signaling neoteny), fertility (enhancing perceptions of femininity), or health (priming a lower susceptibility to ectoparasites; Fink & Neave, 2005; Prokop, 2016; Puts, 2010). Women engaging in pubic hair removal tend to be more sexually active and have a greater number of lifetime sex partners (Herbenick et al., 2013; Osterberg et al., 2017). Despite a general preference for a hairless pubic area, many men in Western cultures find pubic hair on women desirable (Butler et al., 2015; Terry & Braun, 2013).

The retention of pubic hair in humans may function, in part, to disperse pheromones for sexual signaling (Ramsey et al., 2009).

Men practice depilation through shaving and plucking in many preindustrial subsistence societies (Craig & Gray, 2019), and body hair removal among men appears to be growing in popularity throughout Western cultures (Martins, Tiggemann, & Churchett, 2008; Terry & Braun, 2013, 2016). Boroughs, Cafri, and Thompson (2005) found that 63.6% of American young adult men reportedly engaged in depilation, 56% of which removed hair from their chest and 46.7% from their abdomen. In a study by Martins et al. (2008), 33% of Australian adult heterosexual men removed hair from their back or buttocks at least once. Terry and Braun (2013) found that 99% of men between 18 and 35 years of age from New Zealand had engaged in some form of depilation, commonly removing hair from their face (88.6%) and chest (59%). In a 2017 survey of 389 American men, only 6% of respondents between the ages of 18 to 29 indicated that they had never shaved their chest (Kunst, 2019). Across Western cultures, between 63% and 82% of men practice some kind of pubic hair removal (Boroughs et al., 2005; Butler et al., 2015; Martins et al., 2008; Terry & Braun, 2013; Smolak & Murnen, 2011). Similar to women, the primary motives for men's depilation are to feel and appear more attractive and sexy, cleanliness, body definition, tactile enjoyment of smooth skin, and social pressure. In regard to pubic hair, some men also report engaging in depilation to make their genitals appear larger (Boroughs et al., 2005; Martins et al., 2008).

Women's ratings of the attractiveness of men's facial and body hair are highly variable between samples and across cultures (discussed in Dixson et al., 2019). In many societies (e.g., Brazil, China, and U.S.), women rate the faces and bodies of men that are hairless or have a small amount of hair as the most attractive (Dixson et al., 2010; Dixson, Dixson, Li, & Anderson, 2007a; Dixson & Rantala, 2016; Dixson & Vasey, 2012; Rantala, Pölkki, & Rantala, 2010; Valentova, Bártová, Štěrbová, & Varella, 2017a; Valentova, Varella, Bártová, Štěrbová, & Dixson, 2017b). In contrast, women in a smaller number of cultural contexts (The United Kingdom and Cameroon) seem to prefer bearded men and thicker chest hair (Dixson, Halliwell, East, Wignarajah, & Anderson, 2003; Dixson, Dixson, Morgan, & Anderson, 2007b). Older women across cultures also appear to prefer more body hair on men (Dixson et al., 2019). Women's preferences for hairless faces and bodies in men do not appear to be driven by ectoparasite exposure or actual pathogen prevalence, suggesting that ectoparasite avoidance and concerns over health may play less of a role in women's body hair preferences in men (Dixson et al., 2019; McIntosh et al., 2017; Prokop, Rantala, & Fančovičová, 2012). Women's attraction to men's facial hair may be guided by negative frequency-dependent selection, as cleanly shaven and bearded faces seem to become more attractive when they are a rare phenotype and less

attractive when they are common (Janif et al., 2014). People perceive men with more facial and body hair as older in age, more masculine, dominant, and aggressive, as well as higher in social status, which may be advantageous for men's intrasexual rivalry (Dixson & Brooks, 2013; Dixson & Vasey, 2012; Muscarella & Cunningham, 1996; Neave & Shields, 2008).

Similar to body hair removal practices, hairstyling norms have varied significantly across culture and time and have been used to communicate social rank, racial and ethnic identity, religious affiliation, political orientation, sex, and gender, along with various aspects of sexuality (e.g., puberty, fecundity, and celibacy; Sherrow, 2001, 2006). Evolutionary researchers have argued that hairstyling influences mate choice and has likely been shaped by sexual selection (Bereczkei & Meskó, 2006; Meskó & Bereczkei, 2004; Sugiyama, 2005). Scholars have proposed, for instance, that long head hair may be an honest signal of an individual's genetic quality and health and contribute to reproductive success (Etcoff, 1999; Hinsz et al., 2001; Meskó & Bereczkei, 2004; Sugiyama, 2005). Poor nutrition and being deficient in proteins, vitamins, minerals, and fatty acids can result in structural damage to hair, changes in pigmentation, and hair loss (Finner, 2013). Therefore, the length, density, lustre, and the color of head hair may honestly signal health and good genes (Etcoff, 1999; Sugiyama, 2005). Similarly, some scholars have speculated that heterosexual men may find blond hair attractive on women because it can signal youth (neoteny; discussed in Janif et al., 2015). Other researchers have speculated that longer and fuller head hair may be regarded as more attractive because it facilitates a larger distribution of sexual pheromones produced by apocrine glands (Grammer, Fink, Juette, Ronzal, & Thornhill, 2002).

In a Western context, several researchers have shown how people rate women with longer hair as more attractive, feminine, youthful, and healthier than women with shorter hair (Bereczkei & Meskó, 2006; Grammer et al., 2002; Hinsz et al., 2001; Meskó & Bereczkei, 2004; Swami, Furnham, & Joshi, 2008). Longer hair on women seems to be regarded as attractive irrespective of facial attractiveness (Bereczkei & Meskó, 2006; Meskó & Bereczkei, 2004). In one study, American women with longer hair were found to be younger, higher in reproductive value, and healthier than women with shorter hair (Hinsz et al., 2001). Moreover, bald or balding men in Western cultures appear to be perceived as less attractive, less masculine, and older in age and report that they are more dissatisfied with their appearance than men with a full head of hair (Cash, 1990; Muscarella & Cunningham, 1996; Tiggemann, Martins, & Churchett, 2008). Bald men also appear to have fewer lifetime sexual partners (Sinclair, English, & Giles, 2013). In contrast to the empirical work on the attractiveness of hair length, the extant literature covering

hair color preferences has been comparably equivocal. For example, in some studies men have been found to express a preference for blonde hair on women (Cunningham, Druen, & Barbee, 1997; Guéguen, 2012b; Janif et al., 2015), whereas other investigators have reported that men prefer women with brown hair (Swami & Barrett, 2011; Swami et al., 2008). Men's preferences for women's hair color do not appear to be the consequence of frequency-dependent selection (Janif et al., 2015). As mentioned earlier in the section on tanning, these preferences may instead be driven by differences in the desire for particular skin tones (Fink et al., 2018; Swami et al., 2008).

