Female Intrasexual Competition: Self-Promotion, Social Media, Sabotage and Spending

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Certificate of Authorship

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Abstract

People seek partners, pair up, reproduce, and rear offspring. The selection of the optimal mate is integral to maximising the benefits of partnership, hence people exhibit sophisticated physical and psychological mechanisms signalling adaptations to these challenges. Opposite-sex attraction and intrasexual competition are the two broad processes interacting to maximise reproductive success. In this thesis I explore ways in which women compete with other women to secure and retain high quality partners and the resources such partners contribute.

In the first study I explored the combined effects of makeup and ovulation on ratings of female faces on characteristics related to intrasexual competition (like physical attractiveness, flirtatiousness) and characteristics not expected to be related to intrasexual competition (like trustworthiness and conscientiousness). Women were found to rate faces as more physically attractive than men. Women rated faces with makeup as more attractive than bare faces, and this was especially true for women with low intrasexual competitiveness. Intrasexual competitiveness negatively predicted attractiveness ratings of made-up faces for women, but positively predicted attractiveness ratings of made-up faces for men. Contrary to predictions, women and men both rated non-fertile bare-faces as more physically attractive than fertile faces but differences decreased with makeup, suggesting that makeup obscured the effect of ovulation. Ratings on non-competitive characteristics like conscientiousness and trustworthiness, were not affected by intrasexual competitiveness.

In the second study I explored the use of social media as a vector for female intrasexual competition. Firstly, using a mock-up Instagram feed I investigated the effect of mate value and intrasexual competitiveness on participants' likelihood of posting, "liking" or commenting on different types of photos, and secondly by analysing the actual photos posted by a subset of consenting participants. More competitive women were less likely to "like" another woman's photo of herself, but more likely to post a solo-appearance photo of their own. In the second study, high mate value-high intrasexual competitiveness caused a decrease in number of photos posted. But for low and medium mate value women, photos posted increased with increased intrasexual competitiveness, suggesting that those women who have the most to gain by manipulating/curating their online image are the ones who post more photos on Instagram. Overall, in both studies, men were more likely to post photos of luxury products than women, while women were more likely to post solo-appearance photos.

In the third study I explored how women sabotage hypothetical hairdressing clients through disingenuous beauty advice which would detrimentally impact the clients' physical attractiveness. Both lay women and female professional hairdressers cut most hair off women who were of the same-attractiveness level as them. They sabotaged women whose hair was in good condition and had requested a smaller amount cut off to a greater extent than women with hair in poor condition. Client makeup caused lower mate value lay women to cut off less hair, suggesting the dominance incited by women wearing makeup resulted in reduced sabotage. More intrasexually competitive women (including hairdressers) cut off more hair confirming competitor manipulation as an intrasexual competitiveness strategy being employed.

The final study explored conspicuous consumption as a female competitive strategy using women's spending on non-essential items in two different scenarios – in preparation for a women-only social event to be hosted in their home, and at a charity function. In the first scenario high intrasexual competitiveness resulted in an increase in spending on all three items – the kitchen, the outfit and makeup. Women between 35 and 45 years of age spent more if they had children, but the sexes of the children did not make a difference. In the second study, giving to a charity increased with intrasexual competitiveness, perception of judgement by the women around them and whether there was an audience. Women were compelled to buy more tickets when the women around them spent more. We explain these findings in terms of manipulative consumption in which wealthier women seek to deplete the resources of rivals.

Across this thesis I compare ways in which women compete with rivals and highlight how competitor manipulation (in various forms), though less-explored, is likely to be as important as self-promotion and derogation as an effective female intrasexual competitive strategy.

Chapter 1: General Introduction

1.1 Thesis Aims and Chapter Overview

People seek partners, pair up, reproduce, and rear offspring. This can happen in the context of casual relationships or short-term relationships, but both historically (T K Shackelford, Schmitt, & Buss, 2005) and cross-culturally (Buss, 1989), most people form long-term, socially monogamous relationships to raise children with a partner. The benefits of a partner are both proximate (accruing in the immediate term for the individual, such as emotional support, social hierarchy gains, material gains (Brooks et al., 2011; Clark, Graham, & Grote, 2002; Diener, Suh, Lucas, & Smith, 1999; Harknett, 2009) and ultimate (resulting in successful reproduction and rearing of healthy offspring (Amato & Keith, 1991; Harknett, 2009). The selection of the optimal mate is integral to maximising the benefits of partnership (Haselton & Galperin, 2013), hence people exhibit sophisticated physical and psychological mechanisms signalling adaptations to these challenges (Buss, 1989; Gangestad & Simpson, 2000; Haselton & Buss, 2000; Li, Bailey, Kenrick, & Linsenmeier, 2002).

Opposite-sex attraction and intrasexual competition (Fink, Klappauf, Brewer, & Shackelford, 2014) are the two broad processes interacting to maximise reproductive success. To secure a desired mate, individuals must attract display the range of characteristics the prospective mate desired (Buss, 1989; H. E. Fisher, 1998; Gangestad & Simpson, 2000) and one must out-compete other same sex rivals seeking to attract the same mate (Buss, 1988; Buunk & Fisher, 2009; Clutton-Brock et al., 2006). Intrasexual competition is more overt, and more extensively studied in males compared to females in both human (Campbell, 1995; Jensen-Campbell, Graziano, & West, 1995; M. Wilson & Daly, 1985) and non-human species (Arak, 1983; Kvarnemo & Ahnesjo, 1996; Le Boeuf, 1974; Lipshutz, Torneo, & Rosvall, 2023; Miller, 2013). Male intrasexual competition across the animal kingdom tends to involve aggressive displays (such as male-male biting in Siamese fighting fish which increases in the presence of a female audience, (Doutrelant, McGregor, & Oliveira, 2001), or exaggerated morphological traits (for example, the silver-back of the dominant male gorilla (Schaller, 1963). Increased intrasexual violence (Archer, 1994; Georgiev, Klimczuk, Traficonte, & Maestripieri, 2013; Puts, 2016; M. Wilson & Daly, 1985) and humans epigamic traits of male body structure such as height, shoulder width, and upper-body musculature (Barber, 1995; Puts, Carrier, & Rogers,

2022), also signal intrasexual competition in human males. Perhaps the heavy emphasis on studying male intrasexual competition can be attributed to the ready observability of it.

One of the earlier conceptualisations of mate choice was that of Males Compete/Females Choose (MCFC) (Buss, 1988). Originally thought to apply to most mammalian species, in which females are biologically obliged to invest more than do males in each individual offspring post-copulation (due to gestation and lactation), MCFC suggested that females played a less active role than males in mate acquisition and maintenance than did males, simply observing the competition and choosing to mate with the winner. Males, for their part in this model, exercised no choice and simply mated with any female willing to accept them. More recent theories of sexual selection (the evolutionary process by which mechanisms of mate attraction and competition evolve,(Barber, 1995; Clutton-Brock et al., 2006; Miller, 2013; Puts, 2016)), however, recognise models of mutual mate choice (MCC) (Courtiol, Etienne, Feron, Godelle, & Rousset, 2016; Kokko, Jennions, & Brooks, 2006; Snowdon, 2013). In such models, both sexes can make reproductive gains by actively choosing to mate with (or not mate with) certain other individuals. Mutual choice then provides the evolutionary impetus for mutual competition, as both sexes seek to influence the choices of the other (Fawcett & Johnstone, 2003; Puts et al., 2022; Snowdon, 2013).

The current thesis examines how mechanisms of female intrasexual competition manifest in modern day contexts. Through the use of makeup, social media, disingenuous beauty advice to rivals (in this case at the hairdresser) and conspicuous consumption of luxury products, female-specific strategies of intrasexual competition are explored. The minimally researched strategy of competitor manipulation (Fisher & Cox, 2011) came to the fore. In addition, interactions between mate value and intrasexual competitiveness helped differentiate between strategies used globally to all women in general, or strategies specifically aimed at women of higher-, same-level, or lower mate value.

This introduction does not to provide a full literature review on each of the four specific contexts (which can be found in the introduction sections of each subsequent chapters). It focuses on areas common to all of the studies: female mate choice and intrasexual competition more broadly. Initially, I consider *why* females need to compete, *what* they are competing for, and what attributes they have in their arsenal to compete with – including physical attractiveness (both facial and body) and non-physical attributes. Following this is a review of mate value, (which is essentially a measure of an individual's competitiveness in the mating market) and how

a woman's own mate value affects the degree, and kinds, of compromises she is willing to make in partner selection. Finally, I consider the strategies women use to compete. These behaviours may be self-directed (such as manipulating their own appearance) or others-directed (such as derogation of rivals, and competitor manipulation) behaviours, and are discussed in the context of physiological influences, such as the effect of ovulation.

1.2 The need for competition and the attributes contributing to competitiveness

A distinction needs to be made between those traits that enhance intrasexual competitive success and those that enhance attractiveness. Attractiveness comprises signals and behaviours that target the opposite sex, while competitive signals and behaviours target the same sex. The distinction lies in who is receiving the signal of interest (perceiving it and acting on it,(Bee & Miller, 2016; Guilford & Dawkins, 1991; Soler, Batiste, & Cronk, 2014). It is the receiver of the signal, and their subsequent behaviour (and ultimately the effect that behaviour has on the reproductive success of the signaller) that provides the selection pressure on the evolution of that trait as a signal (Rowe, 2013; Soler et al., 2014). Clearly, sexual signals need not be sorted exclusively into one of the two categories - signals may be received by both same-sex rivals and opposite-sex mates. These signals will affect both a person's attractiveness and competitiveness and may be subject to both inter-sexual and intra-sexual selection (D P Schmitt & Buss, 1996; Walters & Crawford, 1994; Wiley & Poston, 1996)..

Both sexes target preferences towards people who are similar in quality to themselves consistent with motivated assortative mating (Buston & Emlen, 2003; Eastwick & Finkel, 2008; Williams & Sulikowski, 2020). An individual’s desirability as a partner depends on the mate preferences of the person they are trying to attract. Since differential reproduction is key to the evolutionary process (Barber, 1995; Kokko et al., 2006) , the psychological mechanisms surrounding reproduction are especially strong targets of selection (Barkow, Cosmides, & Tooby, 1995; Clutton-Brock et al., 2006; Kokko et al., 2006; Puts, 2016). Partner preferences are not idiosyncratic; they tend to follow predictable patterns (Buss & Barnes, 1986; Christensen, 1947; Furnham, 2009; Hill, 1945; Schwarz & Hassebrauck, 2012; T K Shackelford et al., 2005). Cross-culturally, women (more so than men) are attracted to an ability and willingness on the part of men to invest social, psychological and material resources (Boothroyd, Jones, Burt, & Perrett, 2007; Eagly & Wood, 1991). Men (more than women) on the other hand, are attracted to women who show powerful cues of fertility, such as youth, physical attractiveness and health (Scheib, Gangestad, & Thornhill, 1999; Schwarz & Hassebrauck, 2012; Thornhill & Gangestad, 1994, 1999). Evolution has produced opposite-sex mate-preferences for

traits that indicate high mate quality (Boothroyd et al., 2007; Buss, 1989; Buss & Barnes, 1986; Buss & Schmitt, 1993; Eagly & Wood, 1991; Gangestad, Haselton, & Buss, 2006; T K Shackelford et al., 2005). The fertility of human females peaks in their early 20s and decreases with age, making youth an important quality (Symons, 1980). Features of physical appearance such as smooth skin, good muscle tone, lustrous hair and full lips, are hypothesised to have evolved as standards of beauty as a result of their strong correlation with health, thereby indicating a greater likelihood of reproductive success (Lee et al., 2013; Singh, 2002).

Sex specific preferences were explained by Trivers' parental investment model (1972): (1) The sex that invests more in off-spring (typically, the female) will be more discriminating or selective about mating, and (2) the sex that invests less in offspring will be more competitive for sexual access to the high-investing sex. Women invest more physiological resources in their offspring during gestation and lactation and are therefore sensitive to the ability of a partner to provide resources such as food, shelter, material possessions and physical protection. Men produce viable offspring through access to reproductively healthy females and are thus sensitive to cues of health as displayed through aspects of physical appearance. Importantly, in the case of humans, women have greater obligatory parental investment, but this difference is starkest in the context of short-term mating. Sex differences in overall mate selection standards are also greater in short-term than long term contexts, where women increase their standards and men decrease theirs (Thomas, 2018). Such a scenario may portend greater male than female intrasexual competition. But for long-term mating or marriage, both parents typically invest heavily in children. Trivers' theory of the importance of investment in driving choosiness, which in turn drives opposite-sex competitiveness, therefore predicts both sexes to be both discriminating and competitive in the context of long-term mate choice. This promotes selection for intrasexual competitive strategies for women as well as men.

There is much evidence for differences in short-term mating and long-term mating strategies (Gangestad & Simpson, 2000; Li & Kenrick, 2006). Women value resources and generosity in a long-term partner, where the ability to support children is important, and they will trade-off physical attractiveness for access to these resources. In short-term contexts resources are less relevant, and physical attractiveness becomes increasingly important for women (as well as men). For women the risks associated with falling pregnant to an uncommitted partner may be subconsciously being weighed against the high quality of the genes he might contribute, while for men access to as many reproductive opportunities (which are

easier to attain if the mate value of the prospective short-term partner is lower than yours) is more strategic.

In addition to short/long-term mating context, several other variables influence opposite-sex mate preferences, demonstrating that such preferences are adaptively plastic, rather than fixed. Resource availability and disease prevalence affect mate-choice preferences as individuals place greater weight on cues of wealth (Brooks et al., 2011) and cues of disease resistance (Frederick & Haselton, 2007; Gangestad & Buss, 1993) in potential partners, respectively, in these situations. Coinciding with a decrease in sex differences in social roles, women now have greater access to their own resources. At the same time, there has been a reduction in disease prevalence and an increase in health across the population, meaning that physical attractiveness provides less reliable cues to health, since almost everyone is parasite- and disease free (Gangestad et al., 2006). As caring and earning responsibilities become more evenly shared, sex differences in preferences for wealth/physical attractiveness may diminish (Eagly & Wood, 1999), however Wiederman and Allgeier (1992) found that women had a greater preference for wealth in a partner as their own personal wealth increased.

A controversial meta-analysis of 97 mate preference studies (Eastwick, Luchies, Finkel, & Hunt, 2014) found that physical attractiveness and earning prospects were positively correlated with romantic interest for both men and women, but failed to find the expected sex differences in preferences for physical attractiveness by men and resources by women. However, Meltzer et al. (2014) demonstrated that if the meta-analysis by Eastwick et al. was restricted to studies that included only (i) long-term partnerships, (ii) women of reproductive age and (iii) studies in which measures of physical attractiveness assess observable qualities of appearance, the findings would then show greater preference by men than women for physical attractiveness (79 out of the 97 studies included by Eastwick et al. were not confined to participants reporting on long-term relationships).

The Eastwick meta-analysis also included participants of a very broad age-range. As sexual selection theories and parental investment theories suggest that preferences should be adaptive for successful reproduction, these preferences may be less pronounced in older couples, and some studies have even documented preferences in the opposite direction as age increases (Barelds-Dijkstra & Barelds, 2008; Murstein & Christy, 1976). The broadness of the range of studies using different methodologies and sample populations included in the meta-analysis by

Eastwick et al. appears to have obscured the well-supported and widely validated findings for sex differences in mate preferences (Feingold, 1990, 1992a; David P Schmitt et al., 2012).

1.2.1 Physical Attractiveness Preferences

While the work presented in this thesis did not measure physical attractiveness, the stimuli used faces of differing attractiveness and in some cases respondents were required to rate their own attractiveness and the relative attractiveness of their own faces to the faces presented, so it is valuable to have an understanding about what makes a face attractive. For clarity, I define *attractiveness* as the overall appeal of person to a member of the opposite sex, composed of aspects of their appearance (termed *physical attractiveness*) and their character and behaviour (*behavioural attractiveness*).

1.2.1.1 Components of facial attractiveness

While the evidence above suggests that men value physical attractiveness more highly than do women, this does not mean that women are insensitive to a potential mate's physical appearance. Women do value certain components of male physical attractiveness: Facial attractiveness is an important trait for women across many cultures (Lee et al., 2013) as it is an indicator of current good health (i.e. the person is minimally affected by disease, (Todd K. Shackelford & Larsen, 1999)), future good health (Henderson & Anglin, 2003) and it signifies good immunocompetence (Foo et al., 2020). "Averageness" increases the perceived attractiveness of faces for both men and women (Pisanski & Feinberg, 2013; Valentine, Darling, & Donnelly, 2004). For research purposes, average faces are made by combining individual faces into composites, which are found to be more attractive than individual faces (Pisanski & Feinberg, 2013; Valentine, Darling, & Donnelly, 2004). The averageness of a face can be calculated metrically (how morphologically similar the face is to the average morphology of all faces) or constructed photogrammetrically (Grammer & Thornhill, 1994; Rubenstein, Langlois, & Roggman, 2002). Averageness positively predicts high levels of heterozygosity which in turn provides high levels of pathogen defence via heterozygous immune system genes (Thornhill & Gangestad, 1999), making it a cue to health via a heritable resistance to disease (Scheib et al., 1999).

The ideal for many paired features of the human body is perfect bilateral symmetry. Morphological fluctuations from bilateral symmetry that have no systematic directionality across individuals (i.e., fluctuating asymmetry) typically result from genomic stress, such as homozygosity of major genes and genetic mutations, and environmental stress, such as

malnutrition and pollution, or an interaction of the two (Özener, 2010; Parsons, 1990, 1992). The degree to which an individual is capable of withstanding the effects of such stressors during development and, in turn, maintaining a high degree of bilateral symmetry, is in part genetically heritable (Pisanski & Feinberg, 2013). In many species, fluctuating asymmetry is especially apparent in male secondary sexual characteristics (Manning & Chamberlain, 1993; Møller & Pomiankowski, 1993). In fights for nuptial food items between adult males of the Japanese scorpionfly, *Panorpa japonica*, under field conditions, fluctuating asymmetry of forewing length is significantly lower in winners than it is in losers. Also, mating males in nature (for example swallows) have relatively low fluctuating asymmetry compared with non-mating males (Thornhill, 1992). Because it is conspicuous and linked to a hereditary resistance to stress, symmetry, not unlike facial averageness, facial fluctuating asymmetry may act as a cue to developmental stability or heritable health (Pisanski & Feinberg, 2013; Thornhill & Gangestad, 1994, 2006; Van Dongen & Gangestad, 2011) and may play a role in mate choice across species, including humans (Jones et al., 2001; Pisanski & Feinberg, 2013; Rhodes et al., 2001; Scheib et al., 1999; Thornhill & Gangestad, 1994).

Facial sexual dimorphism, i.e. the degree to which male faces systematically deviate in morphology from female faces also influences perceived attractiveness (Pisanski & Feinberg, 2013). The relationship is more straightforward for men's preferences than it is for women's preferences: the more feminine the female face, the more attractive it is, as oestrogen-dependent characteristics of the female face and body correlate with health and reproductive fitness (Foo et al., 2020; Perrett et al., 1998). A recent study confirmed that women's perceived femininity was positively related to their perceived attractiveness cross-culturally, but this was not true cross-culturally of masculinity for men (Fiala et al., 2021). In men, high testosterone levels (which result in more masculine faces with larger jaws, and more prominent brows) signal greater immunocompetence and are positively correlated with men's social status and dominance (Boothroyd et al., 2007; Perrett et al., 1998; Scott, Clark, Boothroyd, & Penton-Voak, 2013). However, men with high levels of circulating testosterone are also more likely to exhibit antisocial behaviours like aggression (Booth, Granger, Mazur, & Kivlighan, 2006; Geniole et al., 2020). They are less likely to invest time and resources in their offspring and mates, (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008), and less masculine men make better parents (Boothroyd et al., 2007). Masculine men report less interest in long-term relationships (Boothroyd et al., 2007), and are more likely to cheat on their partners and get divorced (Booth & Dabbs, 1993).

Women reported negative perceptions of more masculine men's parenting abilities, honesty and commitment to a monogamous relationship (Boothroyd et al., 2007; Perrett et al., 1998).

Since masculinity simultaneously signals both positive and negative mate attributes, female preferences for masculinity in male faces are heavily affected by context and ultimately reflects different cost-benefit trade-offs that women may be making. Women prefer more masculine faces for short-term mating and less masculine faces for long-term mating (Li & Kenrick, 2006). In general, female preferences for male faces of average masculinity are stronger than those for faces of high or low masculinity(Dixson, Sulikowski, Gouda-Vossos, Rantala, & Brooks, 2016; Stower et al., 2020). However, in high-disease areas more masculine faces are preferred, but when disease resistance is less likely to be important the interpersonal benefits of a less masculine partner are prioritised and preferences shift toward the feminine (Perrett et al., 1998; Thornhill & Gangestad, 2006). Hence, women appear to trade-off indicators of good health for indicators of parenting qualities (Gangestad & Simpson, 2000).

1.2.1.2 Components of body attractiveness

Determinants of body attractiveness include stature, body mass index (BMI) and waist-to-hip ratio in women and shoulder-to-hip or chest-to-waist ratio in men. Men who are larger in stature are more dominant and more likely to win physical contests with other men to gain access to territory and resources (Pawlowski, 2003). Taller men are healthier than shorter men as measured by stroke, cardiorespiratory disease, and overall mortality rates (Smith et al., 2000), however, they also require correspondingly more energy resources, which may be costly in regions where food is scarce (Pisanski & Feinberg, 2013). Cross-cultural variations exist whereby larger men are preferred in westernised countries in North America, Europe and Australia (Swami & Tovée, 2005), but women in regions with fewer resources, such as the Himba people from Namibia (Sorokowski, Sorokowska, Fink, & Mberira, 2012) and the Datoga people from Tanzania (Sorokowski & Butovskaya, 2012) do not show the same preference for tall males. The tendency of the male of a couple to be taller than the female (called the male taller norm) was preferred by women in Germany, Austria and Britain (Fink, Neave, Brewer, & Pawlowski, 2007), whereas women of the Himba tribe (Sorokowski et al., 2012) preferred equal height partners. Marlowe (2004) reported that the Hadza tribe of Tanzania showed a greater proportion of partnerships, relative to British couples, in which the woman was taller than the man. This lack of preference for a taller partner in these cultures suggests that women may be trading off the better genes indicated by being taller, with the greater resources that would be required to rear taller sons (Pisanski & Feinberg, 2013). As such female preferences for male

body proportions may exhibit similar context-sensitive trade-offs, as their preferences for male facial morphology.

Men in North America preference women of short to average height, contributing to the male taller norm (Cameron, Oskamp, & Sparks, 1977; Pawlowski, 2003; Swami & Tovée, 2005). However, the apparent absence of the male taller norm in the Hadza people, suggests that their men may not show a preference for shorter women (Marlowe, 2004). It is therefore likely that absolute and relative male tallness, and female short-to-averageness are not universal mate preferences but represent a preference system that is sensitive to environmental cues (Pisanski & Feinberg, 2013).

Body mass index (BMI) is a measure of weight relative to height. Despite having its shortcomings (Müller, 2013), such as not accounting for body fat distribution (Sommer et al., 2020) and not differentiating between fat mass and fat-free mass (where fat-free mass refers to the total amount of body mass that is not composed of fat, including muscle, bone, organs, and fluids and fat mass refers specifically to the amount of adipose tissue or body fat that a person has (Sommer et al., 2020; Wang, Pierson Jr, & Heymsfield, 1992)), it is still the most widely used anthropomorphic tool to measure body size (Sommer et al., 2020). Being underweight or very overweight increases the risk of chronic health problems such as chronic inflammation, eye disorders, heart disease, cancer and diabetes (Golubnitschaja et al., 2021; Pisanski & Feinberg, 2013; Shekar & Popkin, 2020), and in women, can affect fertility and reproduction (Amiri & Tehrani, 2020; Seidenfeld & Rickert, 2001). There are cross-cultural variations in men's preference for women's weight. Men in Uganda, the Hadza from Tanzania, Zulu from South Africa and Matsigenka men of Peru showing a preference for heavier women, while North American and British men preferred women with low to normal BMI, and Japanese men showed a preference for extreme thinness (Pisanski & Feinberg, 2013). Ideal body mass may vary as a function of resource availability, with men from countries low in resources preferring heavier women (Anderson, Crawford, Nadeau, & Lindberg, 1992): when food resources are scarce, women's bodies that readily store fat may be better able to support offspring through breast-feeding stages . This male preference for bigger women when resources are scarce, is contrasted with a female preference for smaller men when resources are scarce (Brown & Konner, 1987). This is because tall men are expensive to build, but fat women are not – if there is a shortage of food offspring with a propensity to store fat will simply have very little to store, but offspring with propensity to grow tall, will require protein to build their tall bodies, and will suffer if there isn't enough food.

Cultural variation in social norms, ideologies, and lifestyle may account for further variations in men's preference for women's weight (Cachelin, Rebeck, Chung, & Pelayo, 2002). Continuous visual exposure to thin bodies may increase preferences for underweight women, thus media exposure and social exposure to underweight women is likely to contribute to men's preference for thinner women in more westernised countries (Winkler and Rhodes (2005). The male preference for thinner women in countries of plentiful food could simply be that where food is plentiful men are choosing women who carry less body fat and so are less prone to medical complications such as heart disease. With plentiful food around women will be able to eat enough while breast feeding to support their offspring, they don't need to have their own supplies stored. Swami (2015) noted a decreased effect of degree of westernisation of their country and preference for thinness in women and has found that socio-economic hardship better predicts a preference for less thin women providing further evidence for the food availability theory of body size mate preferences.

Food availability contingencies aside, it is women, rather than men, in western countries who report underweight women being most attractive. Men exhibit attractiveness peaks for female bodies that are decidedly heavier than the female peak (Demarest & Langer, 1996; Fallon & Rozin, 1985; Furnham, Tan, & McManus, 1997). The idea that women impose thinness on one another (by convincing each other that it's actually men who want it) may be a form of female-female competition aimed at reducing the competition's physical attractiveness to the opposite sex (R. Abed et al., 2012; R. T. Abed, 1998; Faer, Hendriks, Abed, & Figueredo, 2005).

A low waist-to-hip ratio (WHR) in women results from a distribution of fat on the lower part of the body, including the thighs, hips and buttocks, combined with a narrow waist, resulting in an hour-glass shape (Braun & Bryan, 2006). WHR is a reliable indicator of a female's reproductive age, sex-hormone profile, parity and risk for various disease (Singh, 1993, 1995, 2002). Consensus has not been reached on whether there is cross-cultural agreement on an optimally attractive WHR. Singh, Dixson, Jessop and Dixson (2010) found consistent preference for low WHR in men from Cameroon, Komodo Island (Indonesia), Samoa and New Zealand. Other research suggests that for American and European men optimally attractive WHR in women is 0.7 (Crossley, Cornelissen, & Tovée, 2012; Singh, 1993), but this may not be universal to men in all cultures (Marlowe, Apicella, & Reed, 2005; Marlowe & Westman, 2001; Swami, Neto, Tovée, & Furnham, 2007). This lack of consensus may be attributable to the wide array of different stimulus materials used in different studies (line drawings, computer graphics and photographs) (Pisanski & Feinberg, 2013) as well as the methodological difficulty in

differentiating between the effect of size (BMI) and shape (WHR) (Swami et al., 2007). Cross-cultural differences in male preferences for female body fat (discussed above), would no doubt interact with preferences for body shapes indicating high oestrogen and such interactions have not been empirically explored.

In men, testosterone results in an android fat distribution pattern, with more fat deposited on the upper body and abdomen, including the shoulders and neck (Braun & Bryan, 2006), resulting in an inverted triangle body shape. Hence in men, a low waist-to-chest (WCR) and a high shoulder-to-hip (SHR) is more indicative of attractiveness than WHR (Crossley et al., 2012; Swami & Tovée, 2005). Hughes and Gallup (2003) found that men with higher shoulder-to-hip ratios had sexual intercourse first at a younger age, had a greater number of sexual partners and a greater number of extramarital sexual encounters. In a study that provides further evidence of shifts in preference as a result of available resources, Swami and Tovee (2005) reported women's perception of male attractiveness to be strongly linked to male waist-to-chest in participants from higher socioeconomic, urban areas, while in a rural setting BMI was the most important factor affecting attractiveness, with WCR playing only a minor role. Again, this suggests a trade-off between expensive to build muscle (which is a sign of underlying genetic quality), and signs of a tendency to store fat, which is important when food resources are low or unreliable.

1.2.2 Non-physical preferences

While men rely heavily (but not solely) on visual cues to determine their preference for a particular partner, women's preferences for resources and status rely heavily on non-visual information. Resource acquisition can be gauged by a man's status (Symons, 1980), industriousness, ambition and earning capacity (Buss & Schmitt, 1993). Men's mate attraction tactics have evolved to show evidence of resources to potential mates, by displaying direct possession of material resources (e.g. cars, expensive watches), and displaying evidence of future resource attainment (e.g. by mentioning tertiary qualifications or promotions at work) (Buss, 1988).

Even though evidence for sex-based preferences is robust, neither youth, physical attractiveness nor resources are the most important attributes in a potential partner. Both sexes ranked kindness, intelligence (Buss, 1989; T K Shackelford et al., 2005), honesty, displaying a sense of humour, being sympathetic and emotionally stable (Buss & Barnes, 1986; Howard, Blumstein, & Schwartz, 1987; Sprecher, Sullivan, & Hatfield, 1994) as more important. When

participants are explicitly rating mate selection qualities, therefore, species-typical mate preferences were reported to be more important than sex-linked preferences.

The most straight forward way to assess people's preferences is through self-report data. Demand characteristics (Orne, 1962) and social desirability can affect self-reports (Nederhof, 1985). The fact that participants might not want to look shallow, especially by admitting to prioritising supposedly superficial traits like attractiveness and wealth, may result in these characteristics being under-endorsed in such studies. This is a limitation of much mate preferences research. Future studies could be designed to overcome these limitations, for example, by coupling vignettes with pictures, in a between-subjects design, so participants do not get to directly compare attractive versus unattractive people and give them a score. In this way you could examine whether the described or the physical appearance had the larger effect.

In their study on the necessities and luxuries of mate preference, Li et al.(2002) found kindness and intelligence to be considered necessities in a potential partner (with additional preferences of physical attractiveness for men and status and resources for women). Participants would trade-off other characteristics (e.g., creativity) in order to meet a minimum acceptable threshold on the necessity values like intelligence. High intelligence is associated with better health (Arden, Gottfredson, & Miller, 2009), higher semen quality (Arden, Gottfredson, Miller, & Pierce, 2009), greater socioeconomic success (Strenze, 2007) and lower divorce rates (Von Stumm & Ackerman, 2013) and therefore serves as a reliable cue of genetic fitness, potential for resource provision and commitment to a long-term relationship. Women particularly want long term partners who are smart and their preference for intelligence increases with their own mate value, while men showed a preference for short term partners who were less intelligent but valued intelligence more in a long-term partner (Jonason et al., 2019).

Fletcher et al. (1999) factor analysed a list of 49 attributes described by participants as being characteristics of an ideal partner. The results showed a three-factor structure: warmth/trustworthiness, attractiveness/vitality, and status/resources. The factor warmth/trustworthiness, which included items like understanding, supportive, considerate, kind, honest and stable, was rated the most important of the three factors by both men and women. High levels of trustworthiness and warmth signal a partner who would provide the practical and emotional support necessary to raise a family (Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004).

1.2.2 Shifts in mate selection preferences

The evidence above provides strong support for patterns in mate selection preferences, and for the phenomenon of preference shift, contingent on personal and ecological contexts (resource scarcity and disease prevalence). Other factors also induce preference shifts. Research on the effect of operational sex ratio by Stone, Shackelford and Buss (2007) found that when faced with a deficit of potential mates, men lowered their standards to facilitate acquisition of a partner, and in the situation where women were more numerous, women raised their standards to avoid deception by men seeking short-term relationships.

Menstrual cycle (Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Gangestad & Thornhill, 1998) and the short- or long-term nature of the relationship (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004; P C Regan, 1998b) interact to cause preference shifts. Women exhibit a stronger preference for qualities indicating good genetic fitness, such as physical attractiveness (Penton-Voak et al., 1999), muscularity (Jones, Hahn, & DeBruine, 2019) and social dominance (Durante, Griskevicius, Simpson, Cantú, & Li, 2012)when they are ovulating (and thus, potentially fertile) and also when evaluating a short-term partner. Such preferences are stronger in coupled (compared to single) women and may function to direct female preferences to men of high genetic quality (higher than their partner) at the time of the cycle when they are most likely to conceive (Welling & Puts, 2014). This coincides with the time of the cycle partnered women are most likely to be unfaithful (Gangestad, Thornhill, & Garver-Apgar, 2010). Thus it is thought to be part of a secondary sexual strategy, whereby a small minority of children are fathered by an extra-pair male who provides higher quality genes than the woman's partner can provide (Greiling & Buss, 2000).

Hence, preferences vary across individuals and situations, and within individuals as they move from one situation to another. This may make it possible for preference change to facilitate compromises in mate choice, by directing your attention to targeting mates that are most suitable to the current circumstances.