### Individual Differences

Each of the diverse behavioral strategies described in the previous sections indicates that often times, women and men actively attempt to enhance their physical appearance in order to appear more attractive. Despite attractiveness influencing success in various life domains (e.g., the workplace; DeP-riore et al., 2017; Hosoda, Stone-Romero, & Coats, 2003), it is evident that appearance enhancement motives relate to efforts specific to increasing access to mating opportunities. To this end, it is advantageous to consider whether particular individual differences vary systematically with appearance enhancement behavior.

### Mating Effort

The degree to which people use mate competition strategies like self-promotion varies significantly according to many individual difference factors, such as mating effort. Mating effort denotes the proportion of total energy that is devoted to attracting, competing for, and retaining desired mates (Rowe, Vazsonyi, & Figueredo, 1997; Starratt & Shackelford, 2015). Mating effort can be directed toward short-term mating, which may be reflected in an earlier onset of sexual activity, having a stronger sex drive, and expressing greater intentions to pursue sexual relationships with a variety of partners. Mating effort can also be devoted to long-term mating, perhaps by investing in one's current partner and using a greater frequency of mate retention tactics (Gangestad & Simpson, 2000). Several researchers have argued that investment in costly forms of appearance enhancement should increase alongside short-term mating effort in sex-specific ways (Bradshaw, Leyva, Nicolas, & Hill, 2019; Hennighausen et al., 2016; Kruger, 2008; Sundie et al., 2011). This is because those pursuing short-term mating strategies tend to prioritize attractiveness and are willing to incur a larger cost to attract mates and to compete with rivals. Men high in future short-term mating intentions have been found to engage in a greater degree of financial consumption (Kruger, 2008). Similarly, men's short-term mating effort has been found to predict intentions to over-spend on luxury goods, such as

nice clothes, shoes, and a new car (Sundie et al., 2011). French women and men with tattoos and/or body piercings have also been found to have an earlier onset of sexual activity relative to individuals without piercings or tattoos (Guéguen, 2012a). In a more ecologically valid setting, Austrian women describing their appearance as sexy and bold were more likely to be motivated to attend a nightclub to flirt and to have sex (Grammer et al., 2004). Furthermore, high sexual motivation has been shown to mediate the link between Australian women's beautification when dressing up for a "hot date" and an increased sense of psychological assertiveness (Blake, Brooks, Arthur, & Denson, 2020). Despite evidence indicating that short-term mating motives increase the use of more costly self-promotion tactics, it is evident that investment in appearance enhancement is also underpinned by a desire to attract and retain long-term mates. Appearance enhancement is itself an important mate retention tactic that is used in the context of long-term romantic relationships, particularly by heterosexual women (Atari, Barbaro, Sela, Shackelford, & Chegeni, 2017; Brewer & Hamilton, 2014; VanderLaan & Vasey, 2008). For example, support for a tanned appearance by a romantic partner has been shown to predict self-tanning product use (e.g., tanning creams, oils, and sprays) among young adult women and men (Mosher & Danoff-Burg, 2005). Thinking about competing for a romantic partner has also been shown to increase women's intentions to tan and take diet pills (Hill & Durante, 2011). As described earlier in the section on clothing, partnered women appear to display expensive luxury items (e.g., a designer dress) to intimidate rivals and retain desired mates (Hudders et al., 2014; Wang & Griskevicius, 2014). Atari, Barbaro et al. (2017) also found a positive correlation between consideration of cosmetic surgery and benefit-provisioning mate retention behavior (e.g., appearance enhancement) for women, but not for men. Women may, therefore, use certain kinds of self-promotion tactics to drive off intrasexual competitors and to augment physical attractiveness as a benefit-provisioning strategy to retain long-term mates.

### Intrasexual Competitiveness

Intrasexual competitiveness, which concerns how combative people are toward same-sex rivals on the mating market (Buunk & Fisher, 2009), is a relevant psychological construct that embodies heightened mating effort. Among adolescent girls and women, particularly those residing in higher socioeconomic circumstances, the drive for thinness is argued to be motivated by a proclivity toward intrasexual competitiveness (Abed, 1998; Li et al., 2010; Vaillancourt, 2013). Indeed, individual differences in intrasexual competition positively predict disordered eating among younger women (Abed et al., 2012; see Locke & Arnocky, 2020 for review), as well as the severity of symptoms among female patients with clinically diagnosed eating disorders (e.g., bulimia nervosa;

Nettersheim et al., 2018). Moreover, higher levels of intrasexual competitiveness have been reported among male users of anabolic–androgenic steroids relative to non-users in the UK, particularly for those with less bodybuilding training experience (0–2 years; Harris, Dunn, & Alwyn, 2017).

Intrasexual competitiveness has also positively predicted favorable attitudes toward, and a desire to spend money on, cosmetic surgery among Canadian undergraduates (Arnocky & Piché, 2014). Arnocky and Piché (2014) found that this positive relation was mediated by a social comparison orientation, which may be an evolved proclivity to compare oneself to others in order to determine one's relative standing in the local mating market. Appearance-based comparisons may be more important for women given men's preference for physically attractive mates and women's tendency to compete over appearance-related characteristics. Across two studies, Arnocky et al. (2016) showed that social comparison positively predicted several appearance enhancement acts (e.g., desire to lose weight, tanning intentions, facial cosmetic use, and intentions to take a risky diet pill) among Canadian women, which was mediated by dispositional envy (the tendency to desire qualities and things belonging to others). Mafra et al. (2020) also found that intrasexual competitiveness positively predicted the frequency of cosmetic use and the monthly amount spent on cosmetics among Brazilian women.

### Sociosexual Orientation

Several scholars have also examined individual differences in sociosexual orientation, conceptualized as differences in short-term and long-term mating strategies that embody differences in short- and long-term mating effort (Bleske-Rechek & Buss, 2006; Gangestad & Simpson, 2000). Those expressing unrestricted sociosexuality allocate more effort toward uncommitted, short-term sexual relationships, whereas the opposite pattern denotes those with a restricted orientation (Penke & Asendorpf, 2008; Simpson & Gangestad, 1991). In previous work, women with unrestricted sociosexuality have been shown to display a stronger preference for physically attractive and sexy men (Mugleton & Fincher, 2017). These women also appear to be more attractive themselves (Perilloux et al., 2013). Women with unrestricted sociosexuality report engaging in appearance enhancement behavior at a higher frequency relative to their more restricted peers (Bleske-Rechek & Buss, 2006). Among both women and men, an unrestricted sociosexual orientation and sexual openness have been positively associated with having tattoos and piercings (Skoda et al., 2020; Swami, 2012; Wohlrab, Stahl, & Kappeler, 2007). Moreover, previous investigators have shown that women with unrestricted sociosexuality are more likely to engage in costly (e.g., cosmetic surgery) appearance enhancement (Batres, Porcheron, et al., 2018; Bradshaw

et al., 2019). Women wearing cosmetics trigger more jealousy in same-sex others and are evaluated as investing more effort in short-term mating and being more sexually available (Mileva et al., 2016), despite sociosexuality not correlating with self-reported cosmetic product use (Batres, Porcheron, et al., 2018; Mafra et al., 2020). Sociosexuality also does not appear to share a relation with the frequency of wearing high heels among women (Prokop & Švancárová, 2020). It is possible then, that unrestricted sociosexuality is primarily associated with the performance of more costly forms of appearance enhancement (e.g., tattoos).

### Self-Perceived Mate Value

Systematic variation in self-perceptions of mate value have been shown to influence appearance enhancement dynamics. Women who are less satisfied with their bodies report using clothing to hide or conceal aspects of their appearance, whereas those who have higher body satisfaction report using clothing to accentuate their physique (Harden, Butler, & Scheetz, 1998). Canadian young adult women higher in self-perceived mate value express a stronger intention to tan their skin and to purchase beautification products (Arnocky et al., 2016). Additionally, in previous experimental work, women lower in self-perceived mate value have been shown to strategically penalize attractive same-sex others for wearing cosmetics; insinuating that these women are dishonest, lazy, and only use cosmetics to get ahead in the workplace (DelPriore, Bradshaw, & Hill, 2018). Self-perceived mate value has also been shown to positively predict the frequency of makeup use among Brazilian women (Mafra et al., 2020). Furthermore, Slovakian young adult women's self-perceived attractiveness is positively correlated with wearing high heels (Prokop & Švancárová, 2020). Among women in an Amazon Mechanical Turk sample, higher self-perceived mate value was positively linked to body satisfaction and enjoyment in being sexualized, but negatively related to acceptance of cosmetic surgery in others (Arthur et al., 2020). Women lower in self-rated attractiveness may enforce more punitive social norms in regard to cosmetic surgery to limit the competitive ability of same-sex rivals. Despite discrepancies in self- and other-perceived attractiveness, particularly among men (Pereira et al., 2019), a person's perception of their own mate value significantly influences their appearance enhancement behavior.

### Menstrual Cycle Phase Effects

Beyond the challenge of identifying a partner high in phenotypic quality, male ancestors also faced the adaptive challenge of detecting partners who were fertile (Gildersleeve, Haselton, & Fales, 2014). In many other primate species (e.g., chimpanzees), females advertise their fertility status with

genital swelling and olfactory changes. In contrast, human females have menstrual cycles that typically span 21–35 days with three general phases: menstrual, follicular, and luteal (Creinin, Keverline, & Meyn, 2004). During the mid- to late-follicular phase, the periovulatory phase occurs (approximately between days 8–15 in a 28-day cycle), wherein high levels of follicle stimulating hormone and estradiol stimulate ovulation approximately 28–48 h after a surge in luteinizing hormone (Belanger, Temblay, Davis, & Arnocky, 2019). Ovulation connotes a period of peak fertility and a point at which the likelihood of conception is at its highest.

It has been argued through the ovulatory shift hypothesis (Gangestad, Garver-Apgar, & Simpson, 2007) that women experience nuanced shifts in their mating psychology cyclically over the phases of the menstrual cycle as a function of fertility. Specifically, as the likelihood of conception increases toward ovulation women are predicted to be more attracted to men possessing traits associated with good genes (e.g., traits signaling a low mutation load, the presence of beneficial genes, and/or the absence of genes producing harmful effects; Gildersleeve et al., 2014). Women are therefore predicted to shift their mating psychology, such as their appearance enhancement tactics, to emphasize characteristics most likely to attract men and to signal sexual interest when they are most likely to conceive.

In addition to the many physiological changes that accompany ovulation (e.g., increased vocal pitch), women have been shown to adorn more revealing and provocative clothing during the periovulatory phase (Durante, Li, & Haselton, 2008; Haselton, Mortezaie, Pillsworth, Bleske-Rechek, & Frederick, 2007; Röder, Brewer, & Fink, 2009; Schwarz & Hassebrauck, 2008). These women engage in more flirtatious behavior (Cantú et al., 2014) and display a stronger interest in pursuing sexual opportunities (Röder et al., 2009) in comparison with women in a low fertile phase of the menstrual cycle (e.g., luteal). During the periovulatory phase, women have also been found to spend more time putting makeup on and are more likely to go sun tanning (Guéguen, 2012c; Saad & Stenstrom, 2012). Women who are currently taking hormonal contraceptives, and hence cannot ovulate, have also been shown to spend less time applying cosmetics in comparison with those who are not on hormonal birth control (Batres, Russell, et al., 2018). Women also appear to be less accepting of cosmetic surgery at peak fertility during the late-follicular phase in comparison with the luteal phase (low fertility), perhaps as an intrasexual competition tactic to limit other women's use of dishonest appearance tactics (Nicolas & Welling, 2017). Despite some compelling evidence that women's appearance enhancement motives and behavior are influenced by menstrual cycle phase, the ovulatory shifts literature has been hampered by methodological shortcomings (e.g., a reliance on counting methods for cycle phase position; Jones, Hahn, & DeBruine, 2019).