1.2.3 Mate Value

“Mate value” is a measure of an individual’s value in the mating-market. It is one of the most influential factors affecting a person’s willingness to compromise ideal mate standards (Buss & Shackelford, 2008; M Fisher, Cox, Bennett, & Gavric, 2008; Miner, Starratt, & Shackelford, 2009). Cameron, Oskamp and Sparks (1977) likened heterosexual marriage to a stock market, citing a social exchange model where men and women aim to maximise their

rewards by exchanging their own assets for desirable attributes in a partner. Access to a partner of high value will increase chances of successful reproduction by: giving access to a healthy mate (Singh, 2002), producing offspring with "good genes" (Roberts & Little, 2008) and having access to the resources needed for the successful gestation and rearing of children (Buss & Shackelford, 2008). A mate of lower value might be easier to obtain but the rewards would be correspondingly lower. While a mate of higher value than oneself would be favourable in terms of rewards, they would be harder to obtain and potentially more difficult to guard against mate poaching (P C Regan, 1998b). It is therefore adaptive for an individual to accurately assess their own mate value. Back et al. (2011) theorise that an individual comes to learn their mate value by repeated experiences with romantic acceptance and rejection and then evaluates and pursues mates differently depending on how their own mate value self-assessments compare with their assessments of the mate value of others on the dating market.

Traditionally, mate value was defined in terms of the sum of qualities possessed by an individual that would potentially contribute to reproductive success and genetic fitness as displayed through observable characteristics (Waynforth, 2001). Hence, female mate value was often synonymous with physical attractiveness, assessed through measures such as a bilateral symmetry (Pisanski & Feinberg, 2013) and waist-to-hip ratio (Singh, 2002), and male mate value is measured by a combination of ability to accrue resources and physical fitness (Miner et al., 2009; Penke, Todd, Lenton, & Fasolo, 2007). Support for this conceptualisation of mate value comes from a study by Gutierres, Kentick and Partch (1999) who found that women's self-assessments of their mate value were adversely affected by exposure to highly physically attractive women, but unaffected by exposure to socially dominant women, and conversely, men's were affected more by exposure to socially dominant men than by physically attractive men.

Fisher et al. (2008) argue that this definition of mate value as the sum of qualities potentially contributing to reproductive success and genetic fitness (Waynforth, 2001) is too narrow. This is less relevant to people who cannot, or have chosen not to have children, as well as those who are older, but still undergo mate selection processes related to mate value. Additionally, mate value should reflect mate preferences. Kindness, intelligence (Buss, 1989; T K Shackelford et al., 2005), honesty, humour, empathy and emotionally stability (Buss & Barnes, 1986; Howard et al., 1987; Sprecher et al., 1994) were ranked as more important (than physical attractiveness or resources) by both sexes, yet they are ignored in mate value measures. They propose that a more valid definition of mate value is "the total sum of characteristics an

individual possesses at a given moment and within a particular context that impacts on their ability to successfully find, attract and retain a mate." (M Fisher et al., p.14). The context dependency of mate value in the above definition is important, as it acknowledges the fluid nature of some aspects of partner preferences.

Much research so far, based on the traditional definition of mate value, has found sex differences not only in what qualities contribute to mate value, but also in how mate value affects the compromises we make in mate selection. Women are better at assessing their own attractiveness than men (Eastwick & Finkel, 2008; P C Regan, 1998b), although evidence on the degree of correlation between self-rated attractiveness and observer rated attractiveness of facial photos is inconsistent. Weedon and Sabini (2007) found a strong correlation between third-party and self-report attractiveness, while a meta-analysis of 27 studies by Feingold (1992b) found correlation as low as .24 for men and .25 for women. In women, self-perceived mate value and observer-perceived mate value are more highly correlated (Buss & Shackelford, 2008; Gutierres et al., 1999) . In addition to this, women's mate value is positively correlated with ideal preferences in both long and short term relationships (Buss & Shackelford, 2008). So while women overall have higher selection standards than do men (P C Regan, 1998b; Schwarz & Hassebrauck, 2012), high mate value women are the most selective of all (Buss & Shackelford, 2008; P C Regan, 1998a). Little et al. (2001) found that female self-rated attractiveness predicted increased preferences for masculinity and symmetry in male faces. More physically attractive women (as assessed by observer reported attractiveness) expressed elevated standards as indicated by preferences, for good gene indictors e.g. masculinity and "sexiness"; good investment indicators e.g. income; good parenting indictors e.g. desire for children; and good partner indicators e.g. loving and understanding (Buss & Shackelford, 2008) in aptly titled article "Attractive women want it all".

Based on their self-perception, women market themselves at a certain level (Feingold, 1988; Shaw Taylor, Fiore, Mendelsohn, & Cheshire, 2011). This reflects a degree of compromise which takes place unconsciously, as it becomes embedded in their preferences: they prefer a man who might be similar in mate value to themselves, as opposed to one who is substantially higher in mate value than themselves, in spite of the latter being an objectively better quality mate. Evidence for the unconscious nature of these preferences comes from the fact that although individuals tend to mate with others of similar attractiveness (Feingold, 1988), the vast majority of people rate their partner as "attractive" or "very attractive", even those who were objectively rated as unattractive (Gagné & Lydon, 2001). High mate value women do not

compromise unconsciously as they have access to the highest quality males. Also, their own high mate quality lowers the risk of being left by their partner or makes it more likely they will easily be able to attract another one if it were to happen (Buss & Shackelford, 2008).

Some evidence suggests that men are poorer at assessing their own attractiveness (Eastwick & Finkel, 2008) and men's mate value is largely dissociated from their selection criteria (P C Regan, 1998a). One possible explanation for this gender difference in ability to accurately assess their own attractiveness is that men are more easily able to cheat the social exchange contract. A wrong choice on their part is more easily undone by deserting the partnership (Haselton & Buss, 2000). However, we observed that when considering long-term relationships, both men and women engaged in substantial implicit compromise, with lower stated ideal preferences across all potential partner traits, as participant self-perceived mate value decreased (Williams & Sulikowski, 2020), which suggests that men also drive assortive mating. Bailey, Durante and Geary (2011) found that men are particularly sensitive to individual differences in the attractiveness of women of the same mate value as themselves, but less sensitive to variation among women of lower and higher mate value. In addition, artificially increasing men's self-perceived mate value by providing them with false feedback about their "date-ability", shifts their sensitivity to variation in attractiveness to women of higher mate value. The same study found that the dominance of the woman's partner also shifted men's judgement of her attractiveness in a positive direction. This evidence suggests that men do process information relevant to their mate value and target women of their own mate value, particularly in long term contexts.

For women, the consequences of a wrong mate-choice are potentially more far-reaching, as the chances of being left "holding the baby" are much higher (Waynforth, 2001). Therefore, it is more important for a woman to correctly assess her mate value in order to maximise the quality of her partner while minimising the chance of making a mistake (Haselton & Buss, 2000; Haselton & Galperin, 2013). When the cost of making an incorrect mating choice are higher (during ovulation), women allocate more resources to assessment of personal mate value by making more frequent attractiveness comparisons and by placing greater emphasis on attractiveness in defining self-image (Beaulieu, 2007).

1.2.3.1 Mate Value measures

Accurate ways of assessing mate value are important. Initial measures focussed on the attractive appearance of women and the intelligence and ability of men to provide resources

(Miner et al., 2009; Penke et al., 2007). Understanding of the importance of relational/personal characteristics has led to the development of more comprehensive scales. Current psychometric measures of mate value generally fall into two types: trait level measures and global/holistic measures.

Trait level measures assesses mate value as the sum of individually measured traits known to be important in mate selection criteria. For example, the Mate Value Inventory (Kirsner, Figueredo, & Jacobs, 2003) has respondents report on 19 different attributes traditionally associated with mate value: "attractive face", "attractive body", "financially secure"; personal attributes: "good sense of humour", "emotionally stable"; and attributes relating to the quality of the potential relationship: "shares my values", "shares my interests". This scale shows sound psychometric properties in all three forms: the self-ratings scale, the partner rating scale and the ideal partner rating scales (Cronbach's α = .86, .92 and .91 respectively). This scale acknowledges the importance of non-physical attributes (such as kindness) rated highly by both sexes but a potential shortcoming is that it does not take into account the different value placed on different attributes by different sexes as the various attributes are not weighted (Williams & Sulikowski, 2020). Hence mate value is actually calculated identically for males and females. This method of calculating mate value has dominated research as a refinement to simply equating attractiveness/femininity in women and resource provision in men to mate value (Eastwick & Finkel, 2008; Eastwick, Finkel, & Eagly, 2011; Fletcher et al., 1999; Li et al., 2013; Todd, Penke, Fasolo, & Lenton, 2007).

The Mate Value Scale (Edlund & Sagarin, 2014) is an example of a holistic type of mate value measure. It does not assess individual characteristics but assesses the individual's overall perception of their value as a partner as a global construct. It is a brief, four-item measure (also with three forms: self, partner and ideal). The four items include: "Overall, how would you rate your level of desirability as a partner?", "Overall, how would members of the opposite sex rate your level of desirability as a partner?", "Overall, how do you believe you compare to other people in desirability of partner?" and "Overall, how good of a catch are you?" This scale was shown to have good internal consistency, a one-factor structure, good retest reliability, as well as good convergent and discriminant validity (Edlund & Sagarin). Given that it would be unlikely for people to assess their mate value explicitly using an inventory type process in real-life, and that people (especially women) need to have an accurate assessment of their mate value, holistic measures arguably exhibit more ecological validity than trait level measures.

Over the course of the research presented in this thesis, I have used both trait level and holistic measures of mate value, as well as collecting information about participant self-perceived attractiveness (for women). In each study the relationship between the different measures is explored and discussed. A future study in which the various forms of Mate Value measures were directly compared would be beneficial. It would also be valuable to include objective measures, not related to self-perception, such as waist-to-hip ratio, facial symmetry, education level and income. This would provide insight into how well individual measures assess such a complex construct.

Recent work (Conroy-Beam, 2018; Conroy-Beam & Buss, 2017; Conroy-Beam & Buss, 2020) has used Euclidean distances calculated in multi-dimensional space, between the participants' self-reported values on multiple traits and the opposite sex's mean preferences for those traits, to calculate mate-value. Such Euclidean distance-based mate value estimates predict attraction to potential mates, relationship satisfaction, and the capacity to attract and retain mates that match stated ideal preferences (Conroy-Beam, 2018) and while beyond the scope of my thesis, provide another method of calculating mate value for comparison with more traditional mate value assessment measures.

1.2.4 Compromise in mate selection

The willingness to compromise is an adaptive mechanism of ensuring that successful partnerships form in spite of the less-than-perfect nature of every possible mate. The necessity to compromise is so ubiquitous, that when rating their ideal, people seldom demand a perfect score on even the important mate qualities such as kindness, physical attractiveness and wealth (Fletcher et al., 1999). As mentioned previously, some of these compromises take place unconsciously, when preferences are adjusted as a result of both external factors, such as available mates, and internal factors such as self-perception. Other compromises take place explicitly, where people trade-off certain less valuable characteristics (which they still desire), for ones they deem indispensable (Williams & Sulikowski, 2020) . Cunningham, Druen and Barbee (1997) found that both men and women preferred a partner who was attractive and had a good personality, rather than attractive and wealthy, or good personality and wealthy. In a study by Li et al (2002) participants designed their ideal marriage partner, but were constrained by an allocated budget. Both sexes “spent” part of their allocation on intelligence and kindness, while men spent relatively more on their mate’s physical attractiveness, and women spent more on their mate’s resources. These findings represent consciously thought-out compromises that we believe we would be willing to make, but ecological validity appears to be low. Studies

assessing the qualities of actual mates have found that often what we say we want and what we end up with are very different (Buston & Emlen, 2003; Todd et al., 2007).

Speed-dating may be an ecologically valid paradigm to investigate mate selection because it involves real-life interactions between prospective partners. In one speed-dating experiment, 46 participants completed a pre-event questionnaire regarding their preferences for different qualities in a potential mate. After the event, the qualities of their chosen "dates" were compared to their stated preferences and found to differ considerably (Todd et al., 2007). Regardless of their stated preferences, men chose women based on their physical attractiveness, whereas women were generally more discriminating than men, in agreement with prior findings (Buss & Shackelford, 2008; P C Regan, 1998b) and chose men whose *overall* desirability as a mate matched the women's self-perceived attractiveness. Also using a speed-dating paradigm, Eastwick and Finkel (2008) confirmed that participants' ideal preferences assessed before the event failed to predict their actual choices. However, in a series of four studies Li *et al.* (2013) confirmed the real-world validity of ideal partner preferences, including the differences in short- and long-term preferences, using the speed dating paradigm. Therefore, there are inconsistencies in how well speed dating choices match pre-stated ideals.

Why do stated mate preferences and mate choices not always line up? One possibility is that when there are environmental constraints, the available opportunities may not match the ideals (Todd et al., 2007). In other cases, people may trade off compromises on specific dimensions, or lower overall standards, in the face of intrasexual competition for the same mates (Buss & Schmitt, 1993). Kahneman, Ritov and Schkade (1999) proposed that people do not actually possess stable stored preferences, but construct them on the spot when asked or when choosing, resulting in different outcomes at different times. Mate preferences research is of necessity self-report: the only way we can learn someone's ideals is to have them tell us. But people may not be adept at verbalising their internal preferences (T. D. Wilson & Dunn, 1986), or may fall prey to demand effects (Orne, 1962), in both cases causing incongruence between what they said they wanted and what they actually wanted, as evidenced by what they chose in reality. Tooke and Camire (1991), and Trivers (2000) propose that our minds may be adapted to giving "wrong" responses, opposing or masking our true preferences, especially in important domains such as mate choice, in an attempt to deceive competitors and potential mates. A final possible reason is that stating preferences is a rational activity, while meeting and interacting with someone involves an emotional process where the "chemistry" may override the rationality

(Todd et al., 2007), allowing implicit compromises to take place that are contrary to stated preferences.

Williams & Sulikowski (2020, Appendix C1) investigated the implicit and explicit compromises men and women make in long-term mate selection. Participants reported on their ideal trait preferences, the traits of an actual long-term partner, and their own mate value. Implicit compromises described deviations in preferred ideals from the preferred ideals nominated by the highest mate value individuals in the sample. Explicit compromises were the deviations between stated ideal partner traits, and participants' actual partner's traits. In accordance with the view of Fisher et al. (2008) that mate value calculations should reflect opposite-sex mate preferences, Williams & Sulikowski (2020) based mate value estimates on self-ratings of traits, differentially weighted according to the reported preferences of the opposite sex participants in the sample. We observed that both men and women engaged in substantial implicit compromise, suggesting that preferences are adjusted subconsciously based on a person's perception of their own mate quality. Explicit compromises were comparatively rare and largely unrelated to an individual's own mate value. We concluded that implicit compromise plays a far greater role than does explicit compromise in either sex in driving assortative mating.

Mate value is not static and changes relative to the situation. Women show an awareness of the mate value of the other women around them, adjusting both their mate attraction tactics and their perception of themselves in accordance with the perceived quality of their rivals (Fink et al., 2014; Vaillancourt & Sharma, 2011); and they also implicitly adjust their mate selection preferences based on their self-perceived mate value (Williams & Sulikowski, 2020). These ideas provide the theoretical impetus for the research that follows which explores how women may have developed adaptive intrasexually competitive strategies, that exploit the relationship between self-perceived mate value, and mate preference. If a focal woman can manipulate her rivals into lowering their self-perceived mate value, those rivals may effectively remove themselves from competition with the focal woman for mates, and instead target their mate attraction efforts at lower quality mates who are of no interest to the focal woman.

1.2.5 Intrasexual Competition

Early work on intrasexual competition focussed primarily on male-male competition. The males of many species compete for access to the highest quality females by a variety of strategies including: building the best nest (Jose, MØller, & Soler, 1998), showing the most effective mate-guarding behaviours (Bel-Venner & Venner, 2006), and outshining (Studd &

Robertson, 1985) and out-fighting competitors (Edward & Chapman, 2011). Common conceptualisations of intrasexual competition predict that the mate preferences of one sex will establish the domains of competition in the opposite sex. Human males do indeed exhibit range of competitive behaviours which appear commensurate with the priorities of female preferences. When derogating competitors, men are more likely to indicate that a rival is poor, lacks ambition, and is unlikely to succeed professionally (Buss & Dedden, 1990), reflecting the importance women place on the resource acquisition potential of long-term mates (Buss, 1989; Conroy-Beam, Buss, Pham, & Shackelford, 2015; Edlund & Sagarin, 2010)). Men experience greater jealousy when mating rivals have a higher status or greater financial resources (DelPriore, Hill, & Buss, 2012) than when they have restricted resources and low status. Men are more likely to inflate their prestige, status, personal assets, income and education level than women are (Hall, Park, Song, & Cody, 2010), and to lie about their height in online dating profiles (Toma, Hancock, & Ellison, 2008). When mating motives are primed by exposure to young physically attractive women, either in photos (Roney, 2003) or in person (Roney, Mahler, & Maestripieri, 2003), men rate their own ambition and the importance of material wealth higher than when exposed to older/less physically attractive women. This suggests that in the presence of high-quality potential mates, cognitive adaptations in men are activated such that they display and value the preferences of women to a greater extent, enabling them to better succeed in mate competition.

Male intrasexual competition is conceived as overt and showy (Campbell, 1995), including actions which advertise their physical strength, athletic prowess and possession of material resources (like their car or the latest model phone). Men will also engage in more frequent risk-taking behaviours, such as physical aggression, to secure a potential mate (Buss & Shackelford, 1997; Daly, Wilson, & Weghorst, 1982). Female intrasexual competition tactics are described as more subtle (Campbell, 1995), typically with minimal use of physical aggression. The absence of female-female physical aggression has been attributed to its high potential cost through injury (with women's bodies less robust to physical insult than men's bodies (Bose, Segui-Gomez, & Crandall, 2011), and the possibility of a potential partner resenting such an overt display of jealousy (Vaillancourt, 2013). More successful female tactics involve women presenting themselves as more physically attractive than rivals (Fink et al., 2014; M Fisher & Cox, 2009) (referred to in general as self-promotion), derogating female competitors (Buss & Dedden, 1990), competitor manipulation (which Fisher & Cox, 2011, defined as attempts to

reduce a rival's perception of a potential mate), and mate manipulation (attempts to influence a potential mate's behaviour in order to disadvantage a rival).

The work that follows investigates the effects of four different tactics of female intrasexual competition in modern-day contexts. At face-value, each would appear serve as self-promotion strategies. The four areas involved are the use of makeup, hairstyling, impression management through photos posted on social media, and conspicuous consumption by wearing/using high quality luxury brands. As the research proceeded, it became evident that these tactics may simultaneously serve self-promotion to prospective, while also functioning as competitor manipulation strategies. The literature pertaining to each of these situations is covered in detail in the Introduction sections of subsequent chapters. But some discussion of Fisher & Cox's (2011) four types of intrasexual competition are below.

Since men value physical attractiveness in a partner (Buss & Barnes, 1986; Feingold, 1992a; Furnham, 2009) effective self-promotion strategies for women involve enhancing their physical appearance. This can be achieved through wearing flattering types of clothing (Pazda, Prokop, & Elliot, 2014), especially that which shows more uncovered skin (Durante, Li, & Haselton, 2008; Haselton, Mortezaie, Pillsworth, Bleske-Rechek, & Frederick, 2007), and through hair styling (Mesko & Bereczkei, 2004) and wearing makeup (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Guéguen, 2008).

Competitor derogation targets both physical and behavioural attributes that align with opposite sex mate choice priorities (Buss & Dedden, 1990; Campbell, 2004; Fisher & Cox, 2009). For women, key domains of intrasexual derogation are physical appearance, sexual fidelity (being derided for being too promiscuous), or sexual availability (being derided for being too sexually unresponsive) (Buss, 2012). Female competitor derogation is certainly not limited to these domains though, with a recent study reporting that women derogate competitors who threaten their romantic relationships across a wide range of traits – including all 12 measured in that study. These traits included attractiveness, age, sexual faithfulness, loyalty, athletic prowess, ambition, intelligence, supportiveness, trustworthiness, honesty, non-judgement and dependability (Schützwohl, Joshi, & Abdur-Razak, 2022). Vaillancourt and Sharma (2011) found that women tend to derogate "sexy peers" to a greater extent than women they found less sexually threatening, and adolescent girls who rated themselves as highly attractive also reported experiencing higher levels of indirect aggression (Leenaars, Dane, & Marini, 2008). This should be qualified by the acknowledgement of inconsistent findings regarding the extent to which

observer-rated physical attractiveness and self-rated physical attractiveness are related (see Section 1.2.3). Derogation by more physically attractive women has a greater effect on decreasing men's judgements of the attractiveness of derogated rival (Fisher & Cox, 2009) making derogation most effective for highly attractive, high mate quality women.

We propose that the process of rival derogation serves two purposes. It highlights the target's shortcomings (whether real or imagined) to potential partners. But it may also function to lower the target woman's self-perceived mate-value. Since women target their mate-attraction efforts towards men of similar mate value to themselves, targeting a woman's self-perceived attractiveness and self-perceived desirability as a mate, could compel her to shift her mate-attraction tactics further down the mate-value ladder. This could effectively remove her from the aggressor's pool of rivals.

Verbal derogation comes with the risk of reputational damage to the aggressor as well – if she were to be seen as unkind by a (potential) mate (McAndrew, Bell, & Garcia, 2011; Regan, Levin, Sprecher, Christopher, & Gate, 2000). This risk can be mitigated in several ways. Depending on whether something is directly stated or only implies, the aggressor can maintain plausible deniability, claiming to have meant something different, or even that they were "only joking" (Krems, 2021). Verbal derogation reaches its peak around adolescence and early adulthood (Archer, 2004) with girls and young women "bitching", "spreading rumours", "breaking confidences" and "criticising others' clothing, appearance or personality" (Owens, Shute, & Slee, 2000). An example given by a high school student interviewed in that study was (said publicly at school) "have you gotten your pregnancy test back yet?", which neatly encapsulates derogation of promiscuity, and then the 'only joking' denial of malicious intent. Girls in this study identified negative effects of derogation, including psychological effects such as confusion, pain, fear and paranoia, anxiety, loss of self-esteem and social exclusion. They highlighted the importance of group inclusion as both a signal of acceptance "being in" and a protective strategy against indirect aggression by members of that group.

Given that high school is a highly socially stratified environment (Eckert, 1989), girls within a group would more likely be of the same social stratum (Armstrong, Hamilton, Armstrong, & Seeley, 2014). Different strategies of intrasexual competitiveness might be operating within social strata (where we might assume members have approximately equal mate value and should thereby be competing for the same potential partners, but there is a higher social benefit to being as covert in your competition as possible) and between social strata

(competing to keep lower mate value individuals out of your stratum). To my knowledge this had not been researched to date and exploration of competition within and between mate value levels in one particular modern-day context (namely at the hairdresser), by adult women, is addressed in the third study in my thesis (Chapter 4).

Competitor manipulation can be accomplished in several ways such as by making a rival undervalue the quality of a potential mate (by highlighting his negative qualities), or by trying to divert their attention to a more suitable potential mate (that isn't yours) (Fisher & Cox, 2011). Competitor manipulation also involves influencing a rival to complete an action that would be detrimental to their mate value, or to lower their mate value (by providing them with some superior stimulus against which to compare themselves unfavourably) thereby decreasing their competitiveness in the mating market (Williams & Sulikowski, 2020 and Sulikowski, et al., in preparation). An example of this is by providing a competitor with misleading appearance advice: "No, your bum does NOT look big in that!". While the above example is trivial, new research is looking at the very serious impact of intrasexual competitiveness (such as bullying) to induce or exacerbate eating disorders (R. Abed et al., 2012; Lie, Rø, & Bang, 2019) essentially by manipulating vulnerable rivals to lose so much weight that they i) become physically unattractive to men, ii) lose their reproductive ability, iii) become so unwell that they withdraw from intrasexual competition and in the worst case scenario lose their lives.

Providing misleading beauty advice may be a competitive tactic of which women are implicitly aware. Findings that female shoppers in cosmetics stores are more likely to trust the advice and recommendations of gay male sales associates than heterosexual female sales associates specifically when buying appearance-related products (Russell, Bradshaw, Rosenbaum, Hill, & Russell-Bennett, 2021) point to this possibility. Women strategically reduce their display of cues that elicit same-sex aggression to minimise victimisation (Krems, Rankin, & Northover, 2020). In that study, women selected outfits which bared less skin and were more modest when dressing for an encounter with other women. This was especially so in situations where the wearer anticipated an amplified risk of aggression, as a result of being physically attractive or being a newcomer. Both men and women anticipated greater intrasexual aggression towards women who dressed revealingly, particularly if they were also attractive. Collectively these findings demonstrate that women take steps to avoid female intrasexual competitive aggression that may be targeted at them.

Fertility across the menstrual cycle plays an important role in sexual selection (Maner & McNulty, 2013). Ovulating women undergo subtle shifts in behaviour (Gangestad et al., 2004; Guéguen, 2009; Wilcox et al., 2004), odour (Thornhill et al., 2003) and appearance (Roberts et al., 2004). Woman are judged as more attractive during ovulation (Haselton & Gildersleeve, 2011) and looking at photos of ovulating women resulted in increased testosterone release in males (M Fisher, 2004). Miller et al. (2009) found that female lap dancers earned significantly higher tips during ovulation. However, ovulating women also attract more intrasexually competitive behaviours than they do during their non-fertile stage: including increased derogation (M Fisher, 2004; Vaillancourt & Sharma, 2011) and additional mate-guarding behaviour from other females (Haselton et al., 2007). Females are also more intolerant of attractive peers (Vaillancourt & Sharma, 2011), resulting in greater intrasexual competition, such as derogation (Vaillancourt, 2013). As attractiveness is integral to the mate value of females (Gutierres et al., 1999), ovulating females, and highly physically attractive females, generally, represent a greater intrasexual threat.

1.3 Research Aims

The overarching goal of this thesis is to explore how female intrasexual competitiveness strategies operate in modern-day contexts. I also proposed to explore how aggressor-target mate value interactions influence female intrasexual competition. I explored downward competition, upward competition and same-stratum competition.

Downward competition is that in which the aggressor (albeit indirect aggressor) has a higher mate value than the rival. I hypothesise that the reason for this would be to keep lower mate value women from trying to "promote themselves" into a higher stratum, restricting the number of direct competitors for the same potential mates. In a situation like high school, or the school P & F committee, keeping the lower mate value women out serves to establish and maintain an "in-group" which has a socially protective function for those within the group.

Upward competition is that in which the aggressor is of lower mate value than her rival. Attractive women have been found to incite competitive reactions from other women (Vaillancourt, 2013). This suggests that there are some contexts in which it would be adaptive to target competitive aggression toward rivals higher in mate value than yourself. On the face of it, this may seem counterproductive. Whatever strategies of competitor derogation or manipulation may be employed, lowering the apparent mate value of a rival whose mate value was originally higher than your own, will only make closer in mate value to you, and so more, rather than less

likely to target your potential mates. Perhaps upward competition only targets women are already actively competing with the aggressor for mates despite their mate value differential (via mate poaching for example, which highly attractive women tend to engage in more than less attractive women). Upward competition may also target rivals so far above you that even with a lowering of their mate value, they would never compete for your prospective mates. Competitive strategies in this case are simply trying to impose some costs on high mate value rivals without directly benefitting the aggressor. This would be a more global technique of generally targeting the mate value of attractive women. For lower mate value women, upward competition may be the only option and targeting higher mate value women may serve to ensure social alliances within your same-level group.

Same stratum competition occurs when the aggressor is approximately the same mate value as the rival. Women of the same attractiveness level are likely to be the biggest competitors for potential appropriate mates (Fisher & Fernández, 2017). However, women at the same mate level are also likely to move in the same social circles, where obvious aggression would likely have social consequences. Competition at this level may be especially subtle, involving techniques with higher amounts of plausible deniability.

These aims were addressed across four empirical studies. In the first study I explored the combined effects of makeup and ovulation on ratings of female faces on characteristics related to intrasexual competition (like physical attractiveness, flirtatiousness) and characteristics not expected to be related to intrasexual competition (like trustworthiness and conscientiousness). In the second study I explored the use of social media as a vector for female intrasexual competition. Firstly, using a mock-up Instagram feed I investigated the effect of mate value and intrasexual competitiveness on participants' likelihood of posting, "liking" or commenting on different types of photos. Following this I analysed the actual photos posted by a subset of consenting participants, providing ecological validity for the hypothetical posting behaviour measured in the first part. I also explored sex differences in types of photos posted. The third study explored how women sabotage hypothetical hairdressing clients through disingenuous beauty advice which would detrimentally impact the clients' physical attractiveness. Both lay people and professional hairdressers reported how much hair they would cut off "clients" of varying attractiveness. The effects of client attractiveness and hairdresser intrasexual competitiveness and mate value were evaluated. The final study explored conspicuous consumption as a female competitive strategy using women's spending on non-essential items in two different scenarios – in preparation for a women-only social event to be hosted in their

home, and at a charity function. I evaluated the impact of an audience, whether the women had children, the perception of judgement by peers as well as mate value and intrasexual competitiveness on amount spent.

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Chapter 2: Sex Differences in the Perception of Attractiveness as Affected by Makeup and Ovulation

1. Background

Women have developed mate attraction tactics such as wearing makeup to maximize the appeal of their appearance to men and at the same time signal competitiveness to other women. Ovulating women have been judged in some studies by both sexes to be more attractive, representing both a greater appeal to men and competitive threat to women during the time when they are most fertile. This project investigates the degree to which makeup is a competitive signal to rivals or a beauty enhancement aimed at men, and explores whether makeup enhances or reduces the effect of increased attractiveness during ovulation differentially for male and female participants. Participants also rated the faces on other attributes such as trustworthiness, friendliness and conscientiousness, which allowed for a comparison of the differential effects of makeup and ovulation on various qualities (some related to intrasexual competitiveness and others not). I examined the effects of mate value and intrasexual competitiveness on judgements of the faces of other women to identify effects in different strata of intrasexual competition.

1.1.1 Make-up

Women enhancing their physical attractiveness underpins a beauty, fashion, and makeup industry worth billions of dollars (Statista, 2022). The evidence of makeup usage spans more than 6000 years, with ancient Egyptians using black kohl to line their eyes and white pigments to protect their faces from the sun (Eldridge, 2015). By about 4000 BCE pigments were being used on eyes, cheeks and lips in ancient Greece and Rome, and from about 3000 BCE Chinese royalty used nail polish, vermillion on their lips and light powder foundation to whiten their skin to show their social status (Corson, 1972).

The application of cosmetics for aesthetic purposes is broadly accepted as an attempt by women to increase attractiveness. It enhances perceived attractiveness of female faces in photos irrespective of the sex of the perceiver (Batres et al., 2018; Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Etcoff, Stock, Haley, Vickery, & House, 2011; Killian & Peissig, 2013). However, not all makeup application is equal, with the amount and style of applied makeup moderating the effect of its attractiveness. Whether more or less make-up is perceived as more attractive depends on whether it is professionally applied (Tagai, Ohtaka, & Nittono, 2016,

Etcoff et al., 2011) or self-applied (Aguinaldo & Peissig, 2019, 2021). Professionally applied make up from light to heavy can uniformly increase attractiveness (Etcoff et al., 2011), or in some instances light make-up is preferred (Tagai et al., 2016). Amateur- (self) applied make-up may be more attractive when it is heavier (Aguinaldo & Peissig, 2019, 2021). Therefore, it seems most likely that the absolute amount of make-up is less important than the style and skill with which it has been applied. .

The sex of the viewer may moderate make-up's effects on attractiveness. Many prior are studies are silent on viewer sex-differences because they reported findings from single sex samples (Tagai et al., 2016) or mixed sex samples without factoring participant sex (Aguinaldo & Peissig, 2019, 2021; Etcoff et al., 2011). The few studies that have differentiated results by participant sex–found increased attractiveness due to self-applied makeup as perceived by men and women separately, but they also found sex-differences in the attractiveness ratings, with men generally rating attractiveness lower than women (Batres et al., 2018; Cash et al., 1989). Further clarification of whether the effect of makeup on perceived attractiveness is mediated by the sex of the rater, would provide evidence of makeup being used to fulfil a different purpose for male and female viewers and the need to interpret the results of historical studies where raters of all sexes were analysed together with caution.

Make-up impacts more than just perceived attractiveness. Women wearing makeup were judged to be healthier and more confident (Nash, Fieldman, Hussey, Lévêque, & Pineau, 2006). Makeup was found to make older women look younger and younger women look older (Russell et al., 2019). Again, there were sex differences in perceptions of women wearing makeup with men rating made-up faces as having higher prestige, while women rated the same faces as having higher dominance (Mileva, Jones, Russell, & Little, 2016). The study found that women experienced more jealousy towards other women wearing makeup, and believed them to be more attractive to men and more promiscuous. Makeup was found to increase perceptions of sexiness and femininity, even when no effect on perceived attractiveness was found (Cox & Glick, 1986). The effect of makeup is also dependent on the mate value (physical attractiveness) of the wearer: highly attractive women are perceived as more interpersonally aggressive when wearing made-up, and less attractive women are perceived as having more leadership potential (perhaps in line with perceptions of greater dominance) (Sulikowski, Ensor, & Wagstaff, 2022). However, not all perceptions affected by makeup are true: makeup usage is associated with perceptions of more unrestricted sociosexuality by both male and female raters (Batres et al., 2018) but women’s self-reported sociosexuality is not related to their self-reported makeup usage. Men tipped more

in restaurants when the waitress was wearing makeup (Guéguen & Jacob, 2011), and wearing makeup in a bar resulted in an increased number of male approaches (Guéguen, 2008a), perhaps linked to increased perceptions of sociosexuality rather than increased attractiveness.