Furthermore, some researchers have failed to support a link between menstrual cycle phase and women's mating preferences that may encourage particular kinds of appearance enhancement. For example, Dixson and Rantala (2016) did not find any evidence that women's preferences for beards and body hair on men were influenced by menstrual cyclicity, suggesting that men's depilation practices are unlikely to be shaped by women's fertility across the menstrual cycle.

## Sexual Orientation

The majority of research guided by sexual selection theory has been conducted in a heterosexual context. Nonetheless, many researchers have shown the importance of varying sexual orientations in influencing mate competition dynamics (Bailey, Gaulin, Agyei, & Gladue, 1994; Brewer & Hamilton, 2014; Glassenberg, Feinberg, Jones, Little, & DeBruine, 2010; Valentova, Stulp, Třebický, & Havlíček, 2014; VanderLaan & Vasey, 2008).

In previous work, gay men across cultures have been found to express mating preferences that are similar to heterosexual men, putting a premium on youth and physical attractiveness in a mate (Bailey et al., 1994; Kenrick, Keefe, Bryan, Barr, & Brown, 1995; Lippa, 2007). Lesbian women, like heterosexual women, also appear to place more importance on character traits (e.g., honesty and emotional stability) relative to youth and physical appearance. Sex differences, therefore, seem to account for more variability in mate preferences than sexual orientation (Lippa, 2007).

Even so, for some characteristics gay men and lesbian women appear to express preferences that are more sex atypical. For example, gay men have been found to prefer vocal masculinity to a similar extent as heterosexual women (Valentova, Roberts, & Havlíček, 2013). In regard to mate competition tactics, exposure to a competitive rival high in status led both American heterosexual women and gay men, but not straight men or lesbian women, to report poorer body image and more restrictive eating attitudes (Li et al., 2010). Similar results have been found in research on mate retention behavior. Lesbian women, like straight men, appear to display resources to retain their mates more often than heterosexual women (VanderLaan & Vasey, 2008). Similarly, lesbian women, like straight men, less often tempt their mates sexually and enhance their appearance. Moreover, Brewer and Hamilton (2014) found that British lesbian women performed more resource display, as well as more verbal, physical, and ornamental signs of possession (i.e., signaling to others through various means that a person is in a committed relationship) in comparison with bisexual and heterosexual women. Importantly, however, evidence indicates that for some characteristics and mate competition tactics, that particular sexual orientations are aligned with a unique mating psychology. For example, homosexual men prefer more

facial and body hair on men in comparison with heterosexual women (Valentova et al., 2017b). And heterosexual women appear to engage in significantly more sexual inducements and appearance enhancement for the purpose of mate retention, relative to lesbian women, gay men, and straight men (VanderLaan & Vasey, 2008).

Research on the influence of sexual orientation on appearance enhancement tactics provides some mixed results as well in regard to the sex typicality, sex atypicality, or uniqueness of the behavior under consideration. Using data from the 2013 National Health Interview of 34,557 American people, researchers found that, overall, bisexual (7.1%) and homosexual men (5%) were significantly more likely to have tanned indoors than heterosexual men (1.7%; Yeung & Chen, 2016). Heterosexual women between the ages of 18–34 were found to have the highest frequency of tanning (13%), followed by bisexual men (12%), and homosexual men (7.6%). Across five studies, gay American men (51%) were found to express more interest in cosmetic surgery than heterosexual men (23%; Frederick & Essayli, 2016). Gay men also appear to be significantly more likely to engage in body hair depilation in comparison with heterosexual men (Martins et al., 2008).

### Relationship Status

The kind of relationship under consideration (e.g., short-term vs. long-term) influences mating psychology, especially in regard to the sex-differentiated aspects of intrasexual competition (Fisher, Tran, & Voracek, 2008). For instance, Fisher et al. (2009) showed that those who are currently single or dating engaged in more self-promotion and competitor derogation relative to those who were married or in common law relationships.

Being primed with a description of a short-term relationship (dating) increased the intentions of men who were high in sociosexuality to engage in conspicuous consumption (to purchase a Porsche Boxster), whereas a long-term relationship prime (marriage) decreased the likelihood of intentions to spend frivolously (Sundie et al., 2011). Showy displays of status may be particularly effective in short-term contexts for men to attract potential mates. Among single women, exposure to an attractive same-sex (intrasexual competition cue) and opposite-sex individual (courtship cue) increased intentions to tan and take diet pills, whereas only the intrasexual competition cue influenced women in romantic relationships to consider tanning and taking diet pills (Hill & Durante, 2011). Women and men who have been recently broken up with may engage in more appearance enhancement behavior (e.g., shopping) in order to cope and to attract new mates (Perilloux & Buss, 2008). Although, other researchers

have failed to support a link between relationship status and women's preference for more revealing and form fitting clothing (Grammer et al., 2004). Relationship status also does not appear to influence women's propensity to wear high heeled shoes (Prokop & Švancárová, 2020). Relationship status may, therefore, only vary with certain kinds of self-promotion tactics, such as more costly appearance enhancement behavior (e.g., taking a risky diet pill).

## Social-Ecological Context

### Culture

Cultural circumstance is expected to interact with evolved mating preferences as well as the appearance enhancement strategies used by women and men (Buss et al., 1999; Dixon et al., 2019; Frederick et al., 2007a). Because evolution has shaped the development of human psychology, complex cultural ideas, beliefs, norms, and rituals can be seen as collections of human artifacts (Salmon, 2018). Despite not necessarily agreeing on the role of culture in influencing evolution (see Brown & Richerson, 2014 for discussion), scholars in evolutionary psychology, and those in many interrelated fields of study, are in agreement that attempts to decouple culture from biology and evolution are problematic and will lead to erroneous conclusions about human psychology (Buss, 2001; Gangestad et al., 2006; Gintis, 2011; Saad, 2013; Walsh & Yun, 2016). Studying aspects of both evoked and transmitted culture can help researchers elucidate the proximate and ultimate mechanisms underpinning appearance enhancement effort and behavior (Laland et al., 2011).