More competitive women use more makeup. Intrasexual competitiveness positively predicted the amount of money spent on makeup, and intrasexual competitiveness and mate value predicted the frequency of makeup use (Mafra et al., 2020). Wagstaff (2018) also found *frequency* of makeup use to be related to high intrasexual competitiveness (and a restricted sociosexual orientation i.e. preference for long term mating rather than short term), while *quantity* of makeup worn was related to unrestricted sociosexuality, perhaps using excessive makeup as a signaller of sexual availability. The higher a woman's intrasexual competitiveness the more oriented she is to perceiving other women as rivals and the more motivated she is to out-compete rivals (Fisher & Candea, 2012). Wearing makeup is a self-promotion strategy to enhance attractiveness, but it also sends a global signal to all other women in her presence of her dominance and prestige (Mileva et al., 2016, Sulikowski et al., 2022). The signal does seem to be received by viewers but interpreted in different ways depending on their own mate value: viewing photos of attractive faces with makeup (but not without) made high mate value women lower their self-rated attractiveness, but not low mate value women or women who viewed less attractive faces (Sulikowski et al., 2022). In this way, makeup is being used as a competitor manipulation strategy where rivals are induced to downwardly adjust their self-perceived mate value, which lowers the quality of potential mate that they market themselves at (Williams & Sulikowski, 2020). It is particularly aimed at women at the same level of attractiveness as the participant, given the participants and the rivals were both of high mate value/ highly attractive suggesting within-stratum competition.

1.1.2 Cyclical changes in fertility

Fertility across the menstrual cycle plays an important role in sexual selection (Maner & McNulty, 2013). Ovulating women undergo subtle shifts in behaviour (Arslan, Schilling, Gerlach, & Penke, 2018; Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004; Guéguen, 2009; Wilcox et al., 2004), body scent (Gildersleeve, Haselton, Larson, & Pillsworth, 2012; Thornhill et al., 2003), vocal pitch (Pipitone & Gallup Jr, 2008) and appearance (Puts et al., 2013; Roberts et al., 2004). Women are generally judged as more attractive during ovulation by both male and female observers (Bobst & Lobmaier, 2012; Haselton & Gildersleeve, 2011; Puts et al., 2013), (Roberts et al., 2004), (Wagstaff, Sulikowski, & Burke, 2015 but see Bleske-Rechek et al., 2011). Looking at photos of ovulating women resulted in increased testosterone

release in men (Fisher, 2004). Female lap dancers earned significantly higher tips during ovulation, compared to other phases of their cycle (Miller et al., 2009). Hence, physiological and behavioural effects of ovulation suggest that on some levels it is not as undetectable as initially thought (Marlowe, 2004).

Ovulating women represent more of a competitive threat in that their likeliness of conception is greater. A pregnant rival could result in resources being diverted from an existing mate. Women do seem to implicitly perceive ovulating rivals as more threatening. They solicited more intrasexual competitive behaviours than during their non-fertile stage: including increased derogation (Fisher, 2004; Vaillancourt & Sharma, 2011) and additional mate-guarding behaviour in other females (Haselton, Mortezaie, Pillsworth, Bleske-Rechek, & Frederick, 2007). Ovulating women are not only perceived as more threatening but also showed increased intrasexual competitiveness themselves (Fisher, 2004). During periods of high oestrogen, women rated the facial attractiveness of female faces as lower, suggesting increased competition, shown in the form of derogation. By contrast, oestrogen ratings of male faces levels were not significantly affected by the fertile stage of the viewer. During ovulation, women showed an attentional bias towards ornamental objects (objects they could use to increase their physical attractiveness) (Zhuang & Wang, 2014). This bias increased when participants were primed with photos of highly attractive women (rather than highly attractive men), thus implying an intrasexually competitive motive rather than a mate-attraction motive during ovulation. During their luteal phase, exposure to attractive men increased attentional bias towards ornamental objects.

Ovulation may be signalled through changes in skin colouring and texture perceived as enhanced attractiveness (Burriss et al., 2015; Oberzaucher et al., 2012; Rigaill, 2020). Oestrogen levels (which peak during ovulation) affect the redness and luminance of skin colour (Rhodes et al., 1997; Thornton, 2002) by increasing blood flow. Circulating oestrogen binds to skin receptors, changing the oxygenated to deoxygenated blood ratio in skin vessels resulting in a decrease in skin brightness and an increase in redness (Pelletier & Ren, 2004; MJulie Thornton et al., 2003). Cheek and lip colour are associated with greater attractiveness in women (Re, Whitehead, Xiao, & Perrett, 2011; Stephen & McKeegan, 2010) . Red lips attract more attention (than blue/yellow or natural lips) in the early stages of face processing and are associated with slower, more careful processing at later stages (Tanaka, 2021). Red lipstick was found to increase waitresses tips in a restaurant (Guéguen & Jacob, 2012). Lip and cheek colour are easily manipulated by applying makeup – during all stages of the woman's cycle.

Makeup and ovulation are both associated with changes in perception of female faces. These changes are not only in the perception of physical attractiveness, but also in non-physical characteristics such as dominance and intrasexual competitive threat. When considered together, how might makeup conceal or enhance the effect of ovulation? And how might this happen differently for male and female perceivers? In order to retain access to resources even when not ovulating, and withstand the threat of ovulating rivals, women may use makeup to mimic physiological signs of peak fertility – thereby increasing their perceived threat to other women and deceiving men into enhanced perceptions of physical attractiveness. However, given the evolutionary advantage of being able to select a mate who is actually "fitter", men may be expected to have evolved interpreting signals of peak fertility which are not easily replicable through external manipulation making them less susceptible to the effects of makeup. Because highly intrasexually competitive women are most sensitive to the threat of rivals, they might be expected to be more affected by both ovulation and makeup application. By comparing perceptions of intrasexually competitively relevant characteristics like physical attractiveness, flirtatiousness, desirability to the opposite sex to other characteristics which are less likely to induce intrasexual competition, such as friendliness, conscientiousness, and parenting ability, I hoped to identify where specifically intrasexual competition was responsible for the effects.

1.2 The Current Study

In the first part of this study I explored the combined effects of makeup and ovulation on the perceived physical attractiveness of female faces by men and women separately. I used photograph stimuli taken of the same faces, under the same laboratory conditions, during the high fertile phase and the low fertile phase. Makeup was then applied digitally to the photos using the www.taaz.com (Taaz Inc, 2014).

This was largely exploratory in nature, examining the connections between physical attractiveness ratings, makeup and fertility of the stimulus, and sex, intrasexual competitiveness and mate value of the participant. Consistent with known effects of make-up, I expected made-up faces to be judged as more attractive than bare faces overall, by both men and women. I expected that ovulating faces would be judged to be more attractive than non-fertile faces by both men and women in the barefaced condition, but not in the makeup condition and that highly intrasexually competitive women would judge ovulating women with makeup to be more attractive than they would be judged by less competitive women.

Following this, I investigated the combined effect of makeup, ovulation and intrasexual competition on judgements of qualities other than physical attractiveness by men and women separately. I measured how fertility and makeup of photo stimuli, as well as intrasexual competitiveness and sex of the participant impacted judgements of the following characteristics: trustworthiness, friendliness, conscientiousness, parenting ability, flirtatiousness, desire to date (for male participants)/ how desirable you believe this person would be to the opposite sex to date (for female participants), and overall attractiveness. I wanted to investigate which of these characteristics followed similar patterns of effects and if any showed unique effects. I predicted similar patterns for attributes such as physical attractiveness, overall attractiveness and desirability to date, and potentially similar patterns for trustworthiness and conscientiousness. I was interested to see whether friendliness and flirtatiousness were perceived in the same way, and whether there were sex differences in this perception.

In summary, the aim of this study was to investigate the combined effects of makeup and ovulation on perception of various attributes (of varying importance in mate selection) by male and female observers, and to explore how this varied with observer sex, intrasexual competitiveness and mate value.

2. Materials and method

2.1. Participants

A total of 721 participants were recruited through social media (*N*=29) and undergraduate psychology courses (*N*=436) for which they received credit, and a paid participant bank (ProlificAcademic.com, *N*=256). Fifty-eight participants were excluded for either failing to indicate their sex (*N*=1) or for not completing the intrasexual competitiveness measure of the survey (*N*=57). Forty-two participants were excluded for not being predominantly heterosexual. The final analyses included data from 621 participants: male (*N*=289, aged 18-69, *M*=30.21, *SD*=9.61) and female (*N*=332, aged 18-80, *M*=34.45, *SD*=10.71). All participants provided informed consent under HREC protocol number **2015/287** (approved by the Charles Sturt University Human Research Ethics Committee).

2.2. Instruments and Measures

2.2.1. Mate Value Scale

Edlund and Sagarin's (2014) *Mate Value Scale* (MVS) was used to assess global mate value. The MVS is a short four-item self-report measure of mate value where participants rate global statements about their attractiveness as a potential partner (such as "Overall, how would

you rate your level of desirability as a partner?) on a 7-point rating scale ranging from 1 (extremely undesirable) to 7 (extremely desirable). The overall score is the average score of the four-items. People are generally quite accurate at selecting mates who are similar to their own self-perceived mate value (Luo & Klohnen, 2005; Watson et al., 2004) and accurately report their own and others mate value (Brase & Guy, 2004), though women were found to be more accurate than men when determining mate value (Eastwick & Finkel, 2008; Buss & Shackelford, 2008), with self-rated attractiveness and observer report being higher correlated in women than men. This measure exhibits high internal consistency, (Cronbach's alpha = .86), and test-retest reliability, (r= .85, p = < .001). The scale has a strong correlation with other mate value measures and is consistent with key mate value factors such as likability and attractiveness (Edlund & Sagarin, 2014). In the current sample I observed strong internal consistency for both male (Cronbach's alpha = .92) and female (Cronbach's alpha = .90) participants.

2.2.2. Mate Value Inventory (short form)

Kirsner, Figueredo and Jacob's (2003) Mate Value Inventory (MVI-7) provides a more systematic process for people to assess individual qualities making up their mate value. The MVI-7 is a list of 17 traits (previously found to be important for mate selection, (Ellis, 1998; Rowe *et al.*, 1997)), where participants indicate on a scale from 1 (extremely low on this trait) to 7 (extremely high on this trait) the degree to which each attribute applies to them. The traits listed were ambitious, attractive face, attractive body, loyal, responsible, enthusiastic about sex, independent, faithful to partner, financially secure, generous, good sense of humour, healthy, intelligent, desires children, emotionally stable, kind and understanding, and sociable. The average across all 17-items gives the mate value score. The reported internal reliability of this scale is high, Cronbach's alpha = .83 (Fisher, Cox & Bennett, 2008). In the current sample I observed strong internal consistency for both male (Cronbach's alpha = .84) and female (Cronbach's alpha = .81) participants, as well as a strong positive correlation between these two mate value measures for both men, $r = .61$, $n = 286$, $p < .001$, and women, $r = .62$, $n = 331$, $p < .001$, demonstrating construct validity.

I decided to use both the Mate Value Inventory and the Mate Value Scale as different logic underpins each one: implicit subitising of mate value (MVS) versus explicit rating of relevant characteristics (MVI). I felt it would be of value to see whether either tends to explain more variance in, or exhibit larger effects on, other variables. The MVS involves a self-assessment of overall mate value which I expected may have higher ecological validity as people

tend to implicitly know where they fit in terms of mate value and rarely explicitly calculate it by summing up their individual attributes. The mean of the MVI also does not weight the individual qualities for either their relative importance (e.g. "desire for children" may not carry the same importance as "stable personality") or their differential importance to each sex (e.g. "attractive face" contributes more to mate value for women, while resources contributes more to the mate value of men).

2.2.2. Intrasexual competitiveness scale

Bunnk and Fisher's (2009) Scale for Intrasexual Competition was used to calculate the degree to which participants feel competitive towards members of the same sex for access to opposite sex attention. Participants were given 12 statements and asked to indicate on a 7-point rating scale ranging from 1 (not at all applicable) to 7 (completely applicable) how much the statement applies to them. The average of all items on this scale was used as the participant's score of intrasexual competitiveness. The scale has been found to have good construct validity by correlating with social comparison orientation in both sexes, (Bunnk & Fisher, 2009) and Dalley and Buunk (2008) found a high correlation (over .50) between intrasexual competition as measured using this scale, and the frequency with which women compared their own physical appearance with other women. Buunk & Fisher report a strong internal consistency (Cronbach's alpha = .80). Mean sex differences tend not to be reported and the measure also has a high degree of cross-cultural equivalence (Bunnk & Fisher, 2009). In the current study I observed significantly higher mean scores ($t(614) = 7.11$, $p = <.001$, two-tailed) for male ($M = 2.83$, $SD = 1.08$) than female participants ($M = 2.23$, $SD = .99$), and good internal consistency for both sexes (Cronbach's alpha = .88 for males Cronbach's alpha = .91 for females).

2.3 Stimuli

Pairs of photos of female faces of varying attractiveness had been collected previously (D. Wagstaff, 2016) and participants had provided consent for their photos to be used as stimulus photos in subsequent research studies. (Approved by the University of Newcastle's Human Research Ethics Committee, based on the National Guidelines for Ethical Conduct in Human Research. Protocols: H-2009-0311, H-2009-0312, H-2012-0398). One photo was taken during ovulation and the other taken during the non-fertile stage of each woman's cycle. Models ($M_{age} = 25.26$, SD = 5.48, range = 19-36) were photographed under the same conditions without any makeup on during the course of the same month. The levels of oestradiol and progesterone were measured in saliva samples. Oestradiol concentrations were determined using a high-

sensitivity human saliva 17β-estradiol ELISA (Abnova Corporation, Taipei, Taiwan), with duplicates run to ensure accuracy. Progesterone concentrations were also assessed in duplicates, using Progesterone ELISA kits (Enzo Lifesciences, Farmingdale, NY). Intra-assay CV's were maintained below 10%. The oestradiol-to-progesterone ratio was computed, and the findings indicated a significantly higher ratio for the fertile period ($M = 0.05$, $SD = 0.02$) compared to the non-fertile period ($M = 0.04$, $SD = 0.02$) [$t21 = 2.13$, $p = .046$], confirming that the fertile sessions are in a higher conception risk phase (Eisenbruch, Simmons, & Roney, 2015). Additionally, phases were identified using the backwards-counting method based on actuarial data from Wilcox, Dunson, Weinberg, Trussell, & Baird (2001), where ovulation day was calculated as 14 days before the onset of menstruation. These photos formed the basis of the stimulus images. Each stimulus identity was presented to participants in four conditions: with and without makeup (manipulated between participants), while at the fertile and non-fertile stages of their cycles, respectively (manipulated within participants).

The www.taaz.com (Taaz Inc, 2014) makeup software allowed for the identical application of makeup to the ovulating and non-ovulating photo of the same woman, controlling for differences in makeup application if done by hand on each woman on a particular day. The digital makeup applied was intended to represent everyday makeup. Once makeup had been applied to each photo, the photos were shown to a panel of twenty 18-30 year-old women who judged whether the application satisfactorily represented what a woman might wear as everyday makeup. The panel only identified three instances where they did not deem this to be the case. The makeup was adjusted for these images and subsequently assessed by the panel as being appropriate. Figure 2.1 provides indicative stimuli photos with and without makeup prepared according to the same procedures. The actual stimuli are not used for privacy reasons as, models did not consent to their images being made public.

Figure 2.1. Indicative stimulus photos for the makeup manipulation showing bare faces, and everyday makeup.

2.4 Procedure

Participants initially provided demographic information about themselves: age, sex, sex of their partner, relationship status, highest level of education, and personal annual income (scored as 1: $0 - $20 000; 2: $20 000 - $50 000; 3: $50 000 - $80 000; 4: $80 000 - $120 000; 5: $120 000 - $200 000; and 6: >$200 000), and whether they are currently taking an oral contraceptive pill.

Participants were randomly assigned to view either made-up or bare-faced photos. Participants were asked to rate their perception of the following characteristics of the woman in each image: physical attractiveness, trustworthiness, flirtatiousness, friendliness, her conscientiousness, parenting ability, overall attractiveness, and how desirable she would be to date on a scale of one (1 = not at all) to eight (8 = extremely). Order of presentation of the photos was randomised and no reference was made to the fact that participants would see each face twice. After presentation of the images, participants competed the Mate Value Scale, Mate Value Inventory (short form), and the Intrasexual Competitiveness Scale. Lastly, participants were debriefed as to the aims and hypotheses of the study.

3. Results

The data were analysed to determine whether male and female participants rated attractiveness higher in ovulating stimulus photos versus non-fertile photos (within subjects' factors), and whether photos of made-up faces were judged to be more attractive than baref-faced photos (between subjects factor). In addition, the effects of intrasexual competitiveness and mate value of the participant on their attractiveness ratings of the stimulus photos were explored. Three separate mixed analyses of covariance were applied to the attractiveness rating, with makeup/bare-faced (2) and sex (2) as between subjects factors, fertile/non-fertile (2) as a within subjects factor and using firstly, intrasexual competitiveness (z-score of the mean ICS) as the covariate, followed by the two different measures of mate value (separately), using the z-score of the mean MVS and z-score of the mean MVI as the covariates respectively in the two analyses.

3.1 Ratings of Physical Attractiveness

3.1.1 Physical Attractiveness and Intrasexual Competitiveness

In the first analysis I investigated the effect of makeup and fertility on the perceived physical attractiveness of the face in the photo, including how this was affected by the sex, and the intrasexual competitiveness of the rater. A mixed analysis of covariance (ANCOVA) was applied to the attractiveness rating, with makeup/no makeup (2) and sex (2) as between subjects factors, fertile/non-fertile (2) as a within subjects factor and using intrasexual competitiveness (z-score of the mean ICS) as the covariate. 173 Female participants judged the physical attractiveness of faces with makeup (M = 3.951, SD = .925 for faces in the non-fertile stage and M = 3.955, SD = .894 for faces in the fertile stage), and 159 judged bare-faces (non-fertile: M = 3.690, SD = .960 and fertile: M = 3.623, SD = .978). 132 Male participants judged faces with makeup (non-fertile: M = 3.347, SD = .1.158 and fertile: M = 3.414, SD = .1.132) and 155 male participants judged faces without makeup (non-fertile: M = 3.531, SD = .1.156 and fertile: M = 3.414, SD = .1.134).

Initial inspection of the ANCOVA model revealed a significant 3-way interaction between intrasexual competitiveness, sex and makeup, F (1,608) = 9.89, p = .002, η_p^2 = .016, indicating a violation of the assumption of homogeneity of regression slopes (intrasexual competitiveness being the covariate). Such a violation tends to make the significance tests of lower order effects in the model more conservative, provided that the covariate has been centred as it was here (Glass et al 1972, Hollingsworth, 1980; although the three-way interaction itself is reliable and interpretable, Johnson, 2016). This model was, however, also potentially

compromised by variance heterogeneity (Levene's F (3, 612) = 2.995, p = .030, and F (3, 612) = 2.780, p = .040, for non-fertile, and fertile faces, respectively). Although the number of participants across the different groups was similar and groups were adequately large, and so the impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972). I decided to follow up the 3-way interaction by applying the above model (*sans* participant sex as a factor) to the male and female data separately. Heterogeneity of variance was not a concern for the models applied to the male and female data separately (all Levene's $F <$ 1.432, all $p > 0.232$). Prior to examining data from men and women separately, I also observed from the overall model, a significant main effect of sex (F (1,608) = 21.469, $p < .001$, $\eta_p^2 = .034$, with women providing overall higher ratings of attractiveness. The model also revealed a main effect of intrasexual competitiveness (F (1,608) = 6.412, $p = .012$, $\eta_p^2 = .010$), qualified by an interaction between sex and intrasexual competitiveness, F (1,608) = 18.977, $p < .001$, $\eta_p^2 =$ .030, as well as a 2-way interaction between sex and makeup, F (1,608) = 7.104, $p = .008$, $\eta_p^2 =$ .012, qualified by a significant 3-way interaction involving sex, make-up, and fertility F (1,608) = 3.913, $p = .048$, $\eta_p^2 = .006$). The directions of these effects and interactions are reported in detail below where I consider male and female datasets separately. I have clustered the effects reported from the male and female models using sub-headings to assist readability.

3.1.1.1 Sex, make-up, and fertility

Within the female sample, fertile faces were perceived as significantly less attractive overall then non-fertile faces, F (1,328) = 7.017, $p = .008$, $\eta_p^2 = .021$, while no such main effect was observed for men. Both male, F (1,280) = 27.562, $p < .001$, $\eta_p^2 = .090$, and female, F(1,328) = 8.505, $p = .004$, $\eta_p^2 = .025$, data, however, revealed significant fertility-by-makeup interactions. For women, the simple effect of fertility was significant for bare faces, F (1,328) = 14.827, $p < .001$, $\eta_p^2 = .043$, but not for made-up faces. Men, like women, rated non-fertile bare faces as more attractive than fertile bare faces, F (1,280) = 14.800, $p < .001$, $\eta_p^2 = .050$. When the faces were made-up, though, men perceived the fertile faces to be significantly more attractive, F (1,280) =12.896, $p < .001$, $\eta_p^2 = .044$. In subsequent models (where I entered measures of mate value, rather than intrasexual competitiveness, as the covariate), the pattern of these effects did not change, so I don't report on them again.

3.1.1.2 Sex, make-up and intrasexual competitiveness

The female data revealed a significant main effect of make-up, F (1,328) = 9.206, $p =$ .003, $\eta_p^2 = .027$, with made-up faces judged to be more attractive overall, but no overall main effect of intrasexual competitiveness, F (1,328) = 2.131, $p = .145$, $\eta_p^2 = .006$. Within the male

data, no overall effect of make-up was observed, F (1,280) = .944, p = .332, η_p^2 = .003, but there was a significant main effect of intrasexual competitiveness, F (1,280) = 18.665, p <.001, η_p^2 = .062, with more competitive men providing higher ratings overall.

Significant two-way interactions between intrasexual competitiveness and makeup were observed within both the female, F (1,328) = 4.55, p = .034, η_p^2 = .014, and male, F (1,280) = 5.17, p = .024, η_p^2 = .018, samples. Interactions between a covariate and a categorical factor may be accounted for by differential relationships between the covariate and the DV at different levels of the categorical variable and/or by changing impacts of the categorical factor on the DV across different levels of the covariate. Here I explored both possibilities. Pearson correlations revealed that intrasexual competitiveness negatively predicted attractiveness ratings of made-up faces r = -.218, n = 173, p = .004 for women, but positively predicted attractiveness ratings of made-up faces, r = .371, n = 173, p < .001, for men. Intrasexual competitiveness did not predict attractiveness ratings of bare faces for either women, r = .034, n = 159, p = .674, or men, r = .122, n = 152, p = .134. I also estimated the simple effects of make-up at high and low (1 SD above and below the mean, respectively) levels of intrasexual competition. At low levels of intrasexual competition, women rated made-up faces to be more attractive than bare faces, F (1,608) = 11.392, p < .001, η_p^2 = .018, while men rated made-up faces to be less attractive, F (1,608) = 6.269, p = .013, η_p^2 = .010. At high levels of intrasexual competition, make-up did not impact either men's, F (1,608) = 1.032, p = .310, η_p^2 = .002, or women's, F (1,608) = .302, p = .583, η_p^2 = .000, attractiveness ratings.

3.1.2 Physical Attractiveness and Mate Value

Next, I investigated the effect of mate value (in place of intrasexual competitiveness) on physical attractiveness judgements, using the two different measures of mate value, the Mate Value Scale (MVS) and the Mate Value Inventory (MVI). The z-scores of the mean MVS and the z-scores of the mean MVI were used in separate ANCOVAs as the covariate.

Initial observations showed that there was no covariate by factor interaction for either the MVS or the MVI, suggesting that the assumption of homogeneity of regression slopes was valid in both cases. This model was, however, potentially compromised by variance heterogeneity (Levene's F (3, 613) = 2.842, p = .037, and F (3, 613) = 2.330, p = .073, for non-fertile, and fertile faces, respectively for the MVS analysis, and Levene's F (3, 614) = 3.260, p = .021, and F(3, 614) = 2.487, p = .060, for non-fertile, and fertile faces, respectively for the MVI analysis). Although, again, the number of participants across the different groups was similar and so the

impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972).

Initial inspection of the overall models revealed some similar patterns of main effects and interactions for the MVS and the MVI. As found in the intrasexual competitiveness analysis, there was a significant main effect of sex (MVS: $F(1, 609) = 17.898$, $p < .001$, $\eta_p^2 = .029$ and MVI: $F(1,610) = 17.653$, $p < .001$, $\eta_p^2 = .028$) qualified by a 2-way interaction between sex and makeup, MVS: $F(1, 609) = 6.54$, $p = .011$, $\eta_p^2 = .011$ and MVI: $F(1,610) = 6.540$, $p = .011$, $\eta_p^2 = .011$. There was also a significant 2-way interaction between fertility and makeup, MVS: $F(1, 609) = 34.514$, $p < .001$, $\eta_p^2 = .054$ and MVI: $F(1,610) = 34.721$, $p < .001$, $\eta_p^2 = .054$. The directions of these effects and interactions were reported before. However, when controlling for mate value, the 3-way interaction involving sex, make-up, and fertility did not reach significance, MVS: F|(1, 609) = 3.555, $p = .060$, $\eta_p^2 = .006$ and MVI:$F(1,610) = 3.74$, $p = .054$, $\eta_p^2 = .006$.

The model also revealed an effect of mate value as measured by the MVS: $F(1, 609) = 9.978$, $p = .002$, $\eta_p^2 = .016$ but not by the MVI: $F(1,610) = 2.155$, $p = .143$, $\eta_p^2 = .004$: as mate value of participants (as measured by the MVS) increased, physical attractiveness judgements of the stimulus faces increased. Also for the MVS, the 2-way sex by mate value interaction approached significance, $F(1, 609) = 3.728$, $p = .054$, $\eta_p^2 = .006$, while the MVI did not, $F(1,610) = 1.021$, $p = .313$, $\eta_p^2 = .002$. Further examination of this potential interaction showed that at higher mate values men and women did not differ significantly in their attractiveness judgements, $F(1,609) = 2.624$, $p = .106$, $\eta_p^2 = .004$, while at medium and low mate values, the women judged physical attractiveness significantly higher than men did, $F(1,609) = 17.898$, $p < .001$, $\eta_p^2 = .029$ at Z-score MVS = 0 and $F(1,609) = 18.960$, $p < .001$, $\eta_p^2 = .030$ at Z-score MVS = -1.

3.2 Impact of makeup, ovulation and intrasexual competition on other characteristics

At the same time as judging physical attractiveness of stimuli photos, participants were asked to rate each face (in the fertile and non-fertile stage) on the following attributes: trustworthiness, friendliness, conscientiousness, parenting ability, flirtatiousness, desire to date (for male participants)/ how desirable you believe this person would be to the opposite sex to date (for female participants), and overall attractiveness. The same ANCOVA model was applied as before using the ratings on each characteristic as the dependent variable.

As in the case of physical attractiveness discussed previously, when the initial analysis showed a covariate x factor interaction (either a two-way or a three-way interaction), indicating a violation of assumption of homogeneity of regression slopes, the highest order interaction was deemed to be valid as the covariate was centred in each case (Hollingsworth, 1980, Glass *et al*, 1972). Increased probability of a Type II error in the lower order interactions and main effects, meant that the analyses were completed again after splitting the data into two separate samples based on sex. The following characteristics showed a significant three-way interaction between sex, makeup and intrasexual competitiveness: trustworthiness, friendliness, flirtatiousness, desire to date, and overall attractiveness.

Across all analyses, there were no main effects for makeup, no two-way interactions between fertility and intrasexual competition, or makeup and intrasexual competition. There were no significant three-way interactions between fertility, sex and intrasexual competition, or fertility, makeup and intrasexual competition. There were also no significant fertility x sex x makeup x intrasexual competition four-way interactions. Figure 2.2 shows a graph of the mean ratings on eight characteristics by men and women ±SE for female faces in the fertile and non-fertile phases with and without makeup which are reported in subsequent subsections. Observations from Figure 2.2 show that in general makeup increased ratings on all characteristics for women but decreased ratings for men (except on judgements of flirtatiousness). In general, for women, ovulation effects were more pronounced for bare faces (with ratings decreasing with ovulation), while for men ratings for physical attractiveness, flirtatiousness, and desire to date all increased with makeup and ovulation together. Men's judgments on the intrasexually competitive characteristics physical attractiveness, overall attractiveness, flirtatiousness and desirability to date were all lower than women's ratings. While ratings on non-competitive characteristics trustworthiness, friendliness, conscientiousness, and parenting ability were more similar.

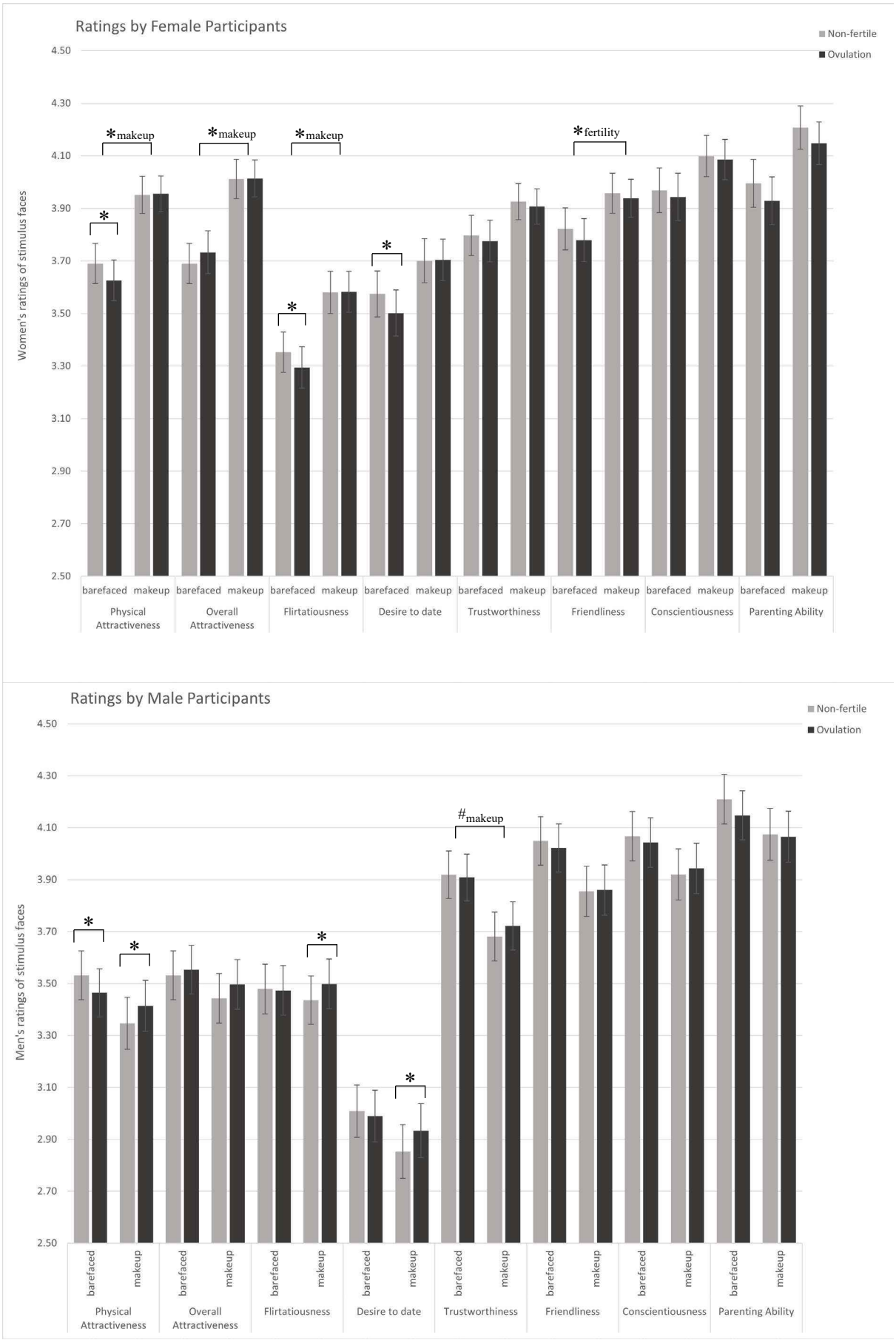

Figure 2.2. Mean ratings on eight characteristics by men and women ±SE for female faces in the fertile and non-fertile phases with and without makeup.

** is $p < .001$, * is $p < .01$, # is $p < .01$

3.2.1 Ratings of overall attractiveness

Unsurprisingly, the characteristic that closest matched the results for physical attractiveness was **overall attractiveness**. However, in addition to the same main effects of sex ($F(1,608) = 19.833$, $p < .001$, $\eta_p^2 = .032$) and intrasexual competitiveness ($F(1,608) = 5.793$, $p = .016$, $\eta_p^2 = .009$), there was a novel main effect of fertility ($F(1,608) = 4.799$, $p = .029$, $\eta_p^2 = .008$) which was not mediated by any interaction effects. Fertile photos ($M = 3.702$, $SE = .042$) were judged to be significantly more attractive overall than non-fertile photos ($M = 3.673$, $SE = .042$). As with physical attractiveness, the 2-way interactions between sex and makeup, and sex and intrasexual competition were qualified by a three-way interaction between sex, makeup and intrasexual competition ($F(1,608) = 7.226$, $p = .007$, $\eta_p^2 = .012$) making it necessary to follow up with ANCOVAs for the male and female samples separately. For the female sample, faces with makeup ($M = 4.028$, $SE = .078$) were judged to be significantly more attractive overall than faces without makeup ($M = 3.714$, $SE = .081$), ($F(1,328) = 8.829$, $p = .003$, $\eta_p^2 = .026$), and there were no significant interactions between makeup and fertility or makeup and intrasexual competition. For the male sample, when judging overall attractiveness, as with physical attractiveness judgements, there was a main effect of intrasexual competition, $F(1,280) = 16.705$, $p < .001$, $\eta_p^2 = .056$, qualified by an interaction between makeup and intrasexual competition, $F(1,280) = 4.254$, $p = .040$, $\eta_p^2 = .015$. *Post hoc* comparisons at low, medium and high intrasexual competitiveness revealed that highly competitive men rated faces with makeup ($M = 3.862$, $SE = .134$) as significantly more attractive than either low ($M = 3.063$, $SE = .137$) or medium competitiveness men ($M = 3.463$, $SE = .094$). Pearson correlations revealed that intrasexual competitiveness negatively predicted overall attractiveness ratings of made-up faces $r = -.173$, $n = 173$, $p = .023$ for women, but positively predicted attractiveness ratings of made-up faces, $r = .354$, $n = 132$, $p < .001$, for men. Intrasexual competitiveness did not predict attractiveness ratings of bare faces for either women, $r = .024$, $n = 159$, $p = .760$, or men, $r = .119$, $n = 152$, $p = .143$.

3.2.2 Ratings of flirtatiousness and desirability to date

This pattern of a significant 3-way sex x makeup x intrasexual competition interaction in the first analysis, followed by a significant makeup x intrasexual competition two-way interactions (in the subsequent separate male and female sample analyses) was repeated for men when judging the characteristics of **flirtatiousness**, $F(1,280) = 3.875$, $p = .050$, $\eta_p^2 = .014$ and **desire to date**, $F(1,280) = 7.100$, $p = .008$, $\eta_p^2 = .025$, In both cases this interaction qualified a main effect of intrasexual competitiveness. Higher intrasexual competitiveness led to increased

perceptions of flirtatiousness and a greater desire to date for faces with makeup than faces without makeup. Pearson correlations confirmed that intrasexual competitiveness positively predicted ratings of flirtatiousness by men for faces with makeup (r = .367, n = 132, p < .001) but not for bare-faces (r = .131, n = 152, p = .106), and intrasexual competitiveness also positively predicted ratings of desirability to date by men for faces with makeup (r = .436, n = 132, p < .001) but not for bare-faces (r = .140, n = 152, p = .086). There were no corresponding significant correlations between intrasexual competitiveness and flirtatiousness or desire to date in the female sample.

The findings from the ANCOVAs for flirtatiousness and desire to date showed additional similar significant effects. There was a significant two-way fertility x sex interaction for flirtatiousness, $F(1,608) = 6.735$, p = .010, $\eta_p^2 = .011$, and desirability to date $F(1,606) = 11.811$, $p < .001$, $\eta_p^2 = .019$. Women rated the non-fertile faces higher in desirability to date, $F(1,606) = 7.248$, p = .007, $\eta_p^2 = .012$, while men rated fertile faces higher in desirability to date, $F(1,606) = 4.800$, $p = .029$, $\eta_p^2 = .008$. In the same way women rated the non-fertile faces higher in flirtatiousness, $F(1,608) = 3.640$, p = .057, $\eta_p^2 = .006$, while men rated fertile faces higher in desirability to date, $F(1,608) = 3.132$, $p = .077$, $\eta_p^2 = .005$. When considering the male and female samples separately in the subsequent analyses, the main effect of fertility was qualified by a fertility x makeup interaction for both flirtatiousness, $F(1,328) = 5.042$, $p = .025$ $\eta_p^2 = .015$, and desirability to date, $F(1,326) = 7.195$, $p = .008$, $\eta_p^2 = .022$ in women, and in men $F(1,280) = 3.820$, $p = .052$, $\eta_p^2 = .013$ (flirtatiousness) and $F(1,280) = 12.927$, $p < .001$, $\eta_p^2 = .044$ (desire to date). *Post hoc* simple comparisons showed that women assessed flirtatiousness to be higher in non-fertile photos than fertile photos when the stimulus face was bare of makeup, $F(1,328) = 8.966$, $p = .003$ $\eta_p^2 = .027$, but there was no difference between fertile and non-fertile faces wearing makeup, $F(1,328) = .014$, $p = .906$ $\eta_p^2 = .000$. Conversely, men assessed fertile made-up faces to be more flirtatious than non-fertile made-up faces, $F(1,280) = 5.980$, $p = .015$ $\eta_p^2 = .021$, and there was no effect for bare-faces, $F(1,280) = .059$, $p = .809$ $\eta_p^2 = .000$. An identical pattern emerged for desirability to date: women assessed non-fertile photos to be higher in than fertile photos when the stimulus face was bare of makeup, $F(1,326) = 13.375$, $p < .001$ $\eta_p^2 = .040$, but there was no difference between fertile and non-fertile faces wearing makeup, $F(1,326) = .003$, $p = .953$ $\eta_p^2 = .000$. Men assessed fertile made-up faces to be more desirable to date than non-fertile made-up faces, $F(1,280) = 16.124$, $p < .001$ $\eta_p^2 = .054$, and there was no effect for bare-faces, $F(1,280) = .059$, $p = .809$ $\eta_p^2 = .000$.

3.2.3 Ratings of trustworthiness and friendliness

In the same way that desire to date and flirtatiousness showed similar patterns of significance, **trustworthiness** and **friendliness** also showed similarities. Initial inspection of the ANCOVA models for both revealed a significant 3-way interaction between intrasexual competitiveness, sex and makeup, F (1,608) = 5.244, p = .022, η_p^2 = .009 (trustworthiness) and F(1,608) = 5.668, p = .018, η_p^2= .009 (friendliness), indicating a violation of the assumption of homogeneity of regression slopes. Again, I followed up the 3-way interaction by applying the above model (*sans* participant sex as a factor) to the male and female data separately. Prior to examining data from men and women separately, I also observed from the overall model for trustworthiness, a significant main effect of intrasexual competitiveness (F (1,608) = 4.738, p = .030, η_p^2 = .008), qualified by an interaction between sex and intrasexual competitiveness, F (1,608) = 11.905, p < .001, η_p^2 = .019. The 2-way interaction between sex and makeup, F (1,608) = 5.006, p = .026, η_p^2 = .008, showed that makeup generally increased the trustworthiness for women and decreased the trustworthiness as perceived by men, however this was qualified by the significant 3-way interaction involving sex, make-up, and intrasexual competitiveness reported above. The same pattern was seen in judgements of friendliness: a significant main effect of intrasexual competitiveness (F(1,608) = 7.748, p = .006, η_p^2= .013), qualified by an interaction between sex and intrasexual competitiveness, F(1,608) = 7.314, p = .007, η_p^2= .012. The 2-way interaction between sex and makeup, F(1,608) = 3.887, p = .049, η_p^2 = .006, was in the same direction as for trustworthiness – makeup generally increased the friendliness for women and decreased the friendliness as perceived by men, however this was again qualified by the significant 3-way interaction involving sex, make-up, and intrasexual competitiveness reported above.

When analysed separately, women participants showed a main effect of fertility when assessing friendliness (but not trustworthiness), F(1,328) = 3.898, p = .049, η_p^2 = .012, judging non-fertile photos to be more friendly than fertile photos (M = 3.893, SD = 1.001 and M = 3.624, SD = .993 respectively). This effect of fertility was not found for men, F(1,280) = .411, p = .522, η_p^2 = .001, and was the only significant effect found for women.

The male data revealed a significant main effect of intrasexual competitiveness for both trustworthiness (F (1,280) = 12.851, p <.001, η_p^2 = .044) and friendliness (F(1,280) = 12.640, p < .001, η_p^2 = .043). In both cases *post hoc* analyses of the dependent variable at z-scores of -1, 0 and +1 for intrasexual competitiveness, revealed that more positive judgements of trustworthiness and friendliness were made by more competitive men. In neither case did the

makeup x intrasexual competitiveness interaction reach significance: F (1,280) = 2.677, p = .103, η_p^2 = .009 (trustworthiness) and F(1,280) = 3.550, p = .061, η_p^2 = .013 (friendliness).

3.2.4 Ratings of Conscientiousness and Parenting Ability

Conscientiousness and parenting ability were two the characteristics which showed significant effects that were least like other attributes. For **conscientiousness**, the only significant effect was the two-way interaction between sex and intrasexual competitiveness, F(1,608) = 8.238, p = .004, η_p^2 = .013, necessitating the separate analysis of male and female samples. Within the female only sample, there were no significant main effects or interactions effects. The male data set showed a significant main effect of intrasexual competitiveness, F(1,280) = 9.909, p = .002, η_p^2 = .034, which was qualified by a three-way interaction between fertility, makeup and intrasexual competitiveness, F(1,280) = 5.876, p = .016, η_p^2 = .021. Conscientiousness was the only attribute to show this interaction effect. Pearson correlations confirmed that intrasexual competitiveness positively predicted ratings of conscientiousness by men for faces with makeup (r = .261, n = 132, p = .002) but not for bare faces (r = .110, n = 152, p = .177). *Post hoc* simple contrasts at high (z-ISC +1), medium (z-ISC) and low (z-ISC -1) showed that at medium intrasexual competitiveness men rated conscientiousness higher in non-fertile faces when the faces were barefaced, F(1,280) = 9.010, p =.003, η_p^2 = .031, but not when they were wearing makeup, F(1,280) = 1.141, p =.286, η_p^2 = .004.

Judgements of parenting ability differed the most from all the characteristics assessed. The full ANCOVA model showed a main effect of fertility, F(1,608) = 21.499, p < .001, η_p^2 = .034, with non-fertile faces being judged as having better parenting ability than fertile faces. There was also a main effect of intrasexual competitiveness, F(1,608) = 4.693, p = .031, η_p^2 = .008, with judgements of parenting ability of the stimulus increasing with intrasexual competitiveness of the participant. The two-way, three-way and four-way interactions failed to reached significance. Given that there was no significant covariate by factor interaction, the model was not split into male and female samples and re-analysed.

3.3 Exploring the differences between intrasexual competitiveness and mate value on judgements of characteristics

Initially, the relationships between participant scores on the Intrasexual Competitiveness Scale, the Mate Value Inventory (MVI) and the Mate Value Scale (MVS) were investigated using Pearson correlation coefficients, separately for men and women. Preliminary analyses

were performed to ensure no violations of assumptions of normality, linearity and homoscedascity.

In both the male and female samples, there was a strong positive correlation between the two different mate value measures (MVI and MVS), $r = .616$, $n = 331$, $p < .001$ for women, and $r = .606$, $n = 286$, $p < .001$ for men. For women, there was no correlation between intrasexual competitiveness and the MVS, $r = -.015$, $n = 331$, $p = .785$, but a small negative correlation between intrasexual competitiveness and the MVI, $r = -.134$, $n = 332$, $p = .015$. A similar small negative correlation between intrasexual competitiveness and the MVI was found in the male sample, $r = -.118$, $n = 284$, $p = .046$. In addition, the male sample showed a small positive relationship between intrasexual competitiveness and MVS, $r = .163$, $n = 284$, $p = .006$.

In the same way as had been done in Part 1 using intrasexual competitiveness as the covariate, a series of 2 (makeup/barefaced) x 2 (fertile/non-fertile) x 2 (sex of rater) mixed analyses of covariance were carried out using the rating on each characteristic as the dependent variable. Makeup/barefaced and sex were between-subjects factors, while fertile/non-fertile was a within-subjects factor. This time, first the MVS was the covariate followed by the same analysis using MVI as the covariate. Again, as before, when there was a significant interaction effect found which included the covariate, the highest order interaction was deemed to be valid and the analyses were completed again after splitting the sample by sex.

Table 2.3 shows a comparison of significant main effects and interaction effects of the three different covariates across the eight characteristics.

Table 2.3

Significant main effects and interaction effects for intrasexual competitiveness and mate value (MVS and MVI) across various characteristics

	Covariates in the ANCOVA model	
	z-MVS	**z-MVI**
Physical Attractiveness		
Main effect of covariate	$F(1, 609) = 9.978$, $p = .002$, $\eta_p^2 = .016$*	$p = .143$
Sex x covariate	$F(1, 609) = 3.728$, $p = .054$, $\eta_p^2 = .006^{\#}$	$p = .313$
Sex x makeup x covariate	$p = .299$	$p = .825$
Females only:		
Makeup x covariate	$p = .145$	$p = .676$
Males only:		

Table 2.3

Significant main effects and interaction effects for intrasexual competitiveness and mate value (MVS and MVI) across various characteristics

	Covariates in the ANCOVA model	
	z-MVS	**z-MVI**
Main effect of covariate	$F(1,282) = 9.998, p = .002, \eta_p^2 = .034$*	$p = .129$
Makeup x covariate	$p = .865$	$p = .967$
Overall Attractiveness		
Main effect of covariate	$F(1,608) = 12.541, p < .001, \eta_p^2 = .020$**	$p = .058$
Sex x covariate	$F(1,609) = 4.243, p = .040, \eta_p^2 = .007$*	$p = .302$
Sex x makeup x covariate	$p = .336$	$p = .812$
Females only:		
Fertility x makeup x covariate	$F(1,327) = 5.236, p = .023, \eta_p^2 = .016$*	$p = .254$
Males only:		
Main effect of covariate	$F(1,282) = 12.700, p < .001, \eta_p^2 = .043$*	$F(1,282) = 3.379, p = .067, \eta_p^2 = .012^{\#}$
Makeup x covariate	$p = .943$	$p = .989$
Flirtatiousness		
Main effect of covariate	$F(1,609) = 12.559, p < .001, \eta_p^2 = .020$**	$F(1,610) = 3.749, p = .053, \eta_p^2 = .006^{\#}$
Sex x covariate	$p = .104$	$p = .518$
Males only:		
Main effect of covariate	$F(1,282) = 11.340, p < .001, \eta_p^2 = .039$**	$F(1,282) = 2.752, p = .098, \eta_p^2 = .010^{\#}$
Makeup x covariate	$p = .447$	$p = .371$
Desirability to date		
Main effect of covariate	$F(1,607) = 11.860, p < .001, \eta_p^2 = .019$**	$F(1,608) = 3.455, p = .064, \eta_p^2 = .006^{\#}$
Sex x covariate	$F(1,607) = 6.843, p = .009, \eta_p^2 = .011$*	$p = .119$
Sex x makeup x covariate	$p = .134$	$p = .914$
Males only:		
Main effect of covariate	$F(1,282) = 15.537, p < .001, \eta_p^2 = .052$**	$F(1,282) = 4.790, p = .029, \eta_p^2 = .017$*
Makeup x covariate	$p = .351$	$p = .845$
Trustworthiness		
Main effect of covariate	$F(1,609) = 7.891, p = .005, \eta_p^2 = .013$*	$F(1,610) = 3.866, p = .050, \eta_p^2 = .006$*
Sex x covariate	$p = .131$	$p = .920$
Sex x makeup x covariate	$p = .719$	$p = .916$
Males only:		
Main effect of covariate	$F(1,282) = 7.468, p = .007, \eta_p^2 = .026$*	$p = .245$
Friendliness		

Table 2.3

Significant main effects and interaction effects for intrasexual competitiveness and mate value (MVS and MVI) across various characteristics

	Covariates in the ANCOVA model	
	z-MVS	**z-MVI**
Main effect of covariate	$F(1,609) = 7.540$, $p = .006$, $\eta_p^2 = .012$*	$p = .159$
Sex x covariate	$p = .272$	$p = .896$
Fertility x makeup x covariate	$F(1,609) = 3.619$, $p = .064$, $\eta_p^2 = .006$#	$F(1,610) = 3.394$, $p = .021$, $\eta_p^2 = .009$*
Sex x makeup x covariate	$p = .864$	$p = .698$
Males only:		
Main effect of covariate	$F(1,282) = 6.085$, $p = .014$, $\eta_p^2 = .021$*	$p = .329$
Makeup x covariate	$p = .484$	$p = .562$
Conscientiousness		
Main effect of covariate	$F(1,609) = 4.468$, $p = .035$, $\eta_p^2 = .007$*	$p = .142$
Sex x covariate	$p = .502$	$p = .738$
Fertility x covariate	$p = .481$	$F(1,610) = 3.965$, $p = .047$, $\eta_p^2 = .006$*
Males only:		
Main effect of covariate	$F(1,282) = 3.303$, $p = .070$, $\eta_p^2 = .012$#	$p = .464$
Fertility x makeup x covariate	$p = .468$	$p = .711$
Parenting Ability		
Main effect of covariate	$F(1,609) = 5.365$, $p = .021$, $\eta_p^2 = .009$*	p = .295

Note. ** is *p* ≤ *.001, * is p ≤ .05, # is .05 ≤ p ≤ .01*

Significant effects are in black, effects approaching significance are in blue, non-significant effects are in red

Analyses using the *z*-score of the mean of the Mate Value Scale as the covariate similarly revealed a main effect of MVS mate value for all eight of the attributes. Again, in general, the higher the mate value, the greater the assessment of each characteristic. This main effect was qualified by a 2-way sex by mate value interaction for only two attributes: overall attractiveness and desirability to date, revealing that as mate value increased in men, evaluations of overall attractiveness and the desire to date became more favourable.

Analyses using the *z*-score of the mean of the Mate Value Inventory as the covariate only revealed a main effect of mate value on trustworthiness ($p = .050$) that was not qualified by any interactions and showed that assessments of trustworthiness increased as mate value (MVI) increased. The main effect of mate value on assessments of flirtatiousness and desirability to date approached significance ($p = .053$ and .064, respectively).

3.4 Summary of results

Overall women participants rated the stimulus photos higher on the intrasexually competitively relevant characteristics, namely physical attractiveness, overall attractiveness, flirtatiousness and desirability to date than men did. While ratings on non-competitive characteristics trustworthiness, friendliness, conscientiousness, and parenting ability were more similar. In general makeup increased ratings on all characteristics for women but decreased ratings for men (except on judgements of flirtatiousness which also increased for men). Only highly intrasexually competitive men judged faces with makeup to be more physically attractive - most men rated bare-faces more favourably. Further, low intrasexually competitive women rated faces with makeup as more attractive while highly competitive women rated bare-faces and made-up faces equally. For women, ovulation effects were more pronounced for bare faces (with ratings decreasing with ovulation), while for men ratings for physical attractiveness, flirtatiousness, and desire to date all increased with makeup and ovulation together. Makeup application enhanced perceptions of physical attractiveness in ovulating faces (women went from preferring bare faces in the non-fertile condition to rating ovulating faces with makeup as equal, and men went from preferring bare faces in the non-fertile condition to preferring made-up faces during ovulation). An increase in mate value (as measured by the Mate Value Scale) showed increased ratings on all eight characteristics, with the greatest effect being for high mate value men.

4. Discussion

The aim of the study was to explore the combined effects of makeup and ovulation on ratings of female faces on characteristics related to intrasexual competition and characteristics not expected to be related to intrasexual competition. In addition, the impact of the observers' own intrasexual competitiveness and mate value on these ratings was analysed.

Effects of makeup on intrasexually competitively relevant ratings

Women were found to rate faces as more physically attractive than men. Women rated faces with makeup as more attractive than bare faces, and this was especially true for women with low intrasexual competitiveness . While there is high variability in the methodology and results among studies regarding the attractiveness enhancing effect of makeup (Aguinaldo & Peissig, 2019; Batres et al., 2018; Cash et al., 1989; Etcoff et al., 2011), I expected to find that faces with makeup would be judged to be more attractive than faces without makeup by both men and women. In agreement with Batres et al (2018), I found that overall women judged the faces to be more attractive than men but while the makeup enhancing effect was generally

evident for woman participants, this was not uniformly the case for men. Only highly intrasexually competitive men judged faces with makeup to be more attractive. Most men rated bare-faces more favourably. To date many studies have not analysed male and female participants separately and most studies accrue more female participants than male participants, therefore when averaged across the whole sample, it looks as if makeup is regarded as more attractive. The fact that most men prefer bare-faces makes sense from the evolutionary perspective since if makeup could alter their perception of beauty it could misrepresent genetic fitness in a potential mate. I would expect that the evolved markers of beauty preferred by men should not be easily changed on a superficial level. The finding that while most men don't prefer makeup but most women regard makeup as appearance enhancing (and makeup sales attest to the depth of this belief held by women) lends weight to our theory that makeup is being used more as an intrasexual competitive strategy than a mate attraction tactic.

Preference by highly competitive men for makeup may be as a result of findings regarding the positive relationship between unrestricted sociosexuality and makeup (Batres et al., 2018; Guéguen, 2008b) – they may be assessing potential partners for short-term relationships and the use of makeup by a woman is signalling sexual availability, or highly competitive men may value the status accrued by showing off a partner with makeup who is perceived as having higher status herself. The opposite was true for women, low intrasexually competitive women rated faces with makeup as more attractive while highly competitive women rated bare-faces and made-up faces equally. This suggests that perhaps the competitiveness in highly competitive women is incited by other women wearing makeup and they subconsciously assign a penalty to other women wearing makeup. This makeup – intrasexual competitiveness relationship was only found when highly competitive women rated physical attractiveness, not when rating all seven of the other attributes.

When comparing assessments of other characteristics to assessments of physical attractiveness, overall attractiveness, flirtatiousness, and desire to date most closely resembled assessments of physical attractiveness. In all cases, women rated faces with makeup higher than bare-faces in line with findings that women wearing makeup are believed by other women to be more attractive to men and more promiscuous (Mileva et al., 2016). Men preferred bare-faces, except for the highly competitive men, where makeup again lead to increased overall attractiveness, perceptions of greater flirtatiousness and enhanced desirability to date. Again, it is important to note that there was no reference to long- or short-term partnerships in the study, so if highly competitive men are oriented towards short-term partnerships, the makeup may be seen

as a signal of sexual availability. The similarity between physical attractiveness, overall attractiveness and desire to date lends weight to many years of findings that physical attractiveness is one of the most important mate selection criteria that men look for in women (Buss, 1989; Shackelford, Schmitt, & Buss, 2005; Williams & Sulikowski, 2020) in spite of acknowledgements by both men and women about the importance of personality characteristics such as kindness and understanding, sense of humour and emotional stability (Buss & Barnes, 1986; Howard, Blumstein, & Schwartz, 1987; Sprecher, Sullivan, & Hatfield, 1994) .

Effects of ovulation on intrasexually competitively relevant ratings

For both men and women physical attractiveness, flirtatiousness and desirability to date were the three characteristics affected by ovulation. I expected to find that ovulating faces would be judged to be more attractive than non-fertile faces by both men and women in the barefaced condition, but not in the makeup condition. I also predicted that highly intrasexually competitive women would judge ovulating women with makeup to be more attractive than they would be judged by less competitive women. Contrary to what was predicted, women and men both rated non-fertile faces as more physically attractive than fertile faces when the faces were bare. But there was no difference in women's ratings of fertile and non-fertile faces when the faces were made-up (as predicted). However, for men, application of makeup resulted in fertile faces being judged to be significantly more attractive than non-fertile faces. From these results it is evident that makeup does alter the impact of fertility on physical appearance, for both men and women, makeup application enhanced perceptions of physical attractiveness in ovulating faces (women went from preferring bare faces to rating ovulating faces with makeup as equal, and men from preferring bare faces to preferring made-up faces). I did not find any differences in perceptions of attractiveness with fertility that were affected by the intrasexual competitiveness of the participant, potentially indicating that highly competitive people are not more perceptive to visual cues of ovulation than anyone else. The fact that the same three characteristics were affected by ovulation for men and women provides validation that participants were paying attention while completing the questionnaire and characteristics most relevant to both intrasexual competitiveness and mate attraction showed the same patterns.

It was interesting to note that overall attractiveness was the only characteristic assessed which was linked to fertility in the direction predicted: in general ovulating photos were judged to be more attractive than non-fertile photos overall and this effect was not mediated by either sex of the rater or makeup.

Ratings of characteristics not expected to be associated with intrasexual competition

Men and women generally rated these non-intrasexually competitive characteristics equivalently. Assessments of trustworthiness and friendliness showed similar patterns to one another and were found to be affected by sex, makeup and intrasexual competitiveness. Generally, makeup increased assessments of trustworthiness and friendliness by women and decreased them by men. Women also assessed non-fertile photos to be more friendly (but not more trustworthy) than fertile photos, supporting research findings that fertile women are judged to be more dominant and elicit more jealousy (Mileva et al., 2016). Again, highly competitive men were more generous in their assessments of both trustworthiness and friendliness, but in this case, there was no difference between faces with makeup and faces without.

Judgements of conscientiousness by women were not affected by fertility, makeup or intrasexual competitiveness perhaps because conscientiousness is not a mate selection trait highly prized by men and therefore not a characteristic that women are attuned to judging, or potentially, conscientiousness is a trait requiring assessment of behaviour rather than visual cues. In men, increased intrasexual competitiveness, resulted in higher conscientiousness ratings for faces with makeup than bare faces.

Assessments of parenting ability were found to be independent of sex and makeup, but non-fertile faces were judged to have better parenting ability than fertile faces, and higher intrasexual competitiveness positively predicted ratings of parenting ability.

Comparisons between MVS and MVI

Comparisons of the effects of intrasexual competitiveness and the two mate value measures showed that mate value measured as a general, overall concept (MVS) and mate value measured by summing scores on individual attributes that have previously been found to be important in mate selection (MVI) yields scores which are highly correlated to one another for both men and women, suggesting that to some extent what they are measuring overlaps. However, when looking at the relationship between mate value and intrasexual competitiveness, in both men and women, high intrasexual competitiveness is associated with lower mate value as measured by the MVI, and in men only, higher mate value as measured by the MVS. Further, in subsequent analyses scores on the mate value scale followed similar patterns to scores on intrasexual competitiveness when judging the eight attributes in the study, with mate value positively predicting scores on each attribute. The effect of sex was observed less for mate value than intrasexual competitiveness, with only two attributes showing sex differences: as mate

value increased in men, evaluations of overall attractiveness and the desire to date became more favourable, but not for women. Interestingly, while high intrasexual competitiveness led to greater impact of makeup for male raters, high mate value did not. Mate value as measured by the MVI only affected assessments of one attribute, which was trustworthiness. The observations of mate value effects on mating relevant criteria for the MVS but not the MVI leads us to believe that the MVS is giving a more valid measurement of mate value as I perceive it in our studies – a global self-assessment of one's value as a potential partner. While I acknowledge that mate value is defined and measured slightly differently throughout the research (Back, Penke, Schmukle, & Asendorpf, 2011; Ben Hamida, Mineka, & Bailey, 1998; Conroy-Beam, 2018; Eastwick & Hunt, 2014; Edlund & Sagarin, 2010; Fisher, Cox, Bennett, & Gavric, 2008) (see Chapter 1 for a more comprehensive discussion), results from the MVI suggest that equally weighting all mate-attraction characteristics does not necessarily give a meaningful overall mate value, and that in reality more important attributes contribute to actual mate value to greater extent and the complex calculation of this is implicitly done when determining who to spend time and resources competing for.

Strengths and limitations

The high participant number overall, and especially the large number of male participants makes this one of the largest studies (to our knowledge) on perceptions of makeup. The fact that sex differences were found to be so prevalent in assessment of various characteristics and also how sex and intrasexual competitiveness interacted lends itself to follow-up studies.

Limitations around accurate assessment of ovulation for the stimulus photographs were minimised by using both the counting back methods and hormone analysis of saliva samples to identify ovulation, but minor differences in photographs taken on two separate days (such as how much sleep the model had, whether they were feeling unwell or stressed etc) may result in changes to perception of attractiveness unrelated to ovulation.

The ability to digitally apply makeup identically to the fertile and non-fertile photo of the same face limited the different application of makeup on different days confounding the results. It is acknowledged that the amount and style of makeup application has been found to have an effect on perceptions (Aguinaldo & Peissig, 2019; Tagai et al., 2016; Wagstaff, 2018), and the makeup applied in this study represented everyday makeup, hence the results might be expected to be different if more or less makeup was applied. In addition, each woman may differ in what

they would consider everyday makeup, so the faces were presented to a panel to be assessed for their general consensus on the "everydayness of the application".

The Mate Value Scale and the Mate Value Inventory are both measures which have been used in several other studies as a measure of mate value. Differences in the effects of these and the amount of variation they explain was found to be vast, suggesting that what they are measuring is connected but not identical. Future studies examining the measurement of mate value and contrasting the different measures would be a valuable avenue of exploration. An interesting extension would be to use the MVI but weight the attributes separately for males and females and calculate a composite score based more specifically on the degree to which each attribute is valued by the opposite sex. The other option would be to complete the analyses using attributes related to physical attractiveness for women and attributes related to intelligence and resource acquisition for men to see how much variance these individual attributes explained rather than being averaged out with items like "independent" and "responsible".

Conclusion

Overall, findings that makeup generally has an enhancing effect on positive attributes of attractiveness for women (except when highly competitive women rate physical attractiveness but nothing else), but generally not for men (except highly intrasexually competitive men) suggest that makeup is being used across all levels of female intrasexual competitiveness as a tactic to signal to other women rather than attract men. It was effective at increasing perceptions of physical attractiveness, overall attractiveness, flirtatiousness and desirability to date, but not trustworthiness, friendliness, conscientiousness or parenting ability in other women. The fact that makeup and ovulation together caused increases in ratings on intrasexually competitively relevant/mate attraction characteristics for both men and women suggests that makeup seems to be enhancing the effect of ovulation, not masking it, for both sexes of observers.

The different effects of sex, makeup, fertility and intrasexual competitiveness on perceptions of various attributes shows the complexity of the multitude of factors affecting of judgements of other people, and the fact that these judgements are affected by attributes of the person doing the doing judging as well as the person being judged. Where attributes shared some commonality it was interesting to see similarities in judgements, which were not evident for other attributes. Of importance to potential future research is the prevalence of sex-differences in the judgement of most attributes, which confounds many previous studies in which male and

female participants were analysed separately, or where male participant sample sizes were very small.

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Chapter 3: Instagratification – The use of social media as an intrasexual competitive strategy in women

At the start of October 2022, the world's population stood at 7.99 billion people, of which, 4.74 billion used social media (Kemp, 2022). Social media is used explicitly (with the conscious awareness of the user) to connect with others, for entertainment, to share information and access news content (Bekalu, McCloud, & Viswanath, 2019) as well as to promote businesses (Novianti & Alamsyah, 2023; Zhou & Men, 2023). In this study I explore the extent to which social media also functions at an implicit level (probably without the conscious awareness of the user), as a vector for female intrasexual competition, allowing women to manage their public image to promote both their intersexual attraction and intrasexual competition goals. Part 1 explores participants self-rated "likeliness to post, like or comment on an image like this" when responding to stimulus photos from specific categories linked to mate attraction and intrasexual competition such as "selfies" and photos of luxury products. This hypothetical engagement with social media is examined in light of participants' sex, mate value and intrasexual competitiveness. Part 2 explores the actual photo posting behaviour of participants who provided consent to access their Instagram accounts and compares hypothetical behaviour found in Part 1 with real-world behaviour.

1. Background

"Social media" and "social networking sites" (SNSs) are terms used for a range of online networks that allow individuals to communicate with others verbally and visually (Carr & Hayes, 2015). The first recognisable SNS, Six Degrees, was established in 1997, and while it is no longer in existence, it has been replaced by a plethora of others including Facebook, Twitter, YouTube, Pinterest, TikTok. Instagram and LinkedIn. These sites allow users to create a profile and connect with others forming virtual communities (Edosomwan, Prakasan, Kouame, Watson, & Seymour, 2011). Documented benefits of social media include socialisation and communication with peers and like-minded individuals (O'Keeffe, Clarke-Pearson, Communications, & Media, 2011), enhanced learning opportunities (Boyd, 2008) and accessing health information (Lenhart, Purcell, Smith, & Zickuhr, 2010). However, not all effects are beneficial.

1.1. Social Networking Sites and Wellbeing

Social media is associated with increased levels of depression (Donnelly & Kuss, 2016; Lup, Trub, & Rosenthal, 2015; Steers, Wickham, & Acitelli, 2014), anxiety (Rosen, Whaling, Rab, Carrier, & Cheever, 2013) and psychological distress in adults (Hughes, 2018) as well as adolescents (Berryman, Ferguson, & Negy, 2018; Keles, McCrae, & Grealish, 2020) but see (Coyne, Rogers, Zurcher, Stockdale, & Booth, 2020). Greater passive consumption (as measured by the number of feed story clicks, profiles viewed and photos viewed) of social media content was associated with increased loneliness (Burke, Marlow, & Lento, 2010; Song et al., 2014). Lonely individuals and socially anxious people were found to turn to social media to compensate for lacking face-to-face relationships (O'Day & Heimberg, 2021) and more frequently experienced problematic/pathological social media usage. Self-esteem was negatively associated with increased time spent on social media (Jan, Soomro, & Ahmad, 2017; Kalpidou, Costin, & Morris, 2011; Vogel, Rose, Roberts, & Eckles, 2014) with exposure to upward social comparisons having more detrimental effects (Vogel et al., 2014). Exposure to beauty and fitness images (rather than travel images or no images) decreased self-rated attractiveness, and frequency of Instagram use was correlated with depressive symptoms, self-esteem, general and physical appearance anxiety and body dissatisfaction, with each of the variables being mediated with social comparison orientation (Sherlock & Wagstaff, 2019). Internalisation and appearance comparison were found to mediate the relationship between SNS use and body image.