For instance, both sociocultural and evolutionary researchers are interested in examining why many girls/women in more developed society wear “sexy” clothing, such as provocative lingerie. It is evident that the availability, style, and attitudes associated with lingerie have varied across culture and time (Moule & Fisher, 2014; Tsaousi & Brewis, 2013). Proximate factors, such as identity construction, the reification of dominant traditional female gendered roles in society, and sexual objectification (i.e., treating a person as a sexual object), influence perceptions of women in sexualized clothing (e.g., lingerie) and their clothing purchases (Gurung & Chrouser, 2007; Holland & Haslam, 2013; Tsaousi & Brewis, 2013). Scholars have noted how girls and women in Western society are constantly exposed to sexualized media and are under an increasing amount of pressure to adorn more sexualized garb in line with rigid cultural standards of femininity (Blake, Bastian, & Denson, 2016; Goodin, Van Denburg, Murnen, & Smolak, 2011; Slater & Tiggemann, 2016; Schaefer et al., 2018). The rise of pornography on the internet is regarded as an especially potent form of sexualized media that has shaped Western beauty practices by, for instance,

encouraging young women to wear thong underwear and stiletto heels (Paul, 2005).

Adorning sexualized garb can create perceptions of women as promiscuous and lacking moral agency, leading to sexual objectification and being at a greater risk for sexual aggression (Blake et al., 2016). Similarly, women wearing makeup are judged as lower in mental capacity and moral status, which is mediated by the perception that they are more promiscuous (Kellie et al., 2020). Using cultivation theory (discussed in Potter, 1993), researchers argue that through the repeated exposure to sexualized media, girls and women internalize the idea that they are sexual objects (i.e., self-objectification; Fredrickson & Roberts, 1997). Exposure to sexually objectifying media has been linked in experimental and cross-sectional work with self-objectification, body image concerns, and appearance-related anxiety among women (see Grabe, Ward, & Hyde, 2008 for meta-analysis; Loughnan, Baldissarri, Spaccatini, & Elder, 2017). Despite the negative psychosocial outcomes associated with sexual objectification, research on the links between cultural sexualization and appearance enhancement has been somewhat mixed. For example, some researchers have failed to support an association between the consumption of sexually explicit media (e.g., pornography) and the appearance enhancement behavior of women and men, such as genital depilation practices (Prokop, 2016; Terry & Braun, 2013). Similarly, women's propensity to take sexualized self-portraits appears to be unrelated to indices of gender equality and the sexualization of women across cultures (Blake, Bastian, Denson, Grosjean, & Brooks, 2018a).

To complement this research on proximate sociocultural factors, evolutionary investigators highlight how we have evolved to find particular characteristics sexually attractive because, like other mammals, we are a sexually reproducing species (Buss, 1988; Diamond, 1998; Stankus, 2012; Symons, 1979, 1995). Sexualized garb is effective and elicits sexual desire, in part, because it signals interest in sex and emphasizes many features women and men have evolved to find desirable for various reasons (Gallup & Frederick, 2010), perhaps because they connote good genes, health, and reproductive potential (Gangestad & Thornhill, 1997), or because they play off of existing sensory biases (i.e., sensory exploitation; Arnqvist, 2006), or alternatively because they amplify an existing adaptation (i.e., a supernormal stimulus; Gray et al., 2003). Evolutionary scholars might suggest that the ultimate reason for purchasing and adorning lingerie is to self-promote and signal sexual interest by drawing attention to certain erogenous areas of the body, as well as to increase women's feelings of sexiness and self-confidence to motivate sexually proceptive and receptive behavior (Moule & Fisher, 2014). The likelihood of women purchasing and wearing lingerie appears to increase during periods of development when fertility is at its highest and when women express higher levels of intrasexual competitiveness (e.g., young adulthood;

Fernandez, Muñoz-Reyes, & Dufey, 2014). The primary consumers of colorful and fashionable lingerie appear to be middle to upper class women under the age of 45 (Mintel, 2004). In a sample of Australian women, younger women aged 18–39 were primarily motivated to purchase lingerie for hedonic reasons (i.e., for pleasure), whereas older women above the age of 40 were more likely to purchase lingerie for pragmatic reasons (Tsarenko & Lo, 2017). In a study of Indian women, female students between the ages of 20–25 spent more money on and time shopping for lingerie in comparison to older women (Singh, 2018). Nonetheless, it is difficult to make sense of age differences in lingerie purchasing behavior because researchers tend not to differentiate between sexualized lingerie from more commonplace underwear purchases.

### Resource Scarcity: Sex Ratio Imbalances, Income Inequality, and Food Availability

Evolutionary scholars have noted that across many species, conditions of resource scarcity tend to amplify competition for those limited resources (Emlen & Oring, 1977; Shuster & Wade, 2003), which encompasses both mate and resource competition (e.g., breeding sites, territory, and shelter; Wacker et al., 2013). In regard to mate competition, the relative number of sexually available to unavailable mates is termed operational sex ratio (OSR; Kokko & Jennions, 2008). Sex ratio imbalances create conditions of mate scarcity and competitor abundance, which are predicted to encourage intrasexual rivalry for the scarcer sex. Across most mammals, intrasexual competition among males is influenced more strongly by variability in potential mates (Kvarnemo & Forsgren, 2000; Trivers, 1972). For example, a male-biased OSR has been shown to promote mating effort in male gray mouse lemurs (*Microcebus murinus*; Eberle & Kappeler, 2004). An abundance of males permits females to become more selective in their mate selection in regard to desired male characteristics. For instance, a male-biased OSR enhances female preference for orange spots (a valued male trait) on male guppies (Jirotkul, 1999).

Among humans, researchers have shown how male-biased populations tend to be linked to aggressive and violent intrasexual rivalry (Barber, 2003). Bioarchaeological evidence suggests that violence and intergroup warfare across time have been driven by resource scarcity as opposed to sociopolitical complexity (Allen, Bettinger, Coddling, Jones, & Schwitalla, 2016). Arnocky, Ribout, Mirza, and Knack (2014) showed how priming participants with mate scarcity increased intrasexual competitiveness, jealousy, and aggressive mate retention behavior among both heterosexual women and men compared to the mate abundance condition. Nonetheless, the links between mate scarcity/abundance and human mate competition have been mixed. Reviewing the literature, Stone (2017) argued that mate scarcity does not

consistently increase mating effort in either women or men. Instead, men's mating effort appears to increase when there is a surplus of mates (i.e., the faithful as your options hypothesis), whereas evidence is mixed for women. For example, Arnocky et al. (2016) found that priming heterosexual men with mate abundance increased their sociosexual attitudes and their intentions to commit infidelity, suggesting that men shift their mating strategies to be more promiscuous amidst female-biased OSRs (female abundance). In contrast, women appear to strategically shift their preferences to invest in committed long-term monogamous relationships when men are abundant (Moss & Maner, 2016).