There is well-documented evidence on the negative effect of SNSs on body image and eating disorders (Harriger, Evans, Thompson, & Tylka, 2022; Marks, De Foe, & Collett, 2020; Opara & Santos, 2019; Padín, González-Rodríguez, Verde-Diego, & Vázquez-Pérez, 2021; Perloff, 2014; Saiphoo, Halevi, & Vahedi, 2020). This occurs through actions such as viewing and posting photos, seeking negative feedback via status updates on body image and disordered eating, and especially through participating in online eating-disorder communities (Custers, 2015; Saul & Rodgers, 2018; Wang, Brede, Ianni, & Mentzakis, 2017). These sites encourage their users to engage in disordered eating behaviours, and pro-anorexia communities can be found with ease on Snapchat, Facebook, Twitter, Instagram, TikTok and others (Custers, 2015). Additionally, algorithms on social media feed users personalised content based on what they have been accessing, resulting in vulnerable individuals being exposed to even greater harm (Harriger et al., 2022).

A sexual competition hypothesis has been proposed to explain eating disorders from an evolutionary perspective (Abed et al., 2012). This theory identifies that female intrasexual

competitiveness is intensified in western societies for several reasons: declining fertility has resulted in a higher number of "pseudonubile" older women, women have higher autonomy, including the ability to regulate their reproductive behaviour, large numbers of youthful (or youthful-looking) women are gathered together in cities, there is an abundance of nourishment and minimal disease – all of which result in a greater pool of competition. So youth has become the primary determinant of mate value in women. Because thinness and the hour-glass figure decrease with age, thinness (as a representation of youthfulness and hence high mate value) has become an important vector for intrasexual competitiveness in westernised societies. Eating disorders represent the extreme version of an otherwise adaptive desire for thinness, where a bid to outcompete rivals in the thinness stakes becomes maladaptive. High intrasexual competitiveness was found to be associated with body dissatisfaction and disordered eating behaviours (Faer, Hendriks, Abed, & Figueredo, 2005). Social media fuels this competition through exposure to visual and verbal information which exacerbates the perceived competition.

1.2 Female-female Interactions on Social Media

Women engage in other intrasexually competitive behaviours on social media which are not as extreme, but more adaptive than the example of eating disorders mentioned above. Social media, especially photo-sharing SNS's, lend themselves to allowing women to self-promote by posting carefully curated or filtered images of themselves. This way they can highlight their physical attractiveness to potential mates and same-sex rivals. In real-life effective self-promotion strategies involve women enhancing their physical attractiveness through showing more uncovered skin (Durante, Li, & Haselton, 2008; Haselton, Mortezaie, Pillsworth, Bleske-Rechek, & Frederick, 2007) through wearing certain colours and types of clothing (Pazda, Prokop, & Elliot, 2014), through styling their hair and wearing makeup (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Guéguen, 2008). Social media allows all of these tactics to be adapted online with the added advantage of filtering and saving for ongoing self-promotion for no extra effort.

However, the Catch-22 is that engagement with social media by posting photos exposes the poster to the self-promoting photos of rivals. There is a significant positive relationship between intrasexual competitiveness for mates and appearance-related comparisons on Instagram (Hendrickse, Arpan, Clayton, & Ridgway, 2017) which mirrors the relationship between intrasexual competitiveness and tendency to engage in appearance-related comparisons found in non-social media contexts (Arnocky & Piché, 2014). Taken together, the above

research suggests that highly competitive women are more likely to engage in social comparison and social networking sites are effective at providing the stimulus for social comparison.

People cite social connectedness as a reason for engaging on social media (Bekalu et al., 2019). Women generally require warm social connections with other women to be successful in other aspects of life (T. A. Reynolds, 2022).and they report loyalty, acceptance, help, companionship and intimacy as functions of same-sex friendships to a greater extent than cross-sex friendships (Rose, 1985). Women were found to be more disclosing of the feelings and problems in same-sex friendships than were men (Reisman, 1990). Hence, there is the need for women to balance intrasexual competition with social connection, including on social media. Women were found to spend more time stalking other women on social media than men (McAndrew & Jeong, 2012), in what is hypothesised to be a modern form of social information acquisition, essentially knowing their rivals better. Because women who move in the same social circles tend to have things in common like age, life-stage, socio-economic and education levels, women's friends may in fact be their rivals too, competing for the same type of mates. Any overtly competitive or aggressive tactic against a friend would be a social signal that you don't want to be friends anymore. Due to the public nature of the posting or commenting on social media direct derogation of competitors would have disadvantages and more subtle tactics such as self-promotion are likely to be more effective. Female-female competition both online and offline is surreptitious (such as gossiping and third party derogation offline) (Massar, Buunk, & Rempt, 2012; Schützwohl, Joshi, & Abdur-Razak, 2022). Surreptitious aggression in women is normally attributed to them needing to maintain a veneer of "kindness" for the benefit of male suitors (Fisher, Shaw, Worth, Smith, & Reeve, 2010) , but it could just as easily be needed to also maintain a veneer of kindness to their own friends. The term "frenemy" has been used to describe someone with whom one is friendly despite a fundamental dislike or rivalry and is used almost exclusively for female and non-heterosexual male relationships. Women were also found to strategically transmit social information about rivals (T. Reynolds, Baumeister, & Maner, 2018), with highly competitive women disclosing more reputation-damaging information than less competitive women, in an attempt to undermine the romantic and social appeal of a same-sex rival. The transmission of such reputation-damaging social information was confirmed to cause social harm to the rival.

1.3 Instagram

The SNS, Instagram, was chosen for this project for several reasons: it is primarily a photo-sharing site, with each post requiring an image, unlike some other SNS's such as

Facebook, where text can be posted alone. Instagram was launched on the 6th October 2010. When I started collecting data for this project in 2016, there were 400 million active users, sharing 80 million photos per day, by the end of the data collection for this project in August 2022, Instagram reported 1.44 billion users who spent an average of 30 minutes per day on the platform (Chen, 2022; Fuciu, 2019) . Instagram comes with a series of built in filters where users can manipulate their photos before posting, allowing the user to upload the most flattering images to "present themselves as they wish to be seen" (Manago, Graham, Greenfield, & Salimkhan, 2008). .

Users can engage in three different ways on Instagram. They can post their own content – which has to have a visual component (either a photo or a video) and can (but does not have to) include text in the form of a caption. Users can "like" content posted by other users. "Liking" is way of interacting with someone else's content by endorsing it with a heart emoji – it represents the least effortful way of engaging and has come to be seen as an acknowledgement of having viewed a post. The number of likes a post received came to hold such value that in 2019 Instagram enabled a feature which allowed users to hide the number of likes received to "depressurize people's experience" (BBCNews, 2021) The most effortful way to engage with content is to comment on another user's post. This involves a text response which is then visible to all other viewers of the post.

In this study I aimed to explore how men and women engaged on Instagram, and how this was affected by their intrasexual competitiveness and mate value. Due to the importance of physical attractiveness as a mate attraction, and hence intrasexual competitiveness tactic for women (Buss, 1988; Feingold, 1990; Walters & Crawford, 1994), I expected to find that women would post more appearance-related images of themselves. Because men attract high quality mates (and fend off rivals) by advertising resources (Buss, 1988; Greenlees & McGrew, 1994; Li et al., 2013), I expected that men would post more images of luxury products than women. Women have been found to be intolerant of "sexy peers" and attractive rivals (Vaillancourt & Sharma, 2011), and highly competitive women are expected to be most perceptive of and intolerant of same-sex competitors (Buunk & Fisher, 2009). Hence, these women are expected to be least likely to endorse photos highlighting the attractive appearance of other women, but would be more likely to post their own photos. In terms of mate value, low mate value women (women of low attractiveness) would stand to gain the most from appearance-enhancing filters and are expected to post more appearance related photos than high mate value women.

2. Part 1

2.1 The current study

Part 1 was a large-sample survey study garnering responses to hypothetical Instagram posts, and from whose participants actual Instagram usernames were recorded to permit analysis of real Instagram behaviour for Part 2.

In Part 1 I evaluated whether intrasexual competitiveness and mate value were associated with a person's engagement with hypothetical content on Instagram. Participants rated their likeliness to post, like or comment on photos similar to stimulus photos. The stimulus photos were representative of various categories that may be connected to intrasexual competitiveness and mate attraction, such as photos highlighting physical appearance, travel, couples and products. I also wanted to explore whether men and women differed in types of content they engaged with on social media, and whether they posted, liked and commented differently.

The HEXACO personality scale was completed to assess individual differences in personality traits. In this way I could identify ways in which the participants giving consent to participate in Part 2 of the study differed from participants who denied access to their personal Instagram accounts.

2.2 Materials and method

2.2.1 Participants

A total of 929 participants were recruited through undergraduate psychology courses (*N*=610) for which they received credit, and a paid participant bank (ProlificAcademic.com, *N*=319). Thirty participants were excluded for not completing the intrasexual competitiveness measure of the survey, and three participants were excluded due to identifying as a gender other than male or female. The final analyses included data from 896 participants: male (*N*=431, aged 18-63, *M*=32.26, *SD*=10.30) and female (*N*=465, aged 18-60, *M*=32.46, *SD*=10.32). 701 Participants identified as exclusively heterosexual, 38 as bisexual, 32 as predominantly homosexual and 128 as predominantly heterosexual or homosexual but incidentally/more than incidentally the other). 66% of participants reported being in a long-term relationship, 46% were in a short-term relationship/s and 30% were single. All participants provided informed consent under HREC protocol number **H17183** (approved by the Charles Sturt University Human Research Ethics Committee).

2.2.2 Instruments and Measures

As described in detail with justifying psychometric evidence in Chapter 2, The Mate Value Scale (Edlund & Sagarin, 2014) and the Mate Value Inventory (Kirsner, Figueredo, & Jacobs, 2003) were used to measure Mate Value in two different ways and the Scale for Intrasexual Competition (Buunk & Fisher, 2009) was used to assess participant intrasexual competitiveness. In addition to these scales, the HEXACO-60 Personality Inventory (Ashton & Lee, 2009) was administered to investigate correlation with certain personality domains and to allow controlling for individual differences.

2.2.2.1 Mate Value Scale

Edlund and Sagarin's (2014) *Mate Value Scale* (MVS) was used to assess global mate value through a short four-item self-report measure of mate value where participants rate global statements about their attractiveness as a potential partner (such as "Overall, how would you rate your level of desirability as a partner?) on a 7-point rating scale ranging from 1 (extremely undesirable) to 7 (extremely desirable). In the current sample I observed strong internal consistency for both male (Cronbach's alpha = .91) and female (Cronbach's alpha = .89) participants.

2.2.2.2 Mate Value Inventory (short form)

Again, Kirsner, Figueredo and Jacob's (2003) Mate Value Inventory (MVI-7) provided a second measure of mate value through the assessment of 17 traits important for mate selection, (Ellis, 1998; Rowe *et al.*, 1997). The mean across all 17-items was used as the MVI score. In the current sample I observed strong internal consistency for both male (Cronbach's alpha = .83) and female (Cronbach's alpha = .80) participants, as well as a strong positive correlation between these two mate value measures for both men, $r = .60$, $n = 431$, $p < .001$, and women, $r = .53$, $n = 465$, $p < .001$, demonstrating construct validity.

2.2.2.3 Scale for Intrasexual Competition

As in the previous study Bunnk and Fisher's (2009) Scale for Intrasexual Competition was used to calculate intrasexual competitiveness. The average of all items on this scale was used as the participant's score of intrasexual competitiveness. Consistent with the previous study, in the current study I also observed significantly higher mean scores ($t(894) = 9.15$, $p = <.001$, two-tailed) for male ($M = 2.64$, $SD = 1.10$) than female participants ($M = 1.98$, $SD = 1.04$), and good internal consistency for both sexes (Cronbach's alpha = .89 for males Cronbach's alpha = .93 for females).

2.2.2.4 The HEXACO-60 Personality Inventory

The HEXACO model of personality structure consists of six basic dimensions: Honesty-Humility (H), Emotionality (E), Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O). Participants rate themselves from 1 (= strongly disagree) to 5 (= strongly agree) on 60 statements (10 from each scale). Four of the six items on each scale are reverse keyed. The Hexaco-60 scales are reported to show good internal consistency reliability (ranging from .77 to .80 in a college sample, and .73 and .80 in a community sample) (Ashton & Lee, 2009). Scale intercorrelations were all below .30 and item-level factor analysis confirmed a six-factor structure (Ashton & Lee). In the current sample Cronbach's alphas were as follows (N = 899 for each scale): Honesty-Humility $\alpha = .74$, Emotionality $\alpha = .77$, Extraversion $\alpha = .81$, Agreeableness $\alpha = .77$, Conscientiousness $\alpha = .75$ and Openness to experience $\alpha = .77$), confirming strong internal consistency for each scale.

2.2.3 Stimuli

Photographic stimuli for this study consisted of a total of 90 photographs selected to represent photos that participants might see on a social media platform like Instagram. The photos were all freely available, open access images, found by google image searching the category name. The categories were selected to cover a range of topics commonly presented on social media including some that I believed may have strategic value in intrasexual competitiveness such as photos which highlight a participants "glamorous appearance" or purchase of luxury items. The following categories were represented: family, couple, children only, female faces with makeup, female faces without makeup, solo appearance body shot (males and females), with friends (for females and males), luxury products (for males and females), shopping, sports (male, female and mixed), prosocial, vacation with people, vacation scenery only, house interiors and exteriors. Examples of photo stimuli are shown in Figures 3.1 a and b, and 3.2 a-d.

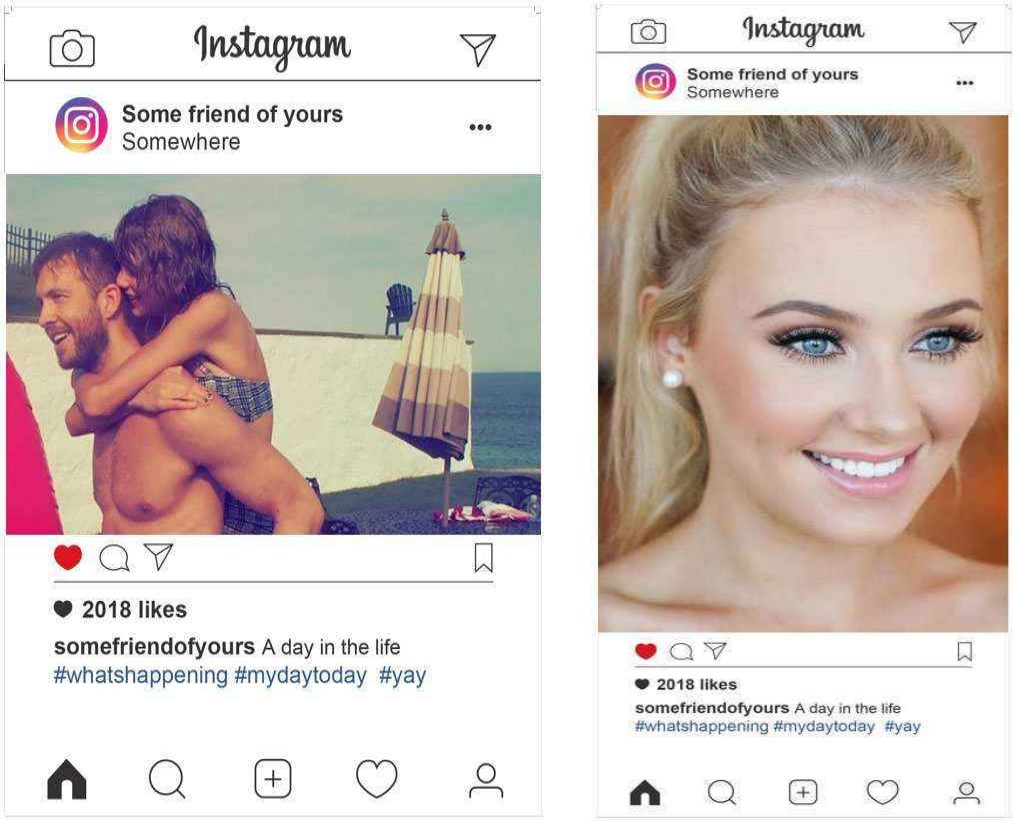

Figure 3.1. a. Sample couple photo**, b.** Sample female face with makeup photo.

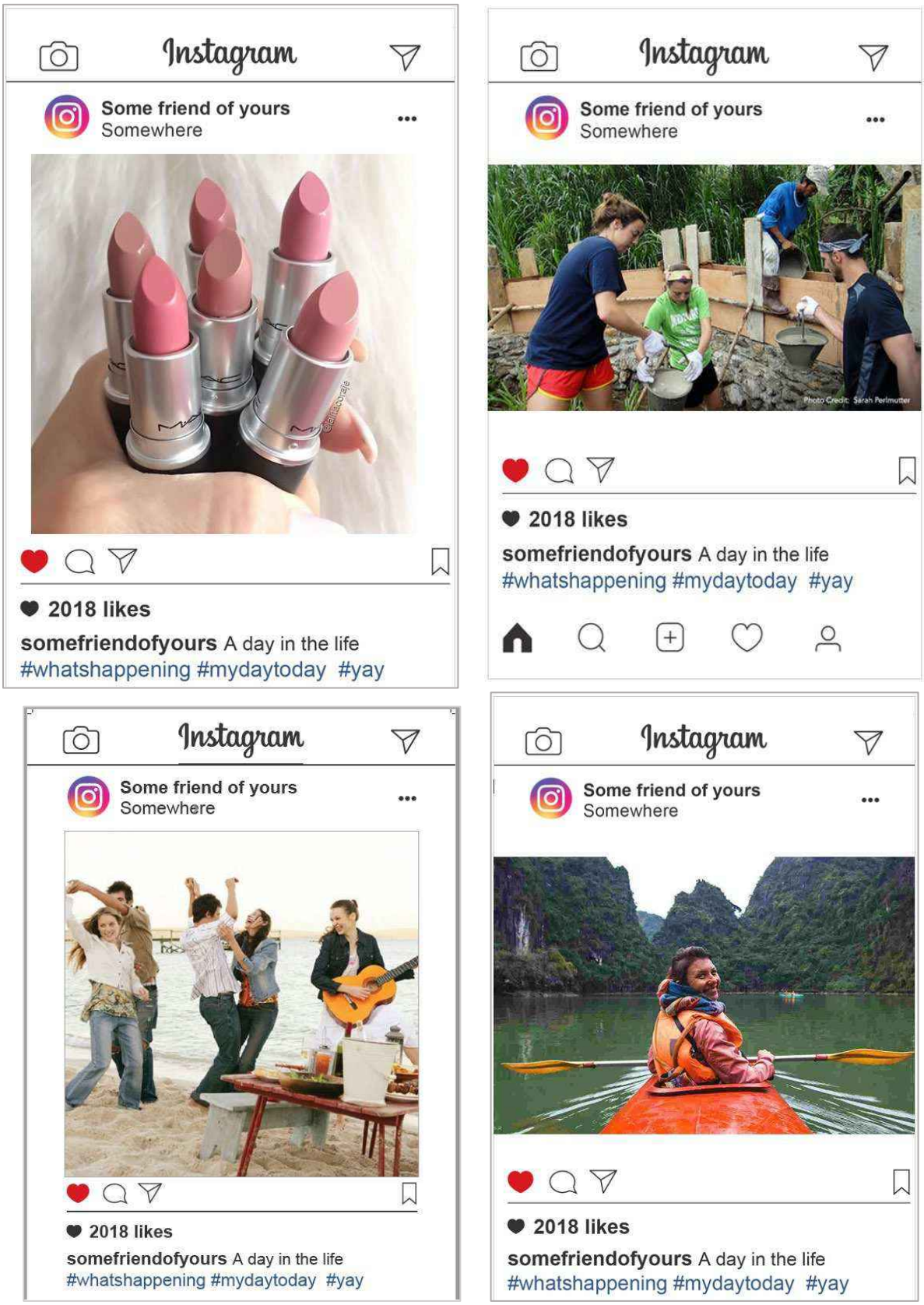

Figure 3.2. a. Sample photo luxury female product, **b.** Sample photo prosocial, **c.** Sample photo with friends, **d.** Sample photo vacation with people**.**

2.2.4 Procedure

Participants initially provided demographic information about themselves: age, sex, sex of their partner, relationship status, highest level of education, and personal and household annual income (scored as 1: $0 - $20 000; 2: $20 000 - $50 000; 3: $50 000 - $80 000; 4: $80 000 - $120 000; 5: $120 000 - $200 000; and 6: >$200 000), and their perception of their wealth compared to their peers.

Participants were then asked questions about their use of social media in general and Instagram in particular. The questions included how many times a week they accessed Instagram and all social media platforms together, total amount of time per week (in hours) they spent on Instagram/all social media, how many followers they have on Instagram, how many accounts they follow on Instagram and how often they post content on social media platforms per week. On the Instagram platform, participants have three ways of engaging (other than simply observing): they can **post** photos of their own (with or without a caption), they can endorse another person's post by "**liking**" it, or they can **comment** on another person's post or reply to a comment posted by another person on their post. Participants were then shown a series of 45 stimulus photos and asked "How likely would you be to post a photo like this on your own Instagram story?", on a five-point scale from extremely likely = 5, somewhat likely = 4, neither likely or unlikely = 3, somewhat unlikely = 2, extremely unlikely = 1). Participants then completed the HEXACO-60 personality inventory. They were then presented with 45 further stimulus images and asked to indicate how likely they would be to either (i) "like" or (ii) comment on this photo if it was posted by someone that they followed on Instagram, using the same five-point scale as before. Where the photo contained people, they were told to assume that the person in the photo is the one doing the posting. After presentation of the images participants competed the Mate Value Scale (MVS), Mate Value Inventory (MVI) (short form), and the Intrasexual Competitiveness Scale.

As discussed in the previous chapter, two different measures of mate value were used as they measure mate value in different ways – by finding the mean self-report score on 17 mate value criteria, and by a global assessment of one's overall value as a potential partner. The two measures were found to be significantly correlated, $r = .569$. $p < .001$, $N = 899$. In the following analyses, I wanted one measure for mate value that captures both these ideas, hence I calculated a composite mate value score by conducting a Principal Components Analysis on all items in

both mate value measures, extracting the first factor which explained 30.00% of the variance and using this as the composite mate value measure. The highest loading items were the four mate value scale items, attractive face, good body, healthy and high social status, which fitted well theoretically with what is known about mate value.

Lastly, participants were asked whether they would give permission for the research team to access their Instagram feed specifically looking at photos from the three months prior to completion of the survey and to provide their Instagram username if they did. In order to qualify for participation in this step, participants had to confirm that they were not personally acquainted with either of the researchers (either Melinda Williams or Dr Danielle Sulikowski) and would not be recognisable to the researchers from a photograph. Participants were informed that they would have a second opportunity to decline participation when the researcher sent them a follow request on Instagram if their account was listed "Private".

2.3 Results

2.3.1 Calculating Photo Category Scores

In order to confirm the theoretical categories which were used to group the photos for Part 1 the responses to the likeliness to post each of the 45 stimulus photos were subjected to principal components analysis. The first PCA was conducted on the whole sample and then, given that I expected men and women to differ in their likelihood of posting different types of photos, was also completed on the sample split by sex and the factor structures were compared. Unsurprisingly, as the theoretical categories were informed by our interest in specifically female intrasexual competitiveness, the factor structure which closest resembled our original categories was that of the female-only sample. The whole sample factor structure was similar but not quite as clear, but the male only sample was quite different. Because I wanted to keep the categories the same across our whole sample (to directly compare sex differences in posting behaviour) and because the study was designed to investigate female intrasexual competition I elected to use the factor structure based on the female only PCA and only the results of this PCA are described below.

Prior to performing PCA, the suitability of the data for factor analysis was assessed. The correlation matrix revealed several coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .93 for the female sample, exceeding the recommended value of .6 (Kaiser, 1970) and Bartlett's Test of Sphericity (Bartlett, 1954) reached significance. Eight factors with Eigenvalues greater than one were extracted from the PCA explaining 30.39%, 10.23%, 7.85%, 4.64%,

3.93%, 2.78%, and 2.37% of the variance respectively. The factors underwent Oblimin rotation (which allows for factors to be correlated) with Kaiser Normalisation and converged after 18 iterations. Inspection of the individual items in each factor revealed that in all cases except one (Couples), two or more of the theoretical groups which I selected collapse into a single larger factor, see Table 3.1 for Theoretical categories and resulting factors measured for participants "likeliness to post a photo similar to this".

Table 3.1

Photos Based on Theoretical Categories and Resulting Factors for Participant Response for "Likeliness to post a photo similar to this" based on the female sample (N= 465)

Factor	Photo based on theoretical category	Factor Loading
Family and children	Family 6	0.897
	Family 2	0.831
	Family 5	0.793
	Children 2	0.768
	Children 1	0.649
	Female friends 3	0.305
Products and shopping	Luxury products (female) 2	0.902
	Luxury products (male) 2	0.860
	Makeup 2	0.753
	Luxury products (female) 4	0.731
	Women shopping 6	0.610
	Women shopping 2	0.583
	Luxury products (male)4	0.450
Houses	House exterior 3	0.852
	House interior 5	0.812
	House exterior 1	0.809
	House interior 1	0.782
Experiences	Vacation (with people) 6	0.778
	Vacation (with people) 4	0.697
	Vacation (scenery) 3	0.631
	Prosocial activity 5	0.618
	Vacation (scenery) 1	0.565

	Prosocial activity 6	0.542
	Prosocial activity 1	0.452
Solo Appearance	Face no makeup (female) 2	-0.890
	Face no makeup (female) 4	-0.865
	Face (male) 3	-0.857
	Face with makeup (female) 2	-0.669
	Face and body (female) 7	-0.525
	Face and body (female) 4	-0.465
	Face with makeup (female) 3	-0.408
Sports	Sports (mixed) 1	-0.843
	Sports (male) 2	-0.811
	Sports (male) 3	-0.772
	Sports (female) 4	-0.709
	Sports (female) 1	-0.392
With Friends	With friends (females) 9	0.659
	With friends (females) 2	0.618
	With friends (males) 3	0.580
	With friends (males) 4	0.448
Couple	Couple 1	-0.749
	Couple 4	-0.708
	Couple 9	-0.393

Based on the eight factors confirmed above, I calculated mean factor scores for each category from participant responses to photos regarding their likeliness to “post”, likeliness to “comment” and likeliness to “like” another person’s post, for both men and women. Note: when calculating mean scores for Appearance photos, each sex’s scores were calculated using the mean of their responses to the appearance photos of the same sex (not the photos of both sexes together). In the same way, when calculating Products scores, each sex’s score was calculated from the mean of the luxury products related to their particular sex: for women: makeup, handbags, jewellery etc, and for men: watches, cars etc.

2.3.2 Comparison of the effect of intrasexual competitiveness on participant likeliness to post, comment or like photos highlighting their appearance

Physical appearance is a highly valued mate selection (and hence intrasexual competitive) criterion of women. I anticipated that if Instagram was serving as a vehicle for female intrasexual competitiveness there would be sex differences in the extent to which men and women would post photos focused on their physical appearance and endorse photos of someone else (of the same sex)'s appearance, and that this would be affected by the participant's intrasexual competitiveness. A mixed analysis of covariance (ANCOVA) was conducted with Action to Appearance Photo (3: participants likeliness to post, comment or like photos) as the within-subjects factor, sex (2) as the between-subjects factor and intrasexual competitiveness (z-score of the mean ICS) as the covariate. 461 Female participants judged their likeliness to post appearance photos ($M = 2.50$, $SD = 1.04$), "like" someone else's appearance photos ($M = 2.98$, $SD = 1.08$) and comment on someone else's photo ($M = 1.86$, $SD = .80$). 431 Male participants rated likeliness to post appearance photos ($M = 1.84$, $SD = .95$), "like" someone else's appearance photos ($M = 2.31$, $SD = 1.11$) and comment on someone else's photo ($M = 1.59$, $SD = .77$).

This model was potentially compromised by variance heterogeneity for likeliness to post (with Levene's $F(1,890) = 7.340$, $p = .007$) , but not for likeliness to like or comment (with both Levene's $F \leq 2.40$, both $p \geq .121$). Because male and female group sizes were large and the number of participants across the different groups was similar ($N = 431$ and $N = 461$, respectively), the impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972).

From the overall model there was a significant main effect of action to photo, Wilks $\lambda = .52$, $F(2,887) = 414.30$, $p < .001$, $\eta_p^2 = .483$, with the likeliness to "like" a photo ($M = 2.65$ $SD = 1.14$) being significantly higher ($p < .001$) than to post ($M = 2.18$, $SD = 1.05$), which itself was significantly higher ($p < .001$) than to comment on ($M = 1.73$, $SD = .80$). There was also a main effect of sex, $F(1,888) = 105.70$, $p < .001$, $\eta_p^2 = .106$), with women more likely than men overall to act. These two main effects were qualified by a significant two-way interaction between action to photo and sex, Wilks $\lambda = .944$, $F(2,887) = 26.192$, $p < .001$, $\eta_p^2 = .056$, . *Post hoc* comparisons of simple effects of sex on each action to photo revealed women rated their likeliness to post ($F(1,888) = 106.152$, $p < .001$, $\eta_p^2 = .107$), "like" ($F(1,888) = 71.291$, $p < .001$, $\eta_p^2 = .074$) and comment ($F(1,888) = 27.091$, $p < .001$, $\eta_p^2 = .030$) on same-sex appearance photos higher than males. The interaction appears to be attributable to the disproportionately

large sex differences observed for propensity to post and like appearance related photos, compared to the smaller effect observed for commenting.

A significant two-way interaction between action to photo and intrasexual competitiveness was also observed, Wilk's $\lambda = .990$, $F\ (2,887) = 4.558$, $p = .011$, $\eta_p^2 = .010$. *Post hoc* examination of likeliness ratings at low (-1 standard deviation), medium (mean SIC) and high (+1 standard deviation) intrasexual competitiveness showed that likeliness to post increased with intrasexual competitiveness, likeliness to "like" decreased with intrasexual competitiveness and likeliness to comment stayed the same with intrasexual competitiveness. In spite of the three-way interaction between action x ISC x sex not being significant, Wilk's $\lambda = .999$, $F\ (2,887) = .304$, $p = .738$, $\eta_p^2 = .001$, I applied the above model (*sans* participant sex as a factor) to the male and female data separately to test the specific hypothesis that female intrasexual competition would show these effects. As expected, I confirmed the main effect for action to photo in both the female and male samples described above. This model revealed a significant 2-way interaction between action to photo and intrasexual competitiveness for women, Wilks $\lambda = .985$, $F\ (2,458) = 3.416$, $p = .034$, $\eta_p^2 = .015$, but not for men, Wilks $\lambda = .992$, $F\ (2,428) = 1.629$, $p = .197$ *n.s*, $\eta_p^2 = .008$.

Figure 3.3 shows the simple effects of posting, liking and commenting at high, medium and low (1 SD above and below the mean, respectively) levels of intrasexual competition for women. As intrasexual competitiveness increases, likeliness to post a photo highlighting their own appearance increases but likeliness to "like" another woman's appearance photo decreases. Likeliness to comment remains the same. These effects were confirmed by calculating the Pearson's correlation co-efficient between intrasexual competitiveness and posting Appearance photos, ($r = .065$, $p = .163$, $N = 464$) and intrasexual competitiveness and liking Appearance photos ($r = -.057$, $p = .222$, $N = 464$) and then using these to calculate the Z-prime ($z' = 2.512$, $p = .006$), confirming that the correlation between intrasexual competitiveness and posting is significantly more positive than the correlation between intrasexual competitiveness and liking.

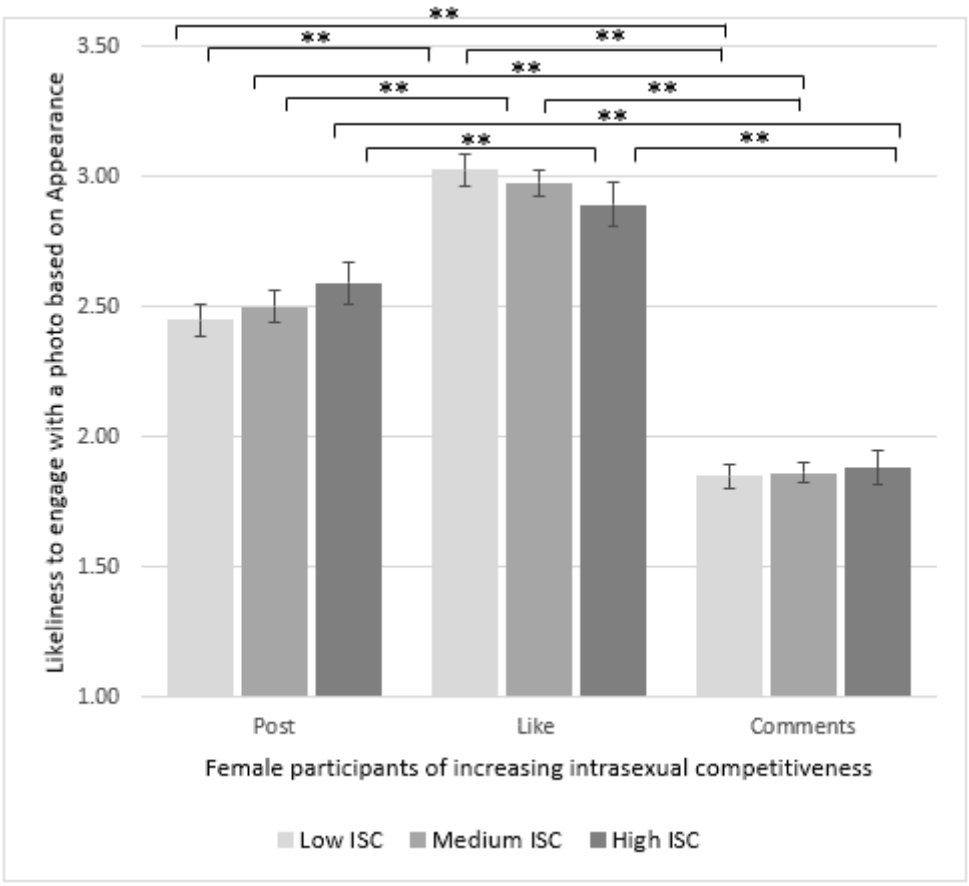

Figure 3.3. Mean likeliness to post, "like" or comment an appearance related photos on Instagram ± SE (measured on a scale of 1 to 5), for women at low, medium, and high intrasexual competitiveness. ** is $p < .001$

2.3.3 Comparison of the effect of mate value on participant likeliness to post, comment or like photos highlighting their appearance

For women especially, mate value is highly correlated with their physical attractiveness. Hence, I theorised that mate value would affect the extent to which women rated their likeliness to post appearance-related of themselves on Instagram. A mixed analysis of covariance (ANCOVA) was conducted with Action to Appearance Photo (3: participants likeliness to post, comment or like photos) as the within-subjects factor, sex (2) as the between-subjects factor and mate value (z-score of the first extracted factor of the PCA conducted on the items from the Mate Value Scale and the Mate Value Inventory) as the covariate.