Several studies have examined the links between sex ratio and self-promotion tactics (Maner & Ackerman, 2020). Griskevicius et al. (2012) found that a male-biased OSR (male abundance) influenced American heterosexual men to desire more immediate rewards and led people to expect men to spend more money on expensive engagement rings (a costly signal of a man's investment potential). Similarly, Locke, Desrochers, and Arnocky (2020) found that mate abundance (a male-biased OSR) increased women's desire for larger and more expensive engagement rings. Women's competitive physical appearance enhancement also appears to increase when competitors are abundant and mates are scarce (i.e., a female-biased OSR), such as exercising to "look good" (Pedersen, 1991). Dixson et al. (2019) found that in cultures with male-biased OSRs, women reported a stronger preference for bearded men. In contexts characterized by intense male–male rivalry, women may express stronger preferences for traits like facial and body hair that increase judgments of age, masculinity, social dominance (Dixson & Brooks, 2013; Dixson et al., 2019; Dixson & Vasey, 2012). In contrast, Arthur et al. (2020) found that the relative availability of mates did not influence women's acceptance of cosmetic surgery. And Blake et al. (2018a) did not find any evidence in favor of operational sex ratio influencing women's tendencies to take "sexy selfies" (an appearance enhancement tactic). Instead, an important indicator of resource scarcity, income inequality, was shown to impact this self-promotion behavior for women.

Across 113 nations, Blake et al. (2018a) found that women's online posting of sexualized self-portraits (i.e., "sexy-selfies"), as well as their beauty salon and clothing store expenditures increased alongside income inequality. In a virtual simulation, Blake and Brooks (2019) also showed that income inequality increased women's intentions to wear more sexualized garb for a hypothetical night out. This relation was mediated by a preoccupation with seeking status ("status anxiety"). Interestingly, Blake and Brooks also found that greater income inequality among poorer individuals was positively linked to women's intrasexual rivalry in the form of competitor derogation, but not to anxiety over status seeking. These results accord with previous evidence linking income

inequality with men's risky, aggressive, and violent competition over status (Daly, 2017; Daly & Wilson, 2001), as well as more intense intrasexual rivalry among women living in lower socioeconomic conditions characterized by higher-income inequality and less access to resources, reproductive opportunities, and parenting ability (Campbell, 1999).

Economic stability and variability in access to food also appear to be important when considering mate preferences, which could impact appearance enhancement motives and behavior. For example, despite men generally preferring women with a lower BMI (Swami & Tovée, 2005), a preference for a thinner body is more predominant in higher-income industrialized economies (Gray & Frederick, 2012; Swami et al., 2010). In contrast, Tsimané men (indigenous tribe in Bolivia) have been found to prefer women with a relatively higher BMIs (26.1, which corresponds to slightly overweight; Sorokowski, Kościński, Sorokowska, & Huanca, 2014) and attribute more health to these women. Therefore, in countries where food availability is scarce and unpredictable, men seem to shift their mate preference standards toward heavier women. Similarly, men living in subsistence cultures (e.g., Papua New Guinea) appear to prefer larger breasts than men from more industrialized economies with greater resource stability and access to food (e.g., New Zealand; Dixson et al., 2011). Havlíček et al. (2017) also found that young adult men from Cameroon preferred large breasts compared to men from Brazil and the Czech Republic who expressed a preference for medium-sized breasts (although Namibian men also preferred medium-sized breasts). Valentova et al. (2017a) also found that Brazilian heterosexual men preferred larger breasts than men from the Czech Republic. Therefore, there may be a preference for morphological features that indicate greater caloric reserves (e.g., larger breasts) among men living in economies where resources are scarce. This may, in turn, influence women's appearance enhancement to emphasize breast size. Cross-cultural and ethnic comparisons for mammoplasty and mastopexy procedures are, however, confounded by the financial cost associated with the procedure and the availability of credible surgeons within particular cultures.

### Pathogen Threat

The degree of importance placed on physical attractiveness and health is predicted to vary by geographic location based on pathogen prevalence, insofar as physical appearance is an honest signal of underlying health (Gangestad et al., 2006; Tybur & Gangestad, 2011). In these ecologies, relatively more attractive and healthy people appear to have an especially strong bargaining hand on the mating market (Fales et al., 2016). Pathogen prevalence has been shown to correlate positively with preferences for healthy and physically attractive mates (Gangestad et al., 2006). Furthermore, regional variability in pathogen prevalence has been associated with women's preference for facial

masculinity (DeBruine, Jones, Tybur, Lieberman, & Griskevicius, 2010). Experimental evidence also supports women's heightened preference for masculine men when primed with pathogen concerns (Lee & Zietsch, 2011; Little, DeBruine, & Jones, 2011). Pathogen disgust may be an adaptive emotional response that elicits attitudes and behavior that aid in avoiding disease-causing agents (i.e., the ectoparasite avoidance hypothesis; Tybur, Lieberman, & Griskevicius, 2009; Tybur & Gangestad, 2011). Jones et al. (2013) found positive correlations between women's self-reported pathogen disgust and a preference for more masculine traits (faces, voices, and bodies). However, some researchers have failed to support the links between self-reported and experimentally induced pathogen disgust with women's preferences for masculine characteristics in men (Lee & Zietsch, 2015; McIntosh et al., 2017; Zietsch, Lee, Sherlock, & Jern, 2015). Actual pathogen prevalence across cultures also does not appear to correlate with women's preferences for body hair in men (Dixson et al., 2019). Moreover, contrary to the ectoparasite avoidance hypothesis, McIntosh et al. (2017) found that women's preference for beardedness was positively linked to pathogen disgust. These researchers reasoned that perhaps bearded men are of higher phenotypic quality and able to absorb the costs associated with having a beard (e.g., the proliferation of ectoparasites). Although, Prokop (2016) found that men expressing higher disgust sensitivity reported a preference for a shaved pubic area on women. Therefore, it is possible that in geographic areas with a higher prevalence of disease that individuals may compete more fiercely over aspects of their physical appearance to emphasize traits signaling greater health. This may counterintuitively occur through the promotion of potentially costly traits (e.g., beards) that signal phenotypic quality.