This model was, also potentially compromised by variance heterogeneity for likeliness to post (with Levene's $F(1,890) = 6.084$, $p = .014$) , but not for likeliness to like or comment (with both Levene's $F \leq 1.922$, both $p \geq .166$). Again, as group sizes were large and the number of participants across the different groups was similar, the impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972). The significant main effect for difference in participants likeliness to post, "like" and comment on appearance-related photos was described in the previous model, as was the main effect for sex and the two-way interaction between sex and action to photo.

There was a significant two-way interaction of action to photo and mate value, Wilks $\lambda = .989$, $F(2,887) = 4.723$, $p = .009$, $\eta_p^2 = .011$. *Post hoc* examination of likeliness ratings at low (-1 standard deviation), medium (mean SIC) and high (+1 standard deviation) mate value showed that likeliness to post increased with mate value, likeliness to "like" remained unchanged and likeliness to comment increased with mate value. Once again, even though the three-way interaction between action to photo x sex x mate value action to photo was not significant, I wished to test the specific hypothesis that this effect would be present for women, hence the ANCOVA model was applied (without sex as a between-subjects factor) to the male and female data separately. As expected, I confirmed the main effect for action to photo in both the female and male samples described above. This model revealed a significant 2-way interaction between action to photo and mate value for women, Wilks $\lambda = .979$, $F(2,458) = 4.896$, $p = .008$, $\eta_p^2 = .021$, but not for men, Wilks $\lambda = .993$, $F(2,428) = 1.492$, $p = .226$ *n.s*, $\eta_p^2 = .007$.

Figure 3.4 shows the simple effects of posting, liking and commenting at high, medium and low (1 SD above and below the mean, respectively) levels of mate value for women. As mate value increases, likeliness to post a photo highlighting their own appearance increases, as does likeliness to comment on the photo of another person. However, likeliness to "like" another woman's appearance photo remains the same. In addition to this, the Pearson's correlation co-efficient between mate value and commenting on Appearance photos, ($r = .114$, $p = .014$, $N = 461$) confirms that women of higher mate value are more likely to comment on the appearance-related photos of other women. Calculation of the Z-prime ($z' = 2.224$, $p = .013$), confirmed that for women, the correlation between mate value and posting is significantly more positive than the correlation between mate value and "liking". The same is true of the correlation between mate value and commenting, which is also significantly more positive than the correlation between mate value and "liking" ($z' = -3.344$, $p \leq .001$). However, there was no significant

difference between the mate value/posting and the mate value/commenting correlations (z′ = -.743, p = .229 *ns*).

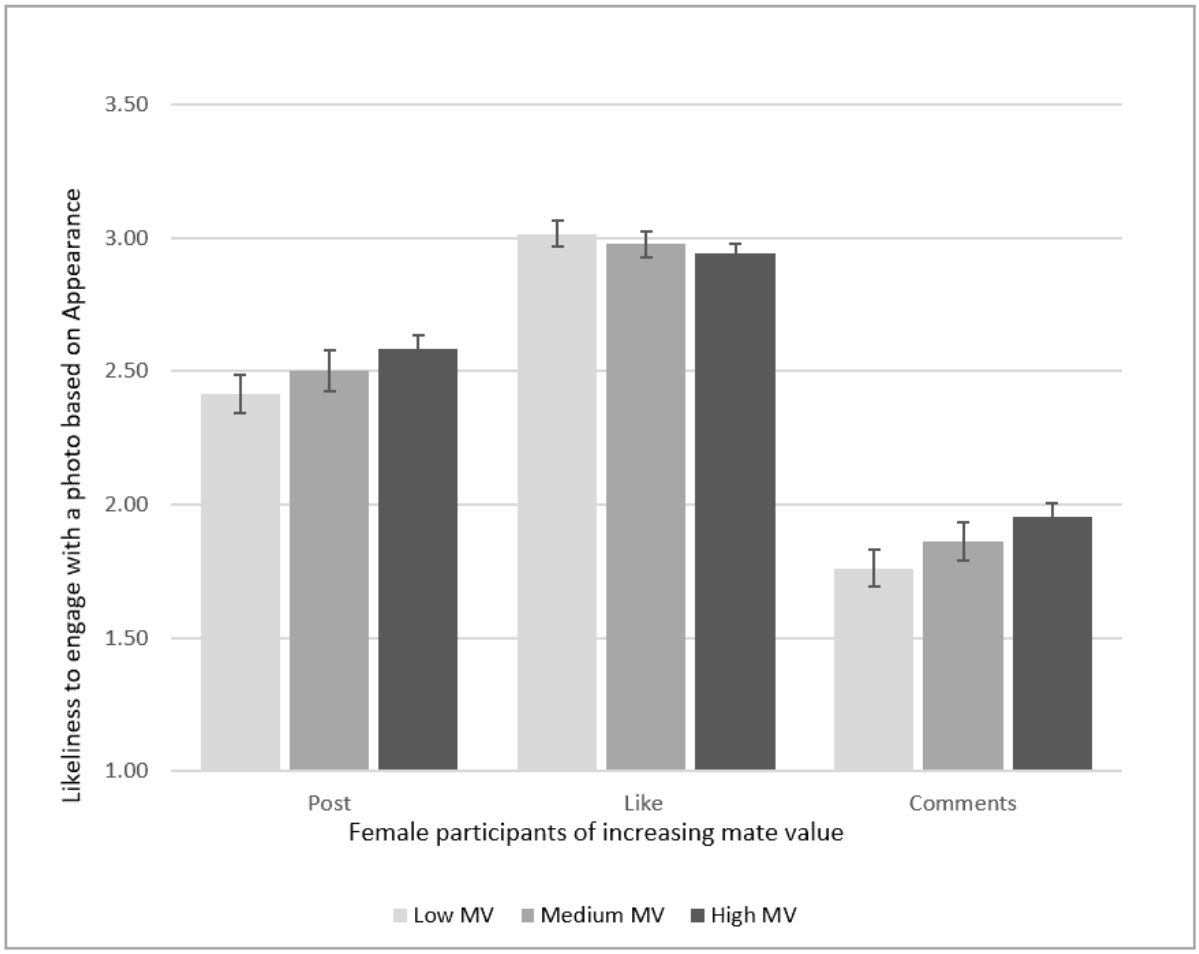

Figure 3.4. Mean Likeliness to post, like or comment an appearance related photos on Instagram ± SE, for women at low, medium and high mate value (measured on a scale of 1 to 5), * is p < .05

Given that both mate value and intrasexual competitiveness were found to effect hypothetical engagement on Instagram I wanted to ensure that there were no interactions between these two covariates. The above ANCOVA model, but with both mate value and intrasexual competitiveness used as covariates in the same model, was applied to the data. There were no significant two-way (mate value x intrasexual competitiveness), three-way (sex x mate value x intrasexual competitiveness or action x mate value x intrasexual competitiveness), or four-way (sex x mate value x intrasexual competitiveness x action) interactions including mate value and intrasexual competition (.591 ≥ all p's ≥ .124).

2.3.4 Comparison of male and female participants' likeliness to post photos from the different categories

In order to explore sex differences in the tendency to post other types of photos (in addition to appearance photos), I conducted a multivariate analysis of covariance (MANCOVA), with the within-subjects' factors being the mean likeliness to post photos from the 8 different categories: appearance, luxury products, couple, family/children, friends, experiences, house, sports. The between-subjects factor was sex (2) and the covariate was intrasexual competitiveness (as measured by the Z-score of the mean of the Scale for Intrasexual Competitiveness). This model was potentially compromised by variance heterogeneity for the categories of appearance, products, family and sports (with Levene's $F(1,893) \geq 5.086$, $p \leq .024$) , but not for couples, friends, experiences or houses (with all Levene's $F \leq 3.323$, $p > .069$). However, as group sizes were large and the number of participants across the different groups was similar, the impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972).

Initial inspection of the model revealed significant main effects of photo category, Wilks $\lambda = .346$, $F(7,885) = 238.94$, $p < .001$, $\eta_p^2 = .654$, and sex, $F(1,891) = 34.927$, $p < .001$, $\eta_p^2 = .038$, which were mediated by a significant two-way interaction between sex and photo category: Wilks $\lambda = .789$, $F(7,885) = 33.748$, $p < .001$, $\eta_p^2 = .211$. There was also a significant main effect of intrasexual competitiveness, $F(1,891) = 14.879$, $p < .001$, $\eta_p^2 = .016$.

Post hoc simple comparisons between men and women's likeliness to post photos of each category are shown in Figure 3.5. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means. Women were significantly more likely to post photos highlighting their appearance ($F(1,891) = 105.525$, $p < .001$, $\eta_p^2 = .106$), themselves in a couple ($F(1,891) = 26.892$, $p < .001$, $\eta_p^2 = .029$), their family/children ($F(1,891) = 35.485$, $p < .001$, $\eta_p^2 = .038$), with friends ($F(1,891) = 46.776$, $p < .001$, $\eta_p^2 = .050$) and showing experiences ($F(1,891) = 54.291$, $p < .001$, $\eta_p^2 = .057$) than were men. Comparison of effect sizes above confirms that the category with the greatest sex difference is that of appearance. Men were more likely to post photos of luxury products than were women ($F(1,891) = 5.116$, $p = .024$, $\eta_p^2 = .006$). There was no significant difference in the degree to which the two

sexes posted photos of houses (p = .434) or sports (p = .283).

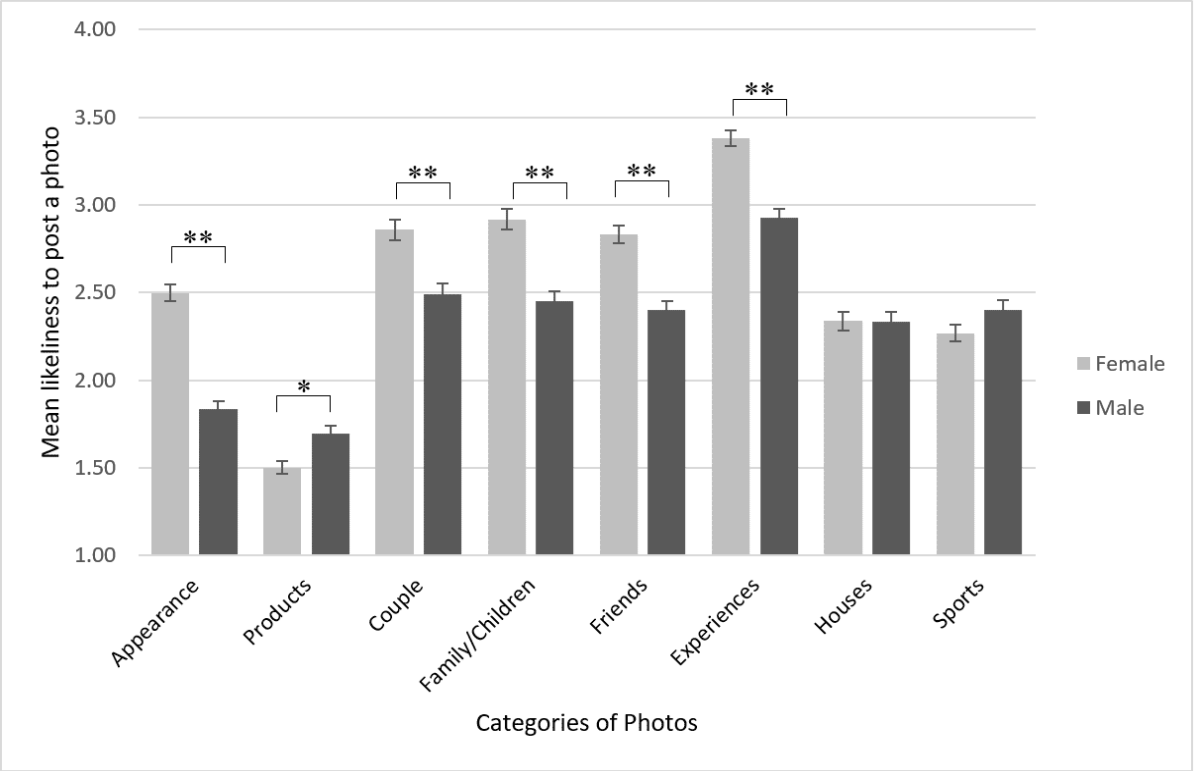

Figure 3.5. Mean likeliness to post different category photos on Instagram ± SE, for women (N = 464) and men (N = 431) (measured on a scale of 1 to 5).
Note. ** is $p < .001$ and * is $.001 \leq p \leq .05$

The significant main effect for intrasexual competitiveness was explored by comparing estimated marginal means for the whole sample at low, medium and high (1SD above and below the mean) intrasexual competitiveness, revealing that with increased intrasexual competitiveness, participants rated their likeliness to post photos higher across all categories, as illustrated in Figure 3.6.

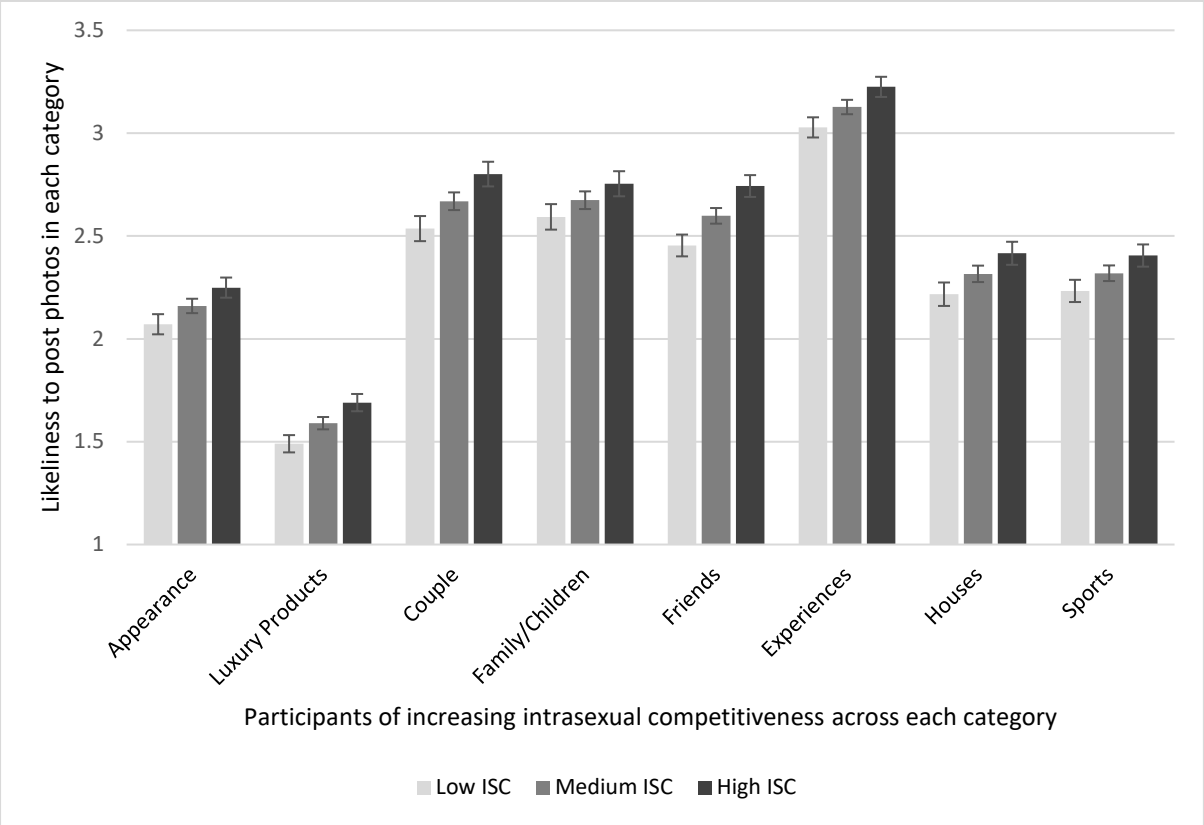

Figure 3.6. Mean likeliness to post different category photos on Instagram ± SE, $N = 895$ (measured on a scale of 1 to 5) at low, medium, and high intrasexual competitiveness.

2.4 Discussion

In this study of hypothetical Instagram use, I examined how various aspects of engagement on Instagram could be predicted by intrasexual competitiveness. Regarding the three potential forms of engaging (liking, commenting, or posting your own content) both men and women reported being most likely to "like" hypothetical content, and least likely to comment on such content, with this disparity being larger for women. As intrasexual competitiveness increases, for women (but not men) likeliness to post a photo highlighting their own appearance increases but likeliness to "like" another woman's appearance photo decreases. Likeliness to comment remains the same. Also, only for women, as mate value increases, likeliness to post a photo highlighting their own appearance increases, as does likeliness to comment on the photo of another person. However, likeliness to "like" another woman's appearance photo remains the same. Women were more likely than men to indicate they would post solo appearance photos, and men were more likely to endorse posting luxury item photos.

Female patterns of self-reported Instagram use were consistent with use of the platform as a medium for intrasexual competition. Across the board, commenting was the least endorsed action toward a post. It is the action which requires the most effort for potentially the least reward. Making a favourable comment acknowledges and potentially highlights to a greater extent, a same-sex rival's attractiveness. While making a negative comment or even "damning with faint praise" leaves the commenter open to being interpreted as jealous, and without plausible deniability. In the real world, gossip and derogation can become a game of "he-said, she-said". A negative comment on a post can't be denied. What also matters though, is that negative comments in real life can also be given behind the target's back, this isn't true of a comment directly on an Instagram post – it is always to the person's face. Hence the opportunity to do harm could easily backfire. High mate value women rated their likeliness of commenting on another woman's appearance-related photo higher than either medium or low mate value women. High mate value women would have the least to lose by highlighting another woman's attractiveness by commenting especially if they still rated their own attractiveness higher, as in "I am so sure of my attractiveness that I can even acknowledge your attractiveness". While there is no way of knowing whether participants envisaged making positive or negative comments, observations of comments made on photos actually posted in Part 2 did not find a single example of an openly derogatory comment on an appearance-related photo. In almost all cases comments on appearance-related photos were positive e.g. "looking hot" or just emojis, appeared to be made by close friends of the poster, and seemed to be fulfilling a social connectedness function, perhaps to maintain socially favourable alliances.

The action of "liking" someone's photo is a way of acknowledging on Instagram that you have seen someone's post. This is the easiest action to take as it does not come with any risk but maintains social connections. However, it is more complex than that. Likes are an easy way for the poster and subsequent viewers to see how engaged other people were with a particular piece of content. Consider, for example, a photo posted by a woman at the beach in her bikini: if the post garners 3 likes or 150 likes (or in the case of some Influencers 1.5 million likes), the effect on the poster is going to be different and the effect of seeing the post and the number of likes on her same-sex rivals will be different. For women, as intrasexual competitiveness increased they were less likely to "like"/acknowledge another woman's photo of herself, but more likely to post a solo-appearance-related photos of their own. In contrast, while women of high mate value were also more likely to post and comment on an appearance-related photo than those of lower mate value, their likeliness to "like" did not increase with mate value. One possible explanation for

this is that lower mate value women endorse with liking because it is risk free and maintains social alliances, while higher mate value women see less risk in commenting and may actually use commenting to draw favourable attention to their own high status while endorsing someone who doesn't really threaten them anyway. "Liking" brings them less attention and may be interpreted as "below them".

High mate value women and highly intrasexually competitive women post more physical appearance photos of themselves. In terms of intrasexual competition this is an act of self-promotion (Fisher & Cox, 2011). Women of high mate value are likely to be more physically attractive, hence advertising this (both in real-life and on social media) would serve to maintain their prestige and status. Highly competitive women are more motivated to out-compete rivals and given the ability to enhance their appearance using filters and curate their Instagram feed with photos they look especially good in, social media provides an effective platform for self-promotion (even when this is not a true representation of their physical attractiveness). There was not found to be an interaction effect of mate value and intrasexual competitiveness, suggesting that women who were of high mate value and highly competitive were not found to be the highest posters of photos. (This will be explored further in the second part of the study).

There were no such connections between mate value or intrasexual competitiveness and appearance-related photos for men. Since physical appearance is less important as a mate-attraction criteria for men than for women, it is unsurprising that male competitiveness did not predict promotion of their physical appearance. However, in the comparison of likeliness to post photos from different categories, men were found to rate their likeliness of posting photos of luxury products higher than women, highlighting their access to material resources, in line with female mate preferences. Out of all the categories of photos, the biggest sex-difference was in the likelihood of posting solo-appearance photos, with women doing this to a much greater extent than men than for any other type of photo, again highlighting the importance of physical appearance as both a female intrasexual competitive strategy and a mate attraction strategy.

3. Part 2 Analysis of participants' Instagram content

3.1 The current study

In the second part of the study our aim was to evaluate the actual content and quantity of photographs being uploaded to Instagram by consenting users and classify them in terms of

whether they are suggesting access to resources, promoting the person's physical attractiveness, their intellect/intelligence or their prosocial characteristics like friendliness, kindness etc. Using intrasexual competitiveness data, personality data and mate value data I hoped to establish relationships between social network posting behaviour that showed good ecological validity. As with part 1 I expected to find that women posted more appearance related photos than did men, and that female intrasexual competitiveness was associated with posting more photos which highlighted their attractive appearance.

3.2 Method

3.2.1 Participants

A total of 206 participants from Part 1 confirmed not being acquainted with the researchers and provided their Instagram usernames. Of these, 11 usernames could not be found on Instagram, 9 people provided usernames without acknowledging consent to access their accounts, 32 people had private accounts and chose not to accept the "follow request" sent by the researcher and 38 participants had no photos posted in the three-month time period before the completing the study despite having posts both before and after this time period. This left 116 Instagram feeds to be analysed consisting of men (*N*=44, aged 19-61, *M*=35.32, *SD*=9.74) and women (*N*=70, aged 18-52, *M*=30.03, *SD*=9.65), and one person who did not report their sex (age = 23 years) who was excluded from all analyses involving gender. One female participant was excluded as her Instagram account was used solely as a business account and had no personal photos, only product photos.

3.2.2 Procedure

I set up an Instagram account with the username "CSU Researcher" from which to follow consenting participants whose accounts were publicly accessible and from which to request access to private accounts. In total screenshots of 2566 photos were saved for analysis. The average number of photos posted within the three-month period was found to vary widely (*M* = 22.31, range 1-504, *SD*=51.87). Photos were classified into the same categories as the photos from Part 1, which had been confirmed by factor analysis, as described in the Part 1 results section. The categories were Solo Appearance (where the participant appeared on their own either as a "selfie" or a body shot), Couple (where the participant appeared with their significant other as ascertained from their pose or comments), Family and Children (photos in which the participant could be linked to the other people as family through either the pose or the comments), With Friends, Sports, Products and Shopping, Houses (both interiors and exteriors), Experiences (including vacation shots, photos doing community/volunteer work, scenery, wild

animals, theatre or music concerts). Where it was not possible to tell from either the photo or the comments whether the other people in the photo were family or friends, the photo was classified as "friends". A separate category was established called "Other" for photos which did not contain people/products/experiences and was used mainly for pets and memes. Celebration photos which did not contain people (e.g. birthday cakes, balloons etc), were classified as "experiences", and a new category of "Food" was added for photos of food and beverages with no people and no visible specific occasion. A total number of photos for each participant was recorded, as well as another specific category which was a subset of appearance photos in which the participant was wearing a swimming costume or similarly revealing item of clothing such as a leotard.

3.3 Results

3.3.1 Comparison of Parts 1 and 2 data sets

To investigate whether the participants who agreed to share their Instagram accounts were representative of the whole sample of participants in Part 1, on the factors of interest to us: namely intrasexual competitiveness and mate value, I studied the placement of Part 2 participants in the scatterplot of whole sample for Intrasexual Competitiveness (as calculated by the mean on the Scale for Intrasexual Competition) versus Mate Value (as calculated by the mean of the scores on the Mate Value Inventory). As shown in Figure 3.7. visual inspection shows a good distribution of participants who consented across mate value and intrasexual competitiveness which allayed fears that perhaps only those high in mate value and/or intrasexual competitiveness would be willing to have their actual Instagram feed analysed.

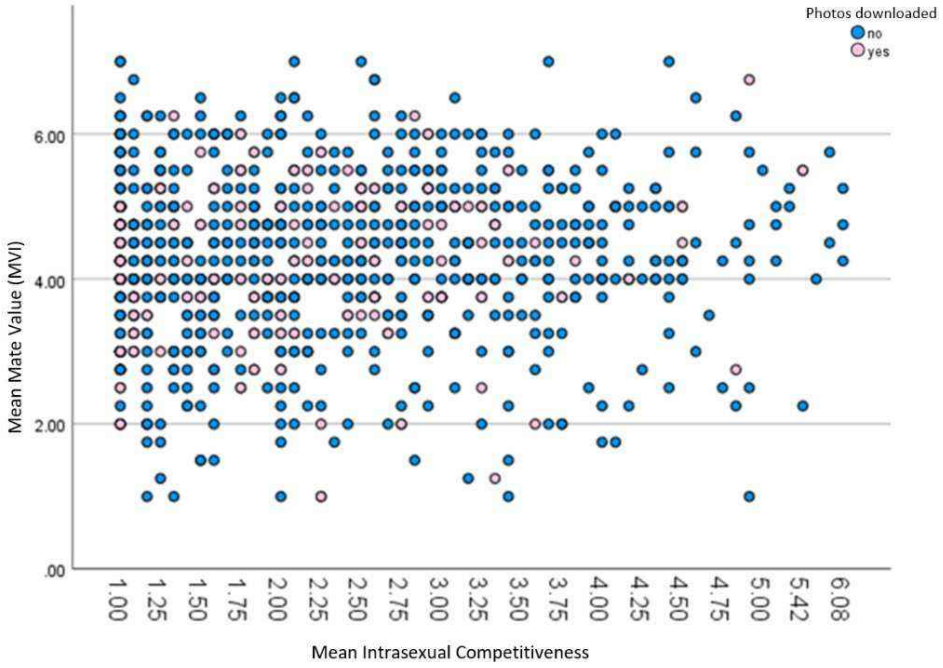

Figure 3.7. Scatterplot highlighting the participants with photos downloaded versus participants in the Part 1 sample who declined permission to download photos, as measured on mean Intrasexual Competitiveness and Mate Value (both scales scored from 1 to 7).

From a total of 899 participants in Part 1, 114 gave permission to access their Instagram accounts for Part 2 of the study. To explore how these participants differed from the rest of the participants on characteristics measured in this study, I conducted a series of 2 x 2 (sex: male/female x permission: yes/no) ANOVAs with dependent variables being the MVS, the MVI, the SIC, the mean “likeliness to post” in Part 1, the mean "likeliness to “like”" from Part 1, the mean “likeliness to comment from Part 1”, the six HEXACO traits, the number of followers in Instagram, the number of followed accounts on Instagram and the frequency of accessing Instagram. There were no two-way interactions between sex and permission for any of the fifteen variables assessed, therefore only main effects of sex and permission need to be described. For eight out of the fifteen variables assessed, there was a significant main effect of sex: overall, women rated themselves higher on the mate value scale than did men (but not the mate value inventory). Women were also more likely to post, “like” and comment on photos on Instagram overall, than were male participants. On the Hexaco-60 personality scale factors, women were significantly higher in Honestly/Humility, Emotionality and Conscientiousness, while there were no sex differences on Agreeableness or Openness. Main effects of permission showed that participants who gave permission to access and analyse their actual Instagram

photos, rated themselves as more likely to post and "like" other people's photos on Instagram than those who did not give permission. There was no difference in their likeliness to comment. In terms of personality factors, participants who gave permission scored lower on the Honesty/Humility factor scale, but higher on the Openness factor of the Hexaco-60, than those who did not. Not unexpectedly, people who gave permission to examine their photos reported themselves as having significantly more followers on Instagram, following significantly more accounts of others on Instagram, and accessing Instagram more frequently than those who did not give permission. Results are summarised in Table 3.2 below.

Table 3.2

Significance levels and effect sizes for characteristics of participants providing permission and not providing permission to access their Instagram feed, using ANOVAs for sex (male/female) x permission to download photos (yes/no)

Dependent Variable	Main effect for Sex		Main effect for permission	
	p of effect	η_p^2	*p* of effect	η_p^2
Mate Value Inventory	ns		ns	
Mate Value Scale	≤ .001	.019	ns	
Scale for Intrasexual Competition	≤ .001	.037	ns	
Mean likeliness to **post** a photo	.002	.013	.010	.007
Mean likeliness to **"like"** a photo	≤ .001	.024	.040	.005
Mean likeliness to **comment** on a photo	.008	.008	ns	
Hexaco Honesty-Humility	≤ .001	.029	.032	.005
Hexaco Emotionality	≤ .001	.057	ns	
Hexaco Extraversion	.089*	.003	ns	
Hexaco Agreeableness	ns		ns	
Hexaco Conscientiousness	≤ .001	.013	ns	
Hexaco Openness	ns		≤ .001	.017
# Followers on Instagram	.064*	.004	≤ .001	.013
# Following on Instagram	ns		≤ .001	.052
Times per week accessing Instagram	ns		≤ .001	.022

Note. $N_{females}$ = 464, N_{males} = 430 and $N_{permission}$ = 114, $N_{no\ permission}$ = 780

* .05 ≤ *p* ≤ .01. ns *p* > .01.

3.3.2 Effect of sex, intrasexual competitiveness and mate value on the number of photos posted to Instagram

In Part 1, women's likeliness to post a photo highlighting their physical appearance was found to increase with increasing intrasexual competitiveness and also found to increase with mate value. For men, intrasexual competitiveness and mate value did not result in differences in the likelihood of posting appearance-related photos. These assessments were made by looking at photos of others and rating the likelihood of posting a similar photo of their own. In Part 2 I wanted to see whether these hypothetical predictions of likelihood were substantiated by the actual photos which consenting participants posted to their Instagram accounts in the three-month period immediately preceding their completion of the online survey. "Appearance photos" were photos where the participant was alone in the photograph and the main subject of the photograph. They consisted of either photos of the face taken by the participant ("selfies") or "body shots" taken by someone else, or with a timed delay. To examine the effect of sex, intrasexual competitiveness and mate value on the number of Appearance photos posted to Instagram I conducted an analysis of covariance (ANCOVA), with sex as a between-subjects' factor, number of appearance photos as the dependent variable, and both mate value and intrasexual competitiveness as covariates. Within the participant sample there was high variability in the number of photos posted for both men ($N = 44$, $M = 1.36$, $SD = 2.68$) and women ($N = 69$, $M = 2.20$, $SD = 3.10$). Levene's test satisfied requirements for homogeneity of error variances ($F(1,111) = .115$, $p = .735$). Inspection of the model showed no significant main effects of sex ($F(1,105) = 2.201$, $p = .141$, $\eta_p^2 = .021$), intrasexual competitiveness ($F(1,105) = .027$, $p = .871$, $\eta_p^2 = .000$), or mate value ($F(1,105) = .070$, $p = .793$, $\eta_p^2 = .001$). There were also no two-way interactions between sex and either mate value or intrasexual competitiveness, or between the two covariates.

Given the relatively small number of appearance photos posted and the high variability, I repeated the ANCOVA model to see whether **total number** of photos posted in a three-month period (dependent variable) was affected by sex (between subjects' factor), intrasexual competitiveness (z-ISC) and mate value (z-MV) (both covariates). 69 Female participants posted a mean of 16.62 ($SD = 22.90$, Range = 1 to 153) photos, while 44 male participants posted a mean of 19.86 ($SD = 29.02$, Range = 1 to 121) photos across all categories in the three-month period immediately preceding completion of the online survey. Homogeneity of variance was satisfied with Levene's $F = 1.534$, $p = .218$. Initial inspection revealed a significant three-way interaction between sex, mate value and intrasexual competitiveness on the total number of photos posted ($F(1,105) = 9.457$, $p = .003$, $\eta_p^2 = .083$). Because mate value and intrasexual

competitiveness were both covariates this suggests a potential violation of the assumption of homogeneity of regression slopes. As noted before, such a violation tends to make the significance tests of lower order effects in the model more conservative, provided that the covariates have been centred as they both were here (Glass et al 1972, Hollingsworth, 1980; although the highest order interaction itself is reliable and interpretable, Johnson, 2016). The significant main effect of mate value, $F(1,105) = 13.722$, $p \leq .001$, $\eta_p^2 = .116$, and the significant two-way interaction of sex and intrasexual competitiveness, $F(1,105) = 5.663$, $p = .019$, $\eta_p^2 = .051$, are both qualified by the three-way interaction between mate value, intrasexual competitiveness and sex described above.