Nonetheless, as stated previously, there is an ongoing debate regarding the putative links between markers of health, physical appearance, and genetic quality (Achorn & Rosenthal, 2020; Foo, Nakagawa, et al., 2017; Foo, Simmons, & Rhodes, 2017). Furthermore, genetic quality is not always expected to correlate with greater health (Tybur & Gangestad, 2011). Higher quality organisms may strategically invest in intrasexual competition at a cost to their health, leading physical attractiveness to reflect competitive ability as opposed to health. For example, men in the best condition may be afforded the ability to invest in mating effort, including potentially costly attractive displays (e.g., masculine characteristic in men) and risk-taking (Baker & Maner, 2008; Puts, 2010; Tybur & Gangestad, 2011).

## Discussion

Physical appearance and beauty have been prioritized across culture and time (Buss, 1989; Chaudhri & Jain, 2009; Dettwyler, 2011; Gallup & Frederick, 2010; Seeger, 1975).

Many scholars have highlighted important sociocultural factors shown to influence appearance enhancement practices, such as exposure to unrealistic physical ideals in the media (Barlett et al., 2008), peers and family (Webb et al., 2017), social norms (Randazzo & Solmon, 2018), patriarchal cultures (Leve et al., 2012), sexual objectification (Strelan & Hargreaves, 2005), and gender role conformity (Lennon & Rudd, 1994). Although empirical work continues to grow in certain areas (e.g., men's conspicuous consumer habits; Durante & Griskevicius, 2016), fewer scholars have generally studied various forms of appearance enhancement from an evolutionary perspective. Evolutionary researchers emphasize the ultimate function (i.e., distal evolutionary cause) of physical appearance enhancement as a self-promotion strategy for outcompeting rivals to attract and retain desired mates (Buss, 1989; Buss & Dedden, 1990; Buunk et al., 2002; Fisher et al., 2009; Saad, 2013; Sugiyama, 2016; Symons, 1995; Tooke & Camire, 1991). Accordingly, evolutionary scholars predict women and men to align their physical appearances with the preferences of the opposite sex in a heterosexual context (Arnocky et al., 2014).

An evolutionary perspective yields unique insight into the various ways in which traits can become attractive across sexually reproducing species, which is relevant to appearance enhancement behavior. Cross-cultural evidence suggests that people consistently rate particular physical features as attractive (Langlois et al., 2000), perhaps because such features serve as cues to the underlying genetic quality and reproductive potential of the bearer (for review see Arnocky et al., 2014). These characteristics may also become attractive as a consequence of amplifying responses to existing adaptations (supernormal stimuli; Gray et al., 2003), playing off of existing sensory biases (sensory exploitation; Arnqvist, 2006), or covarying genetically with other attractive traits (Fisherian selection; Prum, 2017). There is an ongoing debate regarding the putative links between attractive physical features, health, and genetic quality (Achorn & Rosenthal, 2020; Foo, Nakagawa, et al., 2017; Foo et al., 2017). Nonetheless, evolutionary scholars agree that sexual selection has played a key role in shaping what people find attractive and the tactics that they use to self-promote.

To complement existing sociocultural frameworks, we argued that an evolutionary perspective provides unique insight into: (1) making sense of why people across time and culture have been motivated to enhance aspects of their physical appearance, at times in very costly ways, (2) consistent sex and (3) individual differences (e.g., intrasexual competitiveness, sociosexuality, and menstrual cycle phase position) that underpin appearance enhancement practices, and (4) the contexts predicted to influence appearance modification practices (e.g., culture, resource scarcity, and pathogen stress). The dominant paradigm in evolutionary psychology embodies an interactionist framework, wherein

biology, culture, and evolution interrelate to produce adaptive behavioral responses in regard to appearance enhancement (Buss et al., 1999; Davis, 2020; Gangestad et al., 2006). Empirical work from a sociocultural perspective, therefore, provides important insight into the proximate factors that are potentially linked to ultimate evolutionary mechanisms (Laland et al., 2011; Saad, 2013). Researchers using both viewpoints, at times, have failed to appreciate the complementarity between these approaches and the benefits afforded to investigators assuming both levels of analysis (Brown & Richerson, 2014; Henrich, 2011; Mesoudi, 2016; Walsh & Yun, 2016). In this space, researchers can recognize the value of the significant cross-cultural variability in attractiveness and appearance enhancement norms, while noting how women and men have competed to enhance their appearances to attract and retain mates across time.

The current article highlights the utility of an evolutionary point of view in regard to physical attractiveness and appearance enhancement practices (Arnocky et al., 2014; Gangestad & Scheyd, 2005; Saad & Peng, 2006; Sugiyama, 2016). Although limited, evidence continues to mount that sexual selection has acted upon aspects of human physical appearance and the strategies that humans use to accentuate components of our appearance to attract potential mates. The totality of evidence to date indicates that self-promotion is a key mate competition strategy used to augment one's mate value, and that appearance enhancement is the central self-promotion tactic used by women to compete with same-sex rivals for mating opportunities and resources linked to reproductive success (e.g., status; Arnocky, 2016; Arnocky & Vaillancourt, 2017; Buss & Dedden, 1990). Moreover, women and men vary predictably in the kinds of appearance enhancement behavior that they engage in, which conform largely to the mate preferences held by opposite-sex members.

Generally, women seek to competitively emphasize aspects of their youth, health, and fertility by using beautification products (e.g., rejuvenation creams, makeup, and teeth whitening strips) and services (e.g., pedicures, tanning, and cosmetic surgery; Arnocky & Piché, 2014; Frederick et al., 2007b), whereas men seek to display their access to status and wealth (e.g., purchasing expensive designer clothing, Rolex watches, and luxury cars; Durante & Griskevicius, 2018) in addition to their physical prowess (e.g., exercising to increase muscularity). Several individual differences (e.g., mating effort, intrasexual competitiveness, and sociosexuality) have also been shown to vary systematically in regard to the importance placed on physical attractiveness and acts intended to enhance one's appearance. Predictably, individuals higher in a desire to compete with same-sex others for mating opportunities invest more effort toward accentuating their physical appearance. Adaptations are, however, flexible and context-dependent, and self-promotion tactics have been shown to vary according to relationship status,

cultural milieu, level of pathogen threat in a geographic area, and resource availability in the local environment.