To explore the combined effect of mate value and intrasexual competitiveness, whilst acknowledging the effect of sex, the model was reanalysed after splitting the sample to investigate male and female data separately. In the male-only sample, there was a significant main effect of mate value, $F(1,40) = 4.653$, $p = .037$, $\eta_p^2 = .104$. In the female-only data set, there was a significant main effect of mate value, $F(1,65) = 9.594$, $p = .003$, $\eta_p^2 = .129$, and the main effect of intrasexual competitiveness approached significance, $F(1,65) = 2.976$, $p = .089$, $\eta_p^2 = .044$, however these effects were both qualified by a significant two-way interaction between intrasexual competitiveness and mate value, $F(1,65) = 7.646$, $p = .007$, $\eta_p^2 = .105$.

Post hoc comparisons of the effect of male mate value on total number of photos posted in a three-month period were conducted by estimating the means at high (+1 standard deviation), average (the mean) and low (-1 standard deviation) mate values. This confirmed that as mate value increased, men posted fewer photos. This effect was confirmed by a negative correlation between mate value and total number of photos posted ($r = -.296$, $p = .051$ (2-tailed), $N = 44$).

For women, *post hoc* investigations of mate value and intrasexual competitiveness at low, medium and high levels were conducted as above, and are shown in Figure 3.8. In general, low mate value is associated with posting a greater number of photos, but at low mate value and medium mate value, increased intrasexual competitiveness results in an increased number of photos being posted, while at high mate values, increased intrasexual competitiveness is associated with a decrease in number of photos posted.

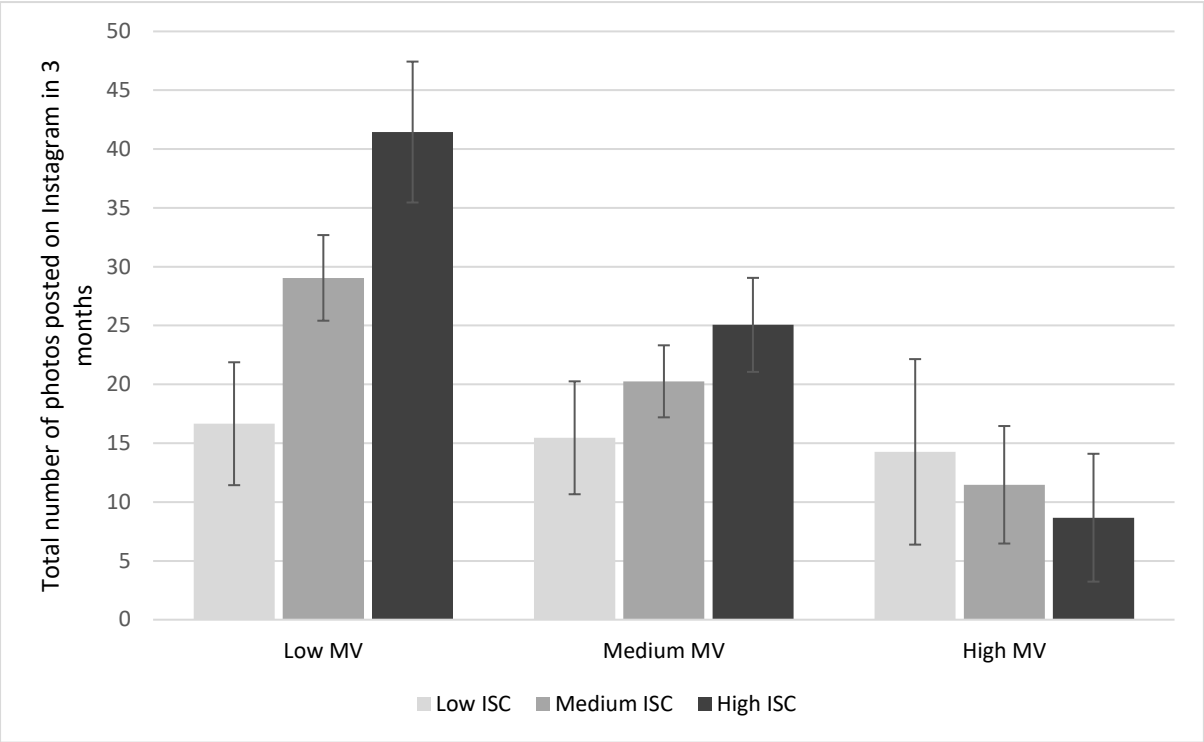

Figure 3.8. Total number of photos posted in a three-month period (± *SE*) for female participants at low, medium, and high mate value with increasing intrasexual competitiveness.

To summarise: In Part 1, women's likeliness to post a photo highlighting their physical appearance was found to increase with increasing intrasexual competitiveness and increasing mate value. In Part 2, the total number of photos (but not "Appearance" photos only) posted by women was found to be dependent on intrasexual competitiveness and mate value combined. In contrast to the hypothetical data, increased mate value actually resulted in decreased posting. While there was no interaction effect of mate value and intrasexual competitiveness in Part 1, there was in Part 2. At low and medium mate value increased intrasexual competitiveness resulted in an increased number of photos being posted, while at high mate values, increased intrasexual competitiveness is associated with a decrease in number of photos posted.

3.3.3 Comparison of differences in the types and quantities of photos posted by men and women on Instagram in a three-month period

To compare whether sex differences in participant ratings of "likeliness to post a photo similar to this" from different categories as found in Part 1 (Figure 3.5) were mirrored in the

actual photos posted by participants, I conducted a repeated measures analysis of covariance (ANCOVA), with the within-subjects factors being the mean number of photos posted from the 10 different categories: appearance, luxury products, couple, family/children, friends, experiences, house, sports, food and other. The between-subjects factor was sex (2) and the covariate was intrasexual competitiveness (as measured by the Z-score of the mean of the Scale for Intrasexual Competitiveness). This model was potentially compromised by variance heterogeneity for the categories of products and family photos (with Levene's $F(1,111) = 4.147$, $p = .044$ and $F(1,111) = 3.993$, $p = .048$, respectively) , but not for appearance, couples, friends, experiences, houses or sports (with all Levene's $F \leq 3.295$, $p \geq .072$). However, as group sizes were larger than 25 (Schmider, Ziegler, Danay, Beyer, & Bühner, 2010) and the number of participants across the different groups was similar, the impacts of variance heterogeneity on Type I error rate would likely have been modest (Glass, 1972).

Initial inspection of the model revealed a significant main effect of photo category, Wilks $\lambda = .601$, $F(9,102) = 7.516$, $p < .001$, $\eta_p^2 = .399$, qualified by a significant two-way interaction between sex and photo category: Wilks $\lambda = .839$, $F(9,102) = 2.175$, $p = .030$, $\eta_p^2 = .161$. There were no main or interaction effects of intrasexual competitiveness.

Pairwise comparisons of women's posting across the categories showed that they posted more solo appearance photos than luxury products photos ($p < .001$), couples photos ($p < .001$), houses ($p < .001$) or sport ($p < .001$) photos. However, they posted more family photos than appearance photos ($p = .027$). The variability on posting family photos was high, largely depending on whether they posted photos of their children or not. Women who did post photos of their children tended to post many.

Post hoc simple comparisons between men and women's likeliness to post photos of each category are shown in Figure 3.9. In general, there was higher variability in the number of photos posted by men across the categories, (except for family photos).Women posted more solo-appearance photos than men, however not to the extent that reached significance, $F(1,110) = 2.258$, $p = .136$, $\eta_p^2 = .020$. The greater number of couple, $F(1,110) = 2.918$, $p = .090$, $\eta_p^2 = .026$ and family photos $F(1,110) = 2.810$, $p = .097$, $\eta_p^2 = .025$ posted by women also approached significance. Men posted more luxury products, but also not to the extent of reaching significance, $F(1,110) = 1.594$, $p = .209$, $\eta_p^2 = .014$. They posted more photos highlighting experiences ($p = .098$), food photos ($p = .036$) and other photos (such as pets and memes) ($p = .106$).

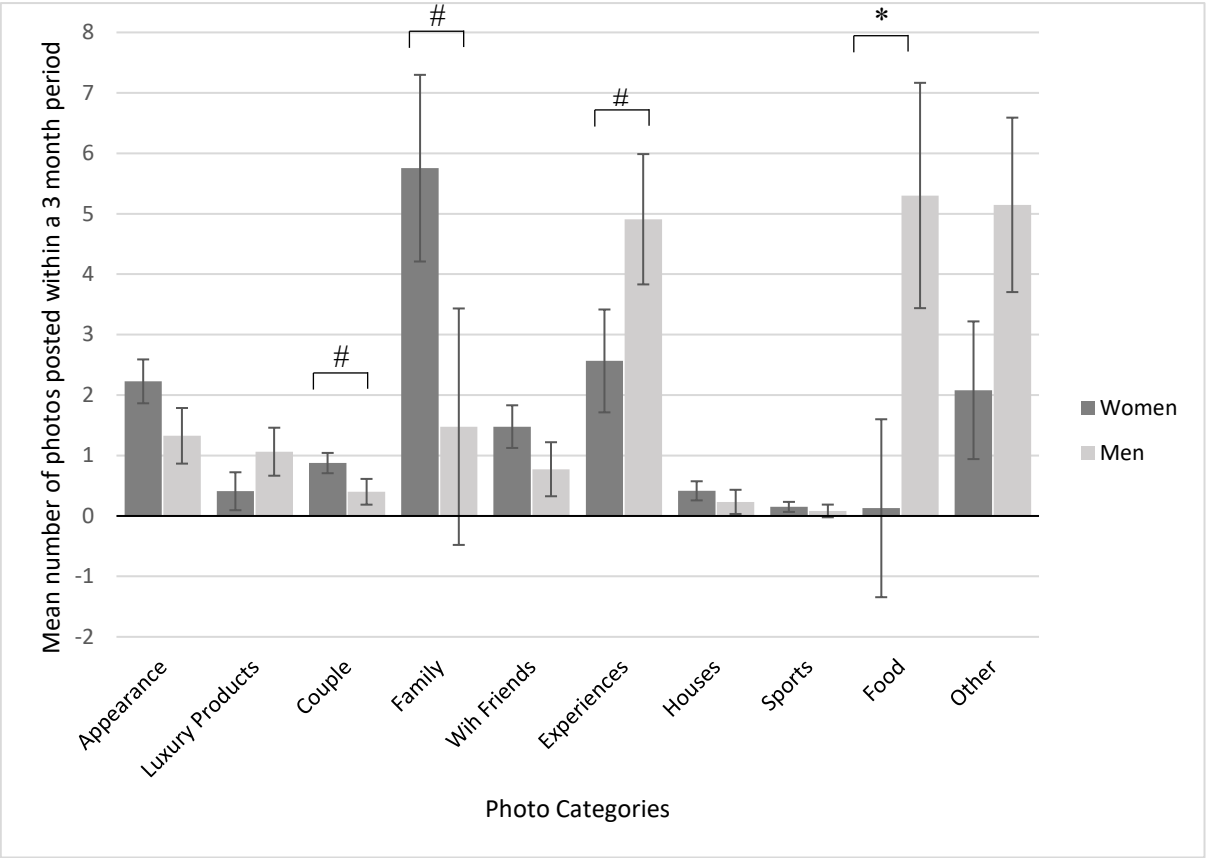

Figure 3.9. Mean number of photos posted in a three-month period (± *SE*) for male (*N* = 44) and female (*N* = 69) participants across the different photo categories.
Note. * is .001 ≤ *p* ≤ .05 and # is .05 ≤ *p* < .10

Actual posting of photos across the different categories showed the same trends as the results of the hypothetical "likeliness to post" reports measured in the first part of the study, however this study was potentially under-powered to find these differences to be significant. Women were found to post more photos that highlighted their appearance, themselves in a couple, their family and photos with friends. While men did post a greater number of luxury product photos in reality in agreement with their hypothetical reporting.

3.4 Discussion

In this study of real-world Instagram use, I examined how the quantity and subject matter of photos posted on Instagram in a three-month period could be predicted by female intrasexual competitiveness and mate value.

Summary of results

When comparing the subset of data of participants who have permission to access their Instagram accounts to the whole dataset from part 1, I found that participants who gave permission to access and analyse their actual Instagram photos, rated themselves as more likely to post and "like" other people's photos on Instagram than those who did not give permission. Participants who gave permission scored lower on the Honesty/Humility factor scale, but higher on the Openness factor of the Hexaco-60, than those who did not. They also had significantly more followers, followed more accounts, and accessed Instagram more frequently than those who did not give permission. There were no differences in intrasexual competitiveness or mate value. When considering the total number of photos posted to Instagram, mate value negatively predicted number of photos posted for men. For women, mate value interacted with intrasexual competitiveness such that in general, low mate value was associated with posting a greater number of photos. At low mate value and medium mate value, increased intrasexual competitiveness resulted in an increased number of photos being posted, while at high mate value, increased intrasexual competitiveness is associated with a decrease in number of photos posted. When comparing the number of photos posted in the different categories, women were found to actually post more appearance-related photos and men were found to post more luxury products photos, in agreement with Part 1 (although these effects approached but did not reach significance in part 2).

Mate value, intrasexual competitiveness and posting behaviour

Mate value and intrasexual competitiveness were found to affect number of photos actually posted. In the first part of the study, the likeliness of posting a photo which highlighted their physical appearance increased with both mate value and intrasexual competitiveness for women. But mate value and intrasexual competitiveness were found not to interact. In part 2 , the number of solo appearance photos posted within a three-month period was found to be small and highly variable. I did not find the number of solo appearance photos to be associated with mate value or intrasexual competitiveness for either men or women. The small number of photos and the small number of participants (which was dependent on participants providing consent to access their Instagram accounts) may have resulted in the study lacking the power to identify these small effects. Recent evidence has found that excessive self-presentation by posting large numbers of "selfies" has a detrimental effect on how observers viewed the selfie taker (Hong, Jahng, Lee, & Wise, 2020), and implicit awareness of this may moderate how many solo-

appearance photos people post in reality. However, when considering the total number of photos posted across all categories, both mate value and intrasexual competitiveness significantly impacted how many photos women posted. In contrast to the hypothetical findings, lower mate value was associated with posting more photos for women. At low and medium mate value, the number of photos posted increased with increased intrasexual competitiveness – perhaps because the ability to curate and filter photos allows lower mate value women to artificially increase their perceived mate value online, and if they also have high intrasexual competitiveness they are more motivated to do this more than women who are less competitive. At high mate value, high intrasexual competitiveness caused a decrease in number of photos posted. Potentially, already naturally physically attractive women have less to gain in terms of image management. When low mate value women artificially increase their physical attractiveness online, they lessen the gap between high and low mate value women, and highly competitive high mate value women disengage from this type of online competition because they can win more easily in real-life. Low intrasexually competitive women are not motivated to interpret female-female interactions as competitive to the same extent and may benefit from the social connections provided by social media to a greater extent. This finding confirms what women in the hypothetical study in part 1 reported regarding their likeliness to post, comment and "like" appearance related photos: as intrasexual competitiveness increased the likeliness to post an appearance related photo increased but the likeliness to endorse a same-sex other's appearance related photo decreased.

The number of photos posted in a three-month period varied widely and in agreement with "likeliness to post" findings in part 1, women actually did post more appearance related photographs than men, and men did post more luxury product photographs than women (although these effects did not quite reach significance with the smaller sample size). This finding is a strong real-world example of evolved mate-selection preferences influencing behaviour in a modern context. As discussed before, mate selection criteria become the basis for intrasexual competitiveness strategies and it is unclear whether women advertising their (most favourably filtered) appearance is functioning as a warning to other women or a signal to men. However, it was evident when examining the comments and likes on appearance-related photos, that for women, the majority of comments and likes were made by other women, suggesting that posting of appearance-related photos is functioning more as an intrasexual competitive tactic than a mate attraction tactic. While the comments on the photos were not quantified for this study (as I were more interested in the posting behaviour of participants I had mate value and intrasexual competitiveness data on, rather than the responses from unknown people *towards* our

participants), this would be an interesting area for both a quantitative and qualitative follow-up study.

3.5 General Considerations

This study found that highly competitive women post more photos on social media but refuse to acknowledge other women's physical appearance photos by "liking". This implies that two intrasexual competitiveness strategies are being employed: self-promotion and competitor manipulation. Instagram comes with a series of built in filters where users can manipulate their photos before posting, allowing the user to upload the most flattering images to "present themselves as they wish to be seen" (Manago et al., 2008). What rivals see on social media affects their perception of themselves. Social comparison orientation (the degree to which someone compares themselves to their peers) is associated with increased social media engagement (Lee, Lee, Choi, Kim, & Han, 2014; Sherlock & Wagstaff, 2019) which would likely result in being exposed to more self-promoting photos posted by rivals. The images of same-sex "friends" are processed if they were accurate representations of physical attractiveness (in spite of engaging in positive self-enhancement strategies on social media themselves) (Kasra, Shen, & O'Brien, 2018). Because women reduce their self-perceived mate value when exposed to highly attractive same-sex rivals (Fink, Klappauf, Brewer, & Shackelford, 2014; Vaillancourt & Sharma, 2011) rivals may be manipulated to adjust their own self-perceived mate value in line with what they are seeing. In addition, studies showing that women "stalk" other women on Instagram in a form of social knowledge acquisition (Krasnova, Veltri, Eling, & Buxmann, 2017; Su, Han, Yu, Wu, & Potenza, 2020) suggest that women are posting images knowing they are likely to be processed by same-sex rivals. Overall, these findings provide strong evidence for the use of social media as a platform for intrasexual competitiveness in women.

56% of the participants originally allowing access to their Instagram feeds were amenable to this happening in reality. It was interesting to note that of the 206 participants who gave their Instagram username having completed the online survey, 32 participants did not allow access to their private accounts when requested later and 38 participants whose accounts were public had no photos posted within the three-month period directly before completing the survey, in spite of having photos on both sides of that period (perhaps suggesting that they removed photos from the critical study period, after providing consent for this period to be studied). These 70 participants may have agreed to share their username in good faith at the

time of the survey, but later changed their mind (and prevented further participation by ignoring the follow request and/or wiping the critical time period off their account). It may also be that social desirability bias led these participants to want to appear co-operative, but that they never actually intended to allow their own Instagram account to be scrutinised. Online privacy is becoming more of a consideration for many people and may explain reluctance to allow access after having had more time to think it through. For those participants who apparently deleted photos from the exact time period but had their Instagram settings on "Public" the situation seems more complex as they appear not to mind having their account accessed by anyone but did not want their content over that three-month period to be analysed. Over 2500 photos were collected attesting to the popularity of this social media platform and the willingness of many participants to share their online content.

While participants who consented to share their Instagram data in part 2 did not differ in intrasexual competitiveness and mate value from the data sample in Part 2, they showed greater engagement with social media as measured by frequency of use of Instagram, and they both followed and were followed by more accounts. Their ratings on Part 1 also attested to this greater engagement with higher likeliness to post and like scores on the hypothetical images. In terms of personality, participants consenting to the analysis of the Instagram feed were lower on the Honesty/Humility subscale, perhaps resulting in their being happy for the likely-distorted/excessively favourable images portrayed on their Instagram account to reflect them (or perhaps believed that they did reflect them accurately), whereas people higher on honesty/humility might be more hesitant for their Instagram account to represent their reality. These participants were also higher on Openness than non-permission givers in Part 1, highlighting their willingness to share personal information and allow someone they didn't know to not only look at, but analyse in detail their personal posts. This confirms that dataset 1 and 2 were not exactly the same in all aspects, although importantly mate value and intrasexual competitiveness were consistent.

The Covid-19 pandemic likely impacted how participants used social media over the course of this study. While I did collect data on the frequency and time spent on Instagram, the Covid pandemic occurred in the middle of data collection which took place from 2016 to 2022. Extended lockdowns and working from home affected many people's engagement with social media (Aggarwal, Singh, Chopra, & Kumar, 2022; Price et al., 2022) – in most cases increasing time spent on social media, confounding comparisons of time spent on social media for participants collected before and after March 2020. Therefore, I elected not to use frequency and

duration spent on social media in our analyses. However, I acknowledge the potential impact of increased engagement on number of photos posted too.

Part 1 of this study is one of the largest studies I know of that has looked at intrasexual competitiveness, mate value and hypothetical engagement with Instagram. Approximately equivalent numbers of male and female participants allowed for valid comparisons of sex effects. To our knowledge, Part 2 is the first study to analyse the actual Instagram content of users and compare this with their hypothetical "likeliness to post/comment and like" behaviour, as well as mate value and intrasexual competitiveness.

Dissimilarities between a hypothetical Instagram environment and participants' real social media experience may also account for dissimilarities between the study 1 and study 2 findings, especially when considering the opposite effect of mate value in the hypothetical study versus real-life, and the interaction between mate value and intrasexual competitiveness found in part 2. When people are responding to hypothetical Instagram photos, as they have in Part 1 of this study and all other studies on Instagram that I are aware of, each participant is exposed to the same Instagram world. In reality, each participant has a unique Instagram world based on who they follow, who follows them, what they like and comment on and what they search for. How any one person behaves on the platform is a complex interplay of evolved mechanisms, individual differences but also differences in what they are exposed to when they look at their Instagram feed. Therefore, even if two participants self-report equal levels of intrasexual competitiveness, and this were to predict similar responses from them in the controlled environment of study 1, they may exhibit divergent behaviour in study 2 as their respective real-life Instagram feeds may contain different levels of highly attractive mates or competitors, both of which influence the expression of intrasexual behaviour (Brase & Dillon, 2022; Edlund & Sagarin, 2010; Gutierres, Kenrick, & Partch, 1999; Penke & Denissen, 2008; Roney, Mahler, & Maestripieri, 2003).

There were important areas in which the hypothetically-based findings were confirmed by actual Instagram engagement. Increased intrasexual competitiveness resulted in greater engagement with social media (except for high mate value, highly competitive women) as evidenced by posting. Women were found to post photos highlighting their physical appearance and men to advertise their resources and status. Together these findings offer some legitimacy to studies relying solely on hypothetical social media environments and self-report data to understand real world social media behaviour.

Social media has become an important part of everyday life for much of the world's adolescent and adult population (Kemp, 2022). Its popularity is unlikely to wane and hence ongoing research in understandings its impact is valuable from a theoretical and applied perspective. This study found that Instagram is used as a vector for intrasexual competition between women by allowing strategic self-promotion and competitor manipulation. Mate value interacts with intrasexual competitiveness to suggest that those women who have the most to gain by manipulating their reality through filters and careful selection of how they represent their lives are the ones who post more photos on Instagram.

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Chapter 4: Sabotage at the Salon - Do hairdressers respond differently to attractive customers?

In April 2022 a video went viral on social media of a woman crying after paying US$300 for a haircut which she felt made her "look like a f-----g Karen, who drove a minivan and was on the PTA" (Evans, 2022, April 30). The responses to her video suggest that many other women identified with the dilemma. One person wrote: "Girl I have been there! I got 8 inches cut off unplanned and the hairstylist kept cutting." There is even a wikiHow webpage on "How to cope with a haircut that is too short" that had been accessed 684,243 times in less than one month (Cox, 2022, September 10) at the time of writing. This does not appear to be a phenomenon which widely affects male customers of hairdressers and hair appears to be linked to perceptions of women's beauty to a much greater extent than men.

Because hair is an important component of the physical attractiveness of women, it may represent a vector for intrasexual competition. In this study I explored whether the attractiveness of the face of the "client" affected the amount of hair that the "hairdresser" recommended cutting off and how this was affected by sex, intrasexual competitiveness, and self-perceived mate value of the person cutting the hair. I investigated whether these effects were exacerbated or mitigated by the client wearing makeup. The first study asked lay people to imagine they were a hairdresser, while participants in the second study were all qualified hairdressers and/or makeup artists working in the beauty industry. Furthermore, ratings of the physical attractiveness of the participants relative to each stimulus client, allowed me to explore whether women advised clients who were more attractive than them, as attractive as them or less attractive than them, differently, identifying whether intrasexual sabotage was aimed upwardly, at the same level or downwards.

1.1 Background

Hair as a Female Sexual Signal

Women use adornment to enhance their perceived attractiveness. Physical attractiveness in women is a key mate attraction criterion (Buss, 1988). More attractive women attain higher quality men to father their offspring and to provide resources for the successful rearing of those offspring. Women enhance their own attractiveness in both easily accessible and impermanent ways (like using makeup (Killian & Peissig, 2013; Osborn, 1996), choosing flattering clothing (Lennon, 1990; Sidhu, Qualter, Higgs, & Guo, 2021), and exercising (Cash, Now, & Grant,

1994)), and in more drastic ways (such as radical dieting (Faer, Hendriks, Abed, & Figueredo, 2005; Marks, De Foe, & Collett, 2020) and cosmetic surgery (Arnocky & Piché, 2014)). Such enhancements typically highlight and/or manipulate aspects of female appearance signalling youth, health and fertility (Pflüger, Oberzaucher, Katina, Holzleitner, & Grammer, 2012). Adornments are therefore used to enhance traits which are linked to physical attractiveness and therefore relevant to mate value. They presumably function to manipulate women's perceived mate quality for prospective mates.

Women's hair may be a reliable signal of mate quality. Younger women tend to have longer and healthier hair than older women and hair quality is positively correlated with self-rated physical health (Hinsz, Matz & Patience, 2000). Long hair was found to enhance attractiveness judgements (particularly of low attractiveness subjects) compared to the same faces with no visible hair showing/short hair (Bereczkei & Mesko, 2006; Mesko & Bereczkei, 2004). If a woman's hair signals desirable qualities, then longer hair may be expected to provide a better signal (by taking up more space in the perceptual field, Etcoff, 1999) Women also tend to report *believing* that men would prefer them to have longer hair, and on average, women report wanting longer hair than they have (Jacobi & Cash, 1994). Women with healthier hair may therefore be expected to be motivated to grow it long.

When assessing various qualities of women in photos to which different hairstyles (long hair, medium-length, short hair, bun, dishevelled, and one face-only without visible hair) had been experimentally added, women with long hair were judged by male participants to be more feminine, intelligent, dominant and healthy (Bereczkei & Mesko, 2006; Mesko & Bereczkei, 2004). However, long hair worn out, not tied back, increased perceptions of promiscuity (Matz & Hinsz, 2018), suggesting that it is not just the length of the hair, but how it is worn, that effects perceptions a woman. In a study measuring women's reactions to a conservatively dressed, attractive female confederate and the same confederate dressed to represent a "sexy" version, photos of the experimental manipulation showed the sexily dressed woman with her hair hanging loose and the conservatively dressed version had her hair tied back (Vaillancourt & Sharma, 2011). In this study women were found to be intolerant of sexy peers, rating their chances of introducing their boyfriend to the sexy confederate lower, their chances of letting their boyfriend spend time alone with her lower, and their likelihood of being her friend lower. Without the authors explicitly referring to the hairstyle, there were distinct differences in how the hair was worn. It is not unreasonable to suggest that one of the attributes leading to the

increased perception of the confederate as "sexy" and therefore threatening, was her long, unrestrained hair.

Competitor Manipulation

Competitor manipulation is a subtle and indirect form of intrasexual competition. Indirect aggression is an evolutionarily adaptive tactic whereby an individual aims to harm a rival while concurrently trying to obscure their intent to harm (Arnocky, Sunderani, Miller, & Vaillancourt, 2012). Relative to direct aggression, it minimises the potential cost of an injury (Fisher & Cox, 2011), it decreases the likelihood of a partner resenting an overt display of jealousy (Vaillancourt, 2013) and it reduces the chance of retaliation by the victim (Björkqvist, 1994). Given that hair is such a salient and malleable feature of women's appearance, how a woman wears her hair can potentially be manipulated by a hairdresser to reduce her ability to out-compete female rivals. In this act of active sabotage a client's self-perceived or actual attractiveness would be lowered, however, plausible deniability would be maintained ("but it needed that much cut off to look healthy", "it really suits you like that", "I thought that's what you wanted").

Competitor manipulation refers to targeted actions that are about manipulating a competitor to do something which makes them less appealing. Self-presentation is another intrasexual competitiveness strategy but refers to actions that enhance the opposite sex appeal of the agent. Both strategies have another consequence to the rival. Women implicitly adjust their ideal mate selection preferences to mates that they believe are attainable based on their own self-perceived mate value. By using any strategy that causes competitors to adjust their own self-perceived mate value downwards, a focal woman may be able to manipulate similar mate-quality rivals into removing themselves from competing for her desired mates. Women selectively present themselves in the most flattering physically attractive and socially successful light (through the careful use of makeup, having their hair professionally styled, choice of clothing, brand name accessories, careful curation of social media feeds etc). Research confirms that we come to believe what we are exposed to (regardless of the fact that we know that the image *we* convey publicly is not the whole story) so women automatically make upward social comparisons in both real-life, print and digital media (Want, 2009) and social media (Saiphoo, Halevi, & Vahedi, 2020) resulting in a lowering of self-esteem (see (Cingel, Carter, & Krause, 2022) for a review). Hence exposing a rival to your most attractive self-portrayal can also result in their adjusting their mate value downwards and withdrawal from competition.

Makeup as a self-promotion strategy

A common technique women use to enhance their attractiveness is through the use of makeup. Women wearing makeup were judged to be healthier and more confident (Nash, Fieldman, Hussey, Lévêque, & Pineau, 2006). Makeup was found to make older women look younger and younger women look older (Russell et al., 2019). Makeup increases perceived facial attractiveness but results regarding the enhancement effect of makeup are mixed and complicated by differences in levels of makeup application (light/everyday/glamorous/heavy) (Aguinaldo & Peissig, 2019; Tagai, Ohtaka, & Nittono, 2016), different types of stimuli used in different studies (Aguinaldo & Peissig, 2021; Etcoff, Stock, Haley, Vickery, & House, 2011), and many studies with few participants or participant samples in which men and women's perceptions were analysed together (Etcoff et al., 2011; Tagai et al., 2016). Self-applied makeup was found to increase attractiveness as perceived by men and women separately (Batres et al., 2018), but there were also sex-differences in attractiveness ratings, with men generally rating attractiveness lower than women. The study reported in Chapter 2 confirmed that makeup increased the physical attractiveness of women as perceived by other women, but this was found not to be true for all men. Only the highest mate value, alpha-male type men rated women's attractiveness higher when wearing makeup. We theorise that they may be interpreting makeup use as a sign of high socio-sexuality (Wagstaff, 2018), and hence finding these women attractive due to these men's greater tendency towards short-term relationships (Arnocky et al., 2021).

There were other sex differences in perceptions of women wearing makeup, with men rating made up faces as having higher prestige, while women rated the same faces as having higher dominance (Mileva, Jones, Russell, & Little, 2016). The effect of makeup is also dependent on the mate value (physical attractiveness) of the wearer: highly attractive women are perceived as more interpersonally aggressive when wearing made-up, and less attractive women are perceived as having more leadership potential (perhaps in line with perceptions of greater dominance) (Sulikowski, Ensor, & Wagstaff, 2022). Women experienced more jealousy towards other women wearing makeup, and believed them to be more attractive to men and more promiscuous (Mileva et al., 2016). Women seem to be aware that wearing makeup will affect how other women view them: intrasexual competitiveness was positively correlated with money spent on makeup and frequency of makeup use (Mafra et al., 2020; Wagstaff, 2018). *Quantity* of makeup worn was related to unrestricted sociosexuality (Wagstaff, 2018), perhaps suggesting the use of excessive makeup as a signaller of sexual availability. If makeup is being used as a

stronger, more predictable signal to other women than men, it is likely functioning more as an intrasexual competitiveness tactic than a mate attraction tactic.

Sabotage and intrasexual competitiveness

The two studies reported here follow two previous studies in which we investigated the impact of client attractiveness, and participant intrasexual competitiveness and mate value, on the tendency to sabotage a female client (Sulikowski *et al.*, 2023 under review). In the previous studies participants (who were all women) advised hypothetical salon clients how much hair they ought to have cut-off. Appearance advice may be an effective competitor manipulation tactic if the advice results is a decrease in attractiveness in the rival. In the first study, female-only participants were members of the general public imagining themselves in the role of hairdresser, advising "clients" whose faces had been assessed as being of high attractiveness or low attractiveness on how much hair to have cut. All clients had medium to long hair. Participants were shown a portrait of each client, a close-up image of their hair, together with a vignette describing the hair as being in either good or poor condition and the client's wishes to cut off "as little as possible", or "as much as necessary." Variations in the hair condition and the clients' wishes provided participants with an obvious and plausible rationale for what was being studied (potentially lessening the salience of attractiveness variations across clients). It also provided us with built-in manipulation checks, allowing us to confirm that participants were paying attention to the details in the vignette across the duration of the study: participants did indeed cut more hair off clients whose hair was described as being in poor condition and clients who were happy for the maximum necessary to be cut off. Secondly, these design features allowed us to create conditions that were especially amenable to intrasexual competition manifesting in the advice to cut off more hair. When the hair was in good condition and the client's wishes were to cut off as little as possible, recommendations to cut off more hair would represent greater sabotage than if the hair was in poor condition (which may in fact improve client attractiveness, and hence not represent sabotage at all).

We found that as participants' intrasexual competitiveness increased, they recommended cutting more hair off, particularly clients whose hair was in good condition and who wished to have as little cut off as possible, lending weight to the idea of sabotage through disingenuous beauty advice. Overall, more hair was recommended to be cut from low attractiveness clients than high attractiveness clients in the two-attractiveness-level study, suggesting downward competition in this particular scenario. However, this led us to the question how women

responded to competitors of the same attractiveness (and hence same mate value) as them, who were likely to be their fiercest competition for mates at a particular level.