## Future Directions and Concluding Remarks

Relatively few researchers have directly studied the cross-sectional associations between evolutionarily relevant individual difference variables, such as short- and long-term mating effort, intrasexual competitiveness, sociosexual orientation, and self-perceived mate value, in determining how heterosexual women and men use a wide variety of appearance enhancement tactics (e.g., lingerie purchases, genital grooming practices, and sexualized self-portraits). For example, a shortage of scholarly work has been devoted to examining how men's self-perceived mate value may influence their likelihood of getting tattoos, exercising, and receiving cosmetic surgery, among other kinds of appearance enhancement behavior. It is also critical for researchers to study mating effort more broadly, and not simply resources allocated toward short-term mates. Some investigators have shown that people consider augmenting their appearance for long-term romantic partners (Atari, Barbaro, et al., 2017; Hill & Durante, 2011; Mosher & Danoff-Burg, 2005). More work is needed to understand how individuals may self-promote to strategically attract and retain long-term mates. Studies that include both short- and long-term mating primes, such as the experiment conducted by Hill and Durante (2011), will allow investigators to tease apart the influence of different kinds of mating effort on appearance enhancement practices. Even fewer scholars have examined the influence of salient demographic and ecological factors (e.g., operational sex ratio, level of pathogen stress, and resource scarcity) on appearance enhancement practices. For instance, does greater income inequality reliably influence women's propensity to sexualize their appearance (Blake et al., 2018a), perhaps by wearing high heels or more revealing clothing?

The importance of culture in studying evolved psychological tendencies cannot be understated. To this end, scholars should seek to study the interactions between important socio-cultural factors with attractiveness and putative adaptations for appearance enhancement. For example, researchers could examine if women's self-objectification interacts with mating effort in context-dependent ways to influence decisions to wear and purchase sexualized clothing (e.g., lingerie; Moule & Fisher, 2014; Tsaousi & Brewis, 2013). To this end, limited work has been devoted to studying the motives underlying women's luxury spending from an evolutionary perspective (Hudders et al., 2014; Miller, 2009; Sundie et al., 2011; Wang & Griskevicius, 2014). Given that women devote significant time, money, and energy to purchasing luxury items, it seems prudent for evolutionary scholars to further study women's conspicuous consumption. Alternatively, perhaps exposure to particular kinds of media reinforcing certain

feminine ideals interacts with intrasexual competitiveness to encourage tanning behavior (Gambla et al., 2017; Saad & Peng, 2006). It would also be productive to assess whether cultural variability in a thin feminine ideal is reliably associated with weight-based appearance enhancement (e.g., dieting, exercise, and cosmetic surgery), and how mating effort may moderate this relation (Frederick et al., 2007a; Frederick, Forbes, & Anna, 2008). Research on women's competitive appearance enhancement in high power distance patriarchal cultures would also be beneficial. For instance, women in Iran are required to adhere to strict and conservative dress codes wherein the face is the only part of the body that is exposed (Mortazavi & Poelker, 2017). Rhinoplasty is the most common cosmetic surgical procedure performed in Iran, and it has become a cultural trend that signals status and wealth for women and men, as well as suitability for marriage in girls and women (Motamedi, Ebrahimi, Shams, & Nejad Sarvari, 2016; Zojaji, Keshavarzmanesh, Arshadi, Baf, & Esmailzadeh, 2014). It would be interesting to assess how this cultural trend emerges amidst evolved predispositions to compete over appearance to signal status, resource holding, and long-term partner desirability (Buss & Dedden, 1990; Durante & Griskevicius, 2018; Gangestad & Scheyd, 2005; Schmitt & Buss, 1996). These examples underscore the benefit of assuming both sociocultural and evolutionary perspectives in attempting to elucidate human appearance enhancement behavior.

Although young adulthood is often described as a time of enhanced mating effort and intrasexual competition (Conroy-Beam & Buss, 2019), the reliance on samples derived solely from a population of undergraduate students restricts the range of mating and attraction behavior under examination. For instance, little is known about how relatively older adult women may modify their appearance to attract new partners, retain current long-term partners, or to pursue extra-pair mating opportunities. Sociocultural researchers have highlighted cultural discourses surrounding aging and sexual identities among older sexually active women who tend to pursue younger men (i.e., “cougars”; Ames & Burcon, 2016; Montemurro & Siefken, 2014). Evolutionary scholars have drawn attention to how older women may strategically use certain kinds of appearance enhancement to appear younger (e.g., makeup; Russell et al., 2019). Researchers could study the appearance enhancement tactics used by these older adult women and the individual differences that may underpin the behavior (e.g., intrasexual competitiveness).

Similarly, researchers need to investigate physical attractiveness and specific kinds of appearance enhancement effort in cultures outside of North America. The majority of empirical work on appearance enhancement behavior has involved “WEIRD” participants (Henrich, Heine, & Norenzayan, 2010). A significant amount of research has been devoted toward studying cross-cultural variability in mating preferences (e.g., Dixson et al., 2007a, 2019; Frederick et al.,

2007a, 2008; Swami & Tovée, 2005), but there is comparably less work that deals specifically with appearance enhancement practices. This research is needed to understand the ways in which evolved mating propensities correspond to appearance enhancement and how sociocultural factors help to shape both mate preferences and self-promotion tactics. To this end, perhaps investigators could examine the differential amount of importance placed on physical appearance and competition for physically attractive mates across cultures (Fales et al., 2016; Gallup & Frederick, 2010; Gangestad & Scheyd, 2005). It would be expected that under conditions where physical appearance is a particularly important mate value characteristic, individuals will more vigorously act to augment their physical appearance to align with the mate preferences of the opposite sex.

Although the guiding paradigm in evolutionary psychology involves an explicit consideration of culture (Buss et al., 1999; Gangestad et al., 2006), evolutionary scholars have not always taken advantage of the insights provided by sociocultural investigators (Brown & Richerson, 2014; Henrich, 2011; Mesoudi, 2016). Similarly, those assuming a sociocultural level of analysis have been, at times, resistant to consider the importance of biology, ecology, and evolution in their models of human behavior (Walsh & Yun, 2016). The current review article highlights the complementarity of sociocultural and evolutionary perspectives in attempting to further elucidate how proximate and ultimate mechanisms interact to produce appearance enhancement behavior.

## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they had no conflict of interest for the current review.

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