The second study was expanded to include three client groups: high, average and low attractiveness, and female participants also provided ratings of their own relative attractiveness to each "client" in order to examine whether competitiveness was stronger towards rivals who they judged to be more attractive, the same level of attractiveness or less attractive than themselves. In this case, when the hair was in good condition and clients advised that they wanted as little as possible cut-off, participants recommended cutting the most hair off clients of average attractiveness, and also tended to cut more hair from clients of low attractiveness, compared to clients of high attractiveness. When relative, rather than absolute, attractiveness of clients was considered, participants who were relatively low on intrasexual competition recommended cutting the most hair off clients they perceived to be as attractive as themselves. Participants who were high on intrasexual competitiveness, however, recommended cutting the most hair off clients they perceived to be less attractive than themselves. We attributed this shift to rival derogation impacting the attractiveness ratings, concluding that across the spectrum of intrasexual competitiveness, women primarily targeted their mate quality peers with advice to cut off more hair. Participants' self-reported mate value played a negligible role in all of these effects.

Given these findings confirming that participant intrasexual competitiveness and client attractiveness do affect the beauty advice given to prospective clients in a way that would manipulate them to decrease their mate value, the first of the current studies was designed to further explore these effects by considering how the addition of makeup affects the degree of sabotage. It also includes male participants to explore sex differences in patterns of sabotage. In the second current study we investigated the ecological validity of our findings by using a dataset consisting of professional hairdressers and aestheticians working in the beauty industry.

1.2 The Current Study

The studies reported in this chapter are the third and fourth in a series of studies. The previous two studies were completed as fourth-year student research projects at Charles Sturt University with myself as the Chief Investigator and Supervisor of the students, under the supervision of my own PhD supervisor, Dr Danielle Sulikowski. These data were written up for submission to a journal for publication (Sulikowski *et al.*, 2023 under review) (see Appendix

C2). As they have already been included in fourth-year student research theses, they cannot also be included as a chapter in this dissertation. The third and fourth studies in the series are presented here. These data were not collected with the involvement of any other research student and have not appeared in any other dissertation.

The first current study again asked participants to take on the role of a hairdresser and advise hypothetical clients how much hair they should have cut-off. It investigated the extent to which advice to cut off more hair was predicted by the client's facial attractiveness and the participants' intrasexual competitiveness and mate value. It extends these ideas by including male participants to measure sex differences in client advice. If women are found to cut more hair off than men, this would provide support for the idea that sabotage is a female intrasexual competitiveness strategy. I also explore whether the client wearing makeup impacts the amount of hair they are advised to have cut off. Makeup is a between-subjects' manipulation: participants saw either the bare-faced clients (as in the first two studies) or client photos to which "everyday" makeup has been digitally added. Make-up is perceived as a socially/sexually aggressive intrasexual signal (Mileva et al., 2016). If signals of aggression elicit more aggressive responses, then we should see more hair being cut-off made up faces, but if such signals tend to curb competitor manipulation, then we should see less hair cut off.

The second current study investigated the extent to which findings from the general population of women would be replicated in a sample of professional female hairdressers and aestheticians working in the beauty industry. Hairdressers provided responses on how much hair they would recommend clients from high attractiveness and low attractiveness groups should cut off in makeup and barefaced conditions. Evidence that such effects might play out in real life hair salons, and not be limited to the hypothetical scenarios depicted in the first three studies, adds more ecological validity to the findings. Again, we explored the effect of makeup, as working in the beauty industry we hypothesised that aestheticians would be more familiar with doing professional makeup and more likely to wear makeup themselves. We were interested to know whether this familiarity decreased any effect of makeup found in women from the general population.

To summarise our predictions: as female intrasexual competition does seem to manifest in the context of appearance advice as confirmed by the first two studies, we predicted that the amount of hair advised to be cut would increase with increased intrasexual competitiveness in women, but not men. Given the results of the first two studies, we expected to find same-level

competition in the female data set, with average attractive clients having more hair cut off than more attractive clients. When analysing how women reacted to clients based on their relative attractiveness to the participant , we expected to find the most hair to be cut off clients who participants rated as being the same level of attractiveness as themselves. While makeup is hypothesised to be used as a competitive signal to other women, we were unsure whether it would incite additional competition resulting in more hair being cut off, or act as a dominance signal, reducing potential sabotage. We hoped that by exploring differences in the effects of makeup between the general population (who would have varying experience/familiarity with makeup usage) and the hairdresser group (who would likely be familiar and use makeup effectively and regularly) we would be able to clarify this effect.

Study 1

2. Materials and method

2.1. Participants

A total of 827 participants were recruited through undergraduate psychology course research participants programs (N = 327, for which they received credit), and a paid participant bank (ProlificAcademic.com, N = 500 , for which participants were compensated the equivalent 6 pounds sterling per hour of participation). Ten participants were excluded for not completing the intrasexual competitiveness measure of the survey, and three participants were excluded due to identifying as a gender other than male or female. Thirty-five women and 48 men were excluded for having a same-sex partner or ideal partner. The final analyses included data from 731 participants: male (N=374, aged 18-59, M_{age} = 30.12, SD = 7.251) and female (N = 357, aged 17-62, M_{age} = 31.33, SD = 9.809). Of the female participants 68.0% reported being in a long-term relationship, 3.4% in a short-term or casual relationship/s and 28.6% were single. Of the male participants 61.5% were in a long-term relationship, 4.8% in a short-term relationship/s and 33.7% were single. All participants provided informed consent under HREC protocol number **H18039** (approved by the Charles Sturt University Human Research Ethics Committee).

2.2. Instruments and Measures

As described in detail with justifying psychometric evidence in Chapter 2, The Mate Value Scale (Edlund & Sagarin, 2014) was used to measure Mate Value and the Scale for Intrasexual Competition (Buunk & Fisher, 2009) was used to assess participant intrasexual competitiveness.

2.2.1. Mate Value Scale

Edlund and Sagarin's (2014) *Mate Value Scale* (MVS) was used to assess global mate value. In the current sample we observed strong internal consistency for both male (Cronbach's alpha = .92) and female (Cronbach's alpha = .90) participants.

2.2.2. Scale for Intrasexual Competition

Bunnk and Fisher's (2009) Scale for Intrasexual Competition was used to calculate the degree to which participants feel competitive towards members of the same sex for access to opposite sex attention. Consistent with the previous study, in the current study we also observed significantly lower mean intrasexual competitiveness scores (t (729) = -5.447, p = <.001, two-tailed) for women (M = 1.98, SD = 1.04) than men (M = 2.64, SD = 1.10), and good internal consistency for both sexes (Cronbach's alpha = .92 for men Cronbach's alpha = .90 for females).

2.3 Stimuli

Twenty-four female faces were drawn from the UCT-HiFi face database. The faces are of women of apparent reproductive age exhibiting neutral expressions. These faces (along with the others in the database) had previously been rated for subjective femininity by male and female raters (N=305). Using femininity ratings as a proxy for attractiveness ratings, we selected the eight most feminine faces (M=11.18, SD=2.21), the eight faces in the middle (M=9.18, SD=2.39), and the eight least feminine faces (M=6.20, SD=2.58) to use as the high, average and low attractiveness stimulus faces. These photos constituted the bare-faced condition in the current study.

The images were cropped to show just the head, hair and neck to the collar bone, set against a neutral background (RGB: 220,211,202), and displayed at a resolution of 72dpi, and a size of approximately 10x15cm. Displayed alongside each image was a supposed magnified view of the hair (7cm in diameter). Hair images were not derived from the face images, but were sourced online and depicted hair that was in either good condition or poor condition. Multiple good and poor condition hair images were collated and colour matched to the stimulus images' hair, so that participants did not view the same hair condition picture multiple times across the study. All stimulus image manipulations were performed in Adobe Photoshop (CS5).

Makeup was digitally added to each face using the app Perfect365 (Perfect365, 2021). The makeup applied was designed to show "everyday makeup" that would be worn by women to work/university/for meeting up with friends. Perfect 365 has predesigned "looks" and in general

the “everyday look” was applied then adjusted to suit the colouring of the client with minor revisions to make the application look as authentic as possible. Because the subjects in the stimulus photos gave permission to use their photos in future studies, but did not consent to having their photos published, indicative stimulus photos (to which the identical processes have been applied), are shown in Figure 4.1a, not the actual stimuli used.

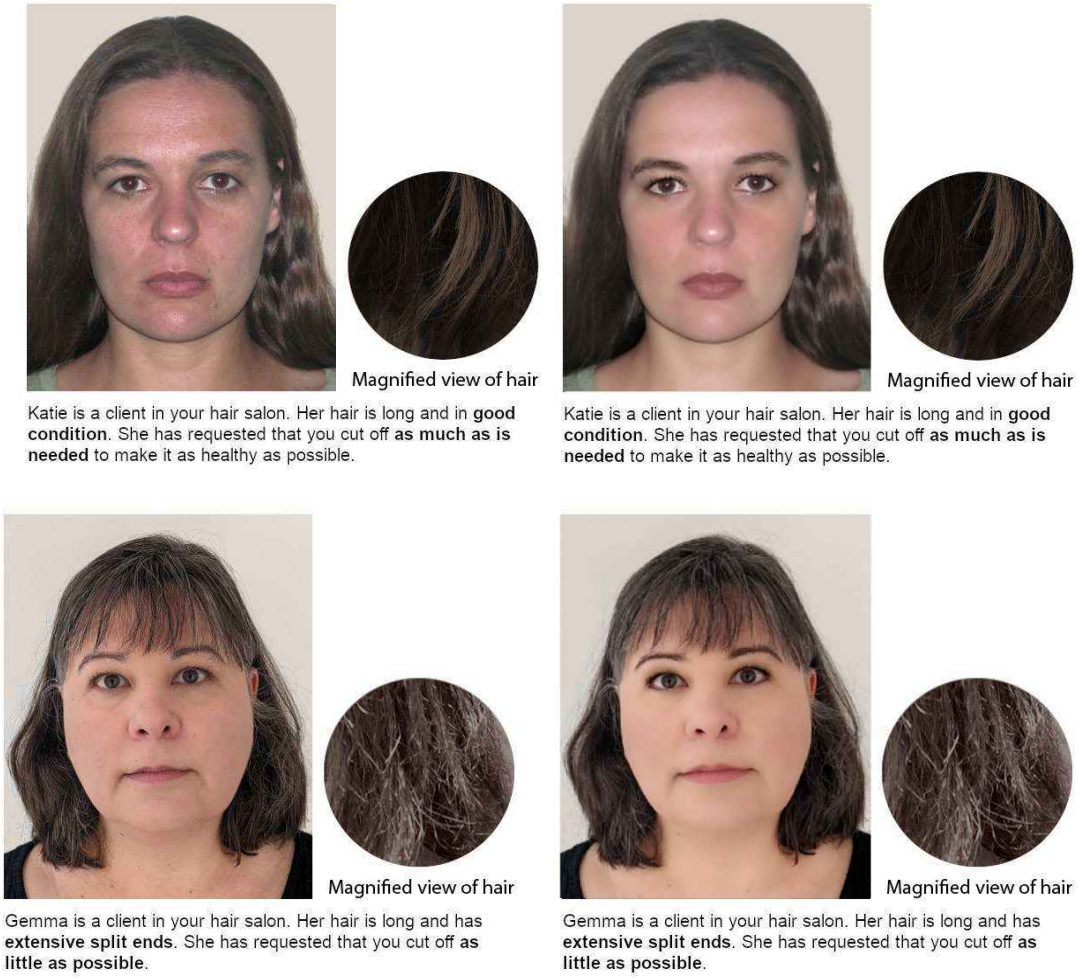

Figure 4.1a. Indicative examples of stimulus photos for the barefaced and makeup conditions

To check the makeup manipulation 32 participants (10 men and 22 women, who did not participate in the main study) were shown the 24 faces with eight faces from each of three conditions: barefaced, with everyday makeup (as used in study) and with evening/glamour makeup (intentionally heavier makeup than used in the study). Participants were asked to rate the makeup in each photo on a 4-point Likert scale, with each point labelled: 1 = bare-faced, 2 = light everyday makeup to 3 = moderate everyday makeup and 4 = heavy/glamorous makeup.

The following means were calculated for each type of photo: Barefaced $M = 1.469$, $SD = .256$, Everyday makeup $M = 2.949$, $SD = .381$, Evening/glamour $M = 3.719$, $SD = .325$. Indicative examples of stimulus photos for the makeup manipulation study are shown in Figure 4.1b.

Figure 4.1b. Indicative examples of stimulus photos for the makeup manipulation validation study showing bare faces, everyday makeup and glamourous makeup photos

A one-way ANOVA confirmed that participants could reliably identify the difference between makeup levels, with a main effect of makeup condition in women, $F(2,20) = 730.057$, $p \leq .001$, $\eta_p^2 = .986$ and men, $F(2,20) = 224.265$, $p \leq .001$, $\eta_p^2 = .982$. *Post hoc* simple comparisons showed significant differences between each level of makeup (none-everyday, none-glamorous, everyday-glamorous) with all *p's* $\leq .001$.

2.4 Design

This study is based on a mixed design with three within-subjects' factors, two between-subjects' factors and two covariates. The dependent variable was the amount of hair the participant recommended that the client cut off (in cm). The first within-subjects variable was client attractiveness: stimulus photos were grouped into three levels of attractiveness (high, medium and low) – each participant saw all eight faces from each attractiveness groups. The second manipulation was client hair condition in which the client's hair was described as being in either good condition or poor condition. The third manipulation was client wishes in which the client reported wanting as much hair cut off as necessary (maximum) or as little as possible (minimum). The hair condition x client wishes were counterbalanced among the attractiveness photos, so that each participant saw two high attractiveness faces in good condition wanting the minimum hair cut off, each participant saw two low attractiveness faces with hair in poor condition wanting the minimum cut off etc. for each of the twelve conditions. The manipulation involving clients with good hair condition asking for the minimum hair to be cut off represents the condition under which the greatest sabotage can occur. If hair is in good condition it is not in the clients' interest to cut off more, especially when it is against her wishes.

Confirming that clients whose hair was in poor condition and clients who asked to have the maximum amount needed cut off, did indeed have more hair cut overall than clients whose hair was in good condition or wishing for the minimum to be removed provided something of a sample wide attention verification, proving that participants read and considered the information in the vignettes when providing their answers.

The between subjects' variables were sex and makeup. Clients saw either all bare-faces or all made-up faces. Mate value and intrasexual competitiveness were covariates.

2.5 Procedure

Participants initially provided demographic information about themselves: age, sex, sex of their partner/ideal partner and their current relationship status. Participants were then shown a picture of a ruler against a normal sized credit card, which is about 8.5 cm long to provide a scale for estimating how much hair they would cut off each "hairdressing client". Participants were then randomly allocated to either the made-up or bare-faced stimuli condition. One at a time and in random order, each participant saw eight faces each from the low, medium and high attractiveness categories. Participants rated how much hair they would cut off on an 11-point Likert scale, with each point labelled from "1cm (or less)", "2cm"…, to "10cm", and "more than

10cm". After indicating how much hair they would cut off each of the 24 "clients", participants were shown each face again, one at a time, (in the same made-up or no bare-faced condition, in a random order, and without accompanying information about hair condition). This time they were asked to rate the attractiveness of each face (for male participants) or the relative attractiveness "compared to your own face" for female participants. Participants responded on a 21-point slider scale, with anchors at -10 ("Very unattractive"/"Much less attractive than me"), 0 ("Of average attractiveness"/"As attractive as I am"), and 10 ("Very attractive"/"Much more attractive than me"). Participants then completed the SIC, and the MVS and were debriefed via an online debrief statement. Total participation time was approximately 27 minutes.

2.6 Data Analysis

The amount of hair each participant recommended to be cut-off each client was averaged for the 12 conditions (high-/medium-/low attractiveness x good/poor hair condition x client wishes for maximum/minimum length cut).

The mean MVS score was calculated, converted to a z-score and used as a measure of mate value. The mean SIC score was also converted to a z-score across the full sample to preserve sex differences as a measure of intrasexual competitiveness.

The MVS and SIC scores were then entered as covariates into a full-factorial 3 (attractiveness of stimulus face: high, average or low) x2 (condition of hair: poor or good) x2 (client's wishes: as little as possible or as much as needed) (all within-subjects' factors) x2 (makeup/barefaced) and x2 (male/female participants) – both between subjects' factors, mixed repeated-measures ANCOVA. Since age did not correlate with the dependent measure across any of the conditions (see Tables 4.1 and 4.2), age was not controlled for in the analyses reported below.

3. Results

3.1 Correlations

Table 4.1 shows the correlations between the individual difference variables and the dependent variables for the study for women, and Table 4.2 shows the same for men. Age, mate value and intrasexual competitiveness were found not to be correlated in either the female or male participant groups. For women, as mate value was increased, less hair was cut off average and low attractiveness women without makeup. For male participants, intrasexual

competitiveness was positively correlated with amount of hair cut off women wearing makeup but not barefaced women across all three attractiveness levels.

Table 4.1

Pearson r correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study 1 for female participants (N = 356)

Individual difference variables				**Age**	**SIC**	**MVS**
1. Age				-		
2. SIC (Scale for Intrasexual Competitiveness)				.004	-	
3. MVS (Mate Value Scale)				.079	.103	-
Dependent variables						
Client Attractiveness	Makeup	Hair Condition	Client Wishes			
Highly Attractive	Makeup	Good	Max	-.053	.121	-.025
			Min	.050	-.029	.075
		Poor	Max	-.020	.092	.093
			Min	-.034	.050	.116
	Barefaced	Good	Max	-.003	.125	-.109
			Min	**.151***	.102	-.086
		Poor	Max	-.062	.109	-.145
			Min	-.078	.118	-.131
Mid-level Attractive	Makeup	Good	Max	.026	.132	.037
			Min	.019	.086	-.017
		Poor	Max	-.025	.059	.081
			Min	-.024	.076	.088
	Barefaced	Good	Max	-.068	.089	-.136
			Min	.062	.051	-.139
		Poor	Max	-.061	.133	**-.196****
			Min	-.084	.105	**-.162***
Unattractive	Makeup	Good	Max	-.012	.093	-.019
			Min	-.052	.024	.003
		Poor	Max	-.052	-.004	.055
			Min	-.016	.069	.129
	Barefaced	Good	Max	-.049	.054	**-.213****
			Min	.029	.078	-.082
		Poor	Max	-.081	.117	**-.174***
			Min	-.111	.114	**-.182***

Note. *p<.05, **p<.01, $^{\#}p$<.

Table 4.2

Pearson r correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study 1 for male participants (N = 374)

Individual difference variables				**Age**	**SIC**	**MVS**
1. Age						
2. SIC (Scale for Intrasexual Competitiveness)				.003	-	
3. MVS (Mate Value Scale)				-.018	.058	-
Dependent variables						
Client Attractiveness	Makeup	Hair Condition	Client Wishes			
Highly Attractive	Makeup	Good	Max	.132	.067	-.023
			Min	.020	.093	.006
		Poor	Max	-.020	**.147***	-.030
			Min	.044	.121	-.012
	Barefaced	Good	Max	-.040	.069	.064
			Min	-.088	.113	.063
		Poor	Max	.100	.012	**.154***
			Min	.086	-.007	.101
Mid-level Attractive	Makeup	Good	Max	.039	**.182***	-.043
			Min	.066	**.166***	-.121
		Poor	Max	.015	.112	-.051
			Min	.038	.035	-.085
	Barefaced	Good	Max	.038	-.009	.132
			Min	-.068	-.025	.064
		Poor	Max	**.153***	.098	.108
			Min	.129	-.054	.078
Unattractive	Makeup	Good	Max	.070	.115	-.017
			Min	-.007	**.145***	-.102
		Poor	Max	-.008	.103	.016
			Min	-.045	.064	-.050
	Barefaced	Good	Max	.094	.021	.052
			Min	-.042	.008	.080
		Poor	Max	.101	-.015	.144
			Min	.128	-.076	.127

Note. *p<.05, **p<.01, #p<.1

3.2 Effect of client attractiveness on male and female participant responses

The complete model showed significant main effects of client attractiveness ($F(2,714)$ = 99.537, p < .001, η_p^2 = .218), makeup ($F(1,715)$ = 7.586, p = .006, η_p^2 = .010) and participant intrasexual competitiveness ($F(1,715)$ = 6.396, p = .012, η_p^2 = .009), as well as the expected main effects of hair condition ($F(1,715)$ = 1870.942, p < .001, η_p^2 = .724) and client wishes ($F(1,715)$ = 1345.419, p < .001, η_p^2 = .653). More hair was cut off attractive clients than average or low attractiveness clients. Clients with bare faces had more hair cut than clients wearing makeup and the amount of hair cut off increased with intrasexual competitiveness. Clients whose hair was in good condition had less cut off than those with hair in poor condition, and clients who indicated that they were happy for the maximum needed to be cut off had more cut off than

those who expressed the desire for the minimum to be removed. However, these main effects were all qualified by two-, three-, four- and five-way interactions which are reported in Table 4.3.

Homogeneity of variance was satisfied, with all Levene's $F \leq 2.456$ and $p \geq .062$. The interactions between the covariates and the other factors indicate a possible violation of homogeneity of regression slopes, but as discussed in the previous chapters, this would make the model more conservative, whilst leaving the highest order interaction interpretable (Hollingsworth, 1980).

Table 4.3

Significant interaction effects for the full-factorial 3 (attractiveness of stimulus face: high, average or low) x2 (condition of hair: poor or good) x2 (client's wishes: as little as possible or as much as needed)) x2 (makeup/barefaced) and x2 (male/female participants) mixed between-within ANCOVA model with covariates of mate value (z-MVS) and intrasexual competitiveness (z-SIC)

Significant interaction effect	*F*	df	*p*	η_p^2
Attractiveness x *z*-SIC	3.148	2, 714	.044	.009
Attractiveness x hair condition	27.461	2, 714	<.001	.071
Attractiveness x client wishes	4.809	2, 714	.008	.013
Attractiveness x hair condition x client wishes	3.522	2, 714	.030	.010
Attractiveness x hair condition x makeup x *z*-SIC	5.235	2, 714	.006	.014
Hair condition x sex	25.558	1, 715	<.001	.035
Hair condition x makeup				
Hair condition x sex x makeup	5.639	1, 715	.018	.008
Hair condition x sex x makeup x *z*-MVS x *z*-SIC	5.162	1, 715	.023	.007
Hair condition x client wishes	26.788	1, 715	<.001	.036
Hair condition x client wishes x sex	5.517	1, 715	.019	.008
Hair condition x client wishes x sex x *z*-SIC	3.508	1, 715	.061	.005
Sex x *z*-MVS	3.911	1, 715	.048	.005
Sex x *z*-MVS x makeup	7.621	1, 715	.006	.011
z-MVS x *z*-SIC	3.825	1, 715	.051	.005

To further investigate these numerous and complex interactions, many of which involved sex, the next step was to complete the same model without sex as a between-subjects' factor, on the male and female data sets separately.

3.2.1 Effects within the female only dataset

In the female only data set ($N = 357$), 180 participants saw faces without makeup and 177 responded to faces with makeup. Levene's *F* statistics (all $F \leq 3.331$, all $p \geq .069$) indicated

variance homogeneity. There were significant main effects for attractiveness ($F(2,348) = 53.356$, $p < .001$, $\eta_p^2 = .235$), hair condition ($F(1,349) = 1287.450$, $p < .001$, $\eta_p^2 = .787$) and client wishes ($F(1,349) = 682.392$, $p < .001$, $\eta_p^2 = .662$) – all following the same pattern described in the full model. These main effects were qualified by two-way attractiveness x hair condition ($F(2,348) = 12.020$, $p < .001$, $\eta_p^2 = .065$), attractiveness x client wishes ($F(2,348) = 4.024$, $p = .019$, $\eta_p^2 = .023$), and client wishes x hair condition ($F(1,349) = 26.609$, $p < .001$, $\eta_p^2 = .071$) interactions, and further qualified by a three-way attractiveness x hair condition x client wishes interaction ($F(2,348) = 3.736$, $p = .025$, $\eta_p^2 = .021$). *Post hoc* analyses showed that clients of higher attractiveness had significantly more hair cut than clients of low and average attractiveness (who did not differ significantly) under every condition of client wish and hair condition, however the greatest effect was for highly attractive clients whose hair was in good condition and requested the minimum amount cut off. This represents the condition under which the greatest sabotage could occur. See Figure 4.2.

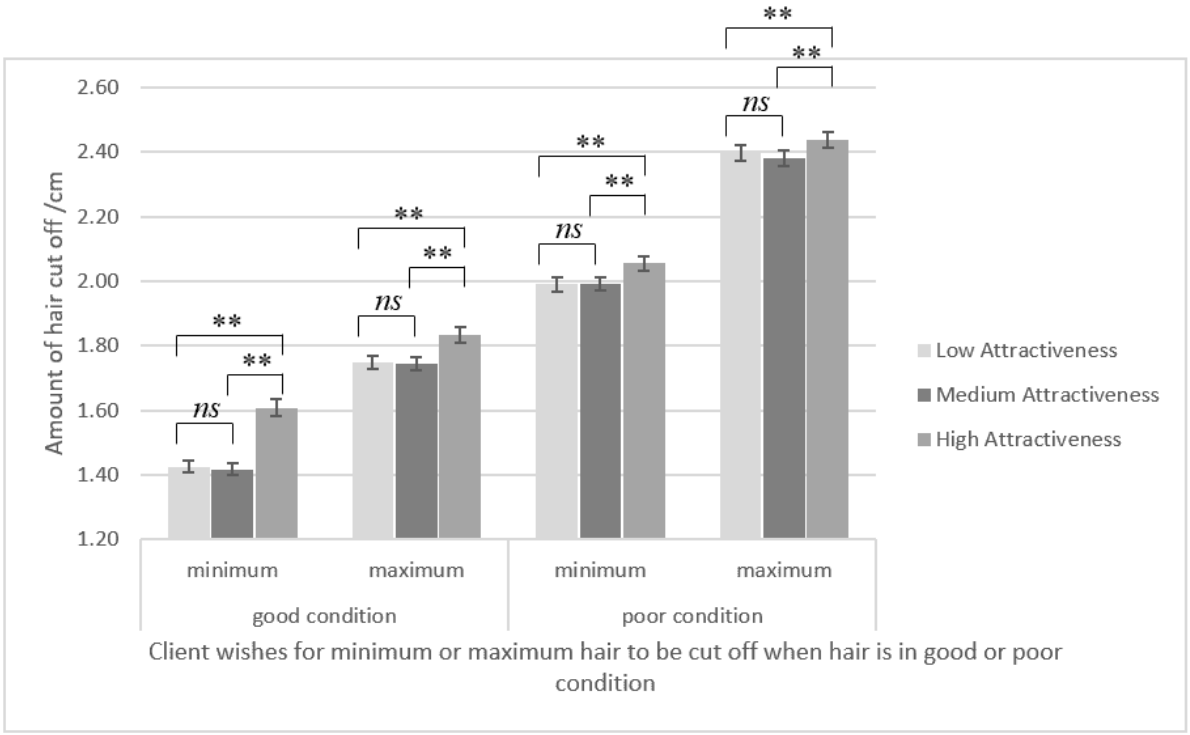

Figure 4.2. Mean length of hair cut off clients of increasing attractiveness ± SE, by female participants when hair is in good and poor condition and the client wishes the minimum amount or the maximum necessary cut off.

** $p < .001$, *p<.05, *ns* is not significant

The main effect of makeup was significant, ($F(1,349) = 6.493$, $p = .011$, $\eta_p^2 = .018$), with more hair being cut off bare faces than made up faces, but this was qualified by a makeup x mate value interaction ($F(1,349) = 4.711$, $p = .031$, $\eta_p^2 = .013$). *Post hoc* comparisons for the simple effect of make-up estimated at low (z-MVS = -1), average (z = MVS = 0) and high (z-MVS = 1) mate value (all for z-ISC = mean) showed that for low and medium mate value participants, the simple effect of make-up was significant ($p < .001$and $p = .015$ for low and medium mate value participants, respectively) with more hair being cut off bare-faced clients. However, for female participants of high mate value the same amount of hair was cut off clients wearing makeup as those without ($p = .964$). Figure 4.3 shows the amount of hair cut off clients with and without makeup as a function of mate value.

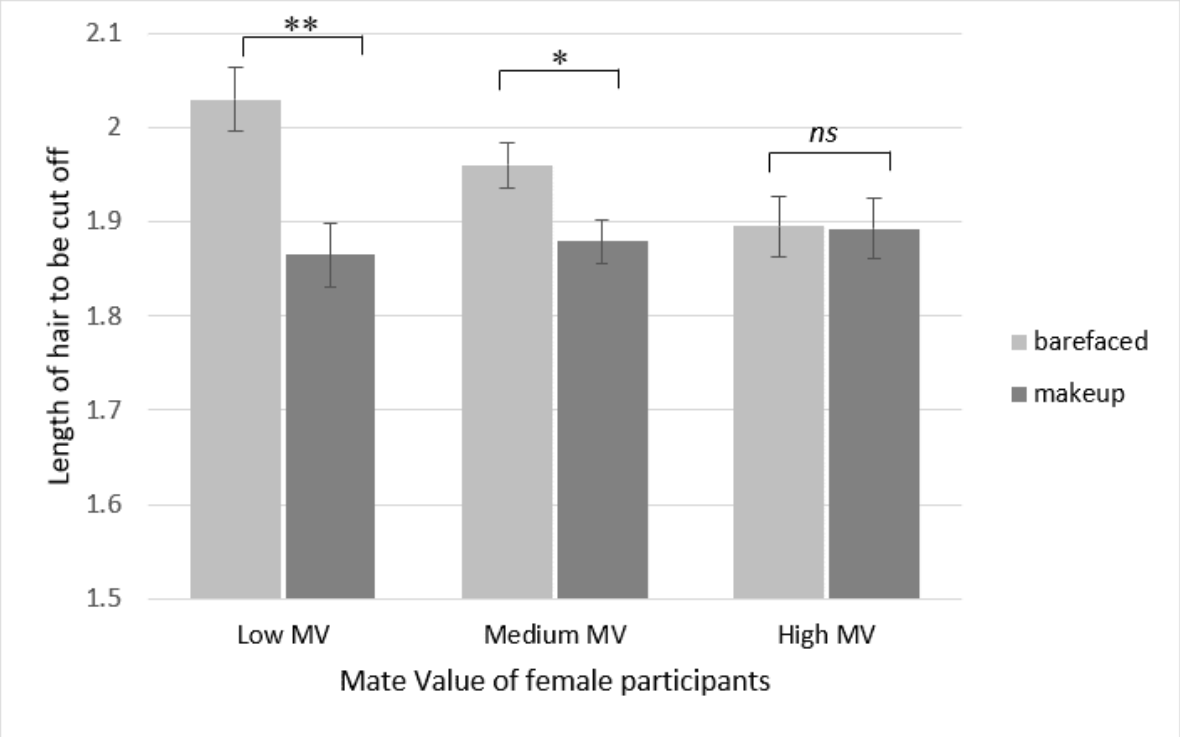

Figure 4.3. Mean length of hair cut off clients with no makeup and with makeup ± SE, by women at low (z-MVS = -1), medium (z-MVS = 0) and high mate value (z-MVS = 1)
** $p < .001$, *p<.05, *ns* is not significant

There was a main effect of intrasexual competition. *Post hoc* comparisons at low (M = 1.890, SE = .021), medium (M = 1.920, SE = .017) and high (M = 1.965, SE = .026) levels of

intrasexual competitiveness (*z*-SIC of -1, 0 and 1 respectively, with *z*-MVS=0) revealed that the more competitive the female participant, the more hair she would cut off the client.

3.2.2 Effects in the male dataset

In the men only model (*N*= 374), 185 male participants saw faces without makeup and 189 responded to faces with makeup. Homogeneity of variance was satisfied, with all Levene's $F \leq .005$, all $p \geq .254$. As in the female sample, there were significant main effects for attractiveness ($F(2,365) = 47.285$, $p < .001$, $\eta_p^2 = .206$), hair condition ($F(1,366) = 674.545$, $p < .001$, $\eta_p^2 = .648$) and client wishes ($F(1,366) = 675.944$, $p < .001$, $\eta_p^2 = .649$) – all following the same pattern described in the full model. These main effects were qualified by a two-way attractiveness x hair condition interaction ($F(2,365) = 15.758$, $p < .001$, $\eta_p^2 = .079$) that revealed that when hair was in good condition more hair was cut from highly attractive clients than from clients of either medium ($p < .001$) or low ($p < .001$) attractiveness, but there was no difference between medium and low attractiveness clients ($p = .083$). When the hair was in poor condition, the same effect was seen but to a greater extent: high vs medium and low (both $p < .001$) and medium vs low ($p = .333$). There was also a two-way client wishes x hair condition interaction, ($F(1,366) = 4.252$, $p = .040$, $\eta_p^2 = .071$), which, as expected revealed that when the hair was in poor condition and the client requested as much as necessary was removed, significantly more was removed than when the hair was in good condition or the client requested the minimum be cut off.

In addition, there were several effects involving makeup: makeup x hair condition ($F(1,366) = 6.098$, $p = .014$, $\eta_p^2 = .016$), and makeup x attractiveness ($F(2,365) = 3.678$, $p = .026$, $\eta_p^2 = .020$), qualified by a four-way interaction between attractiveness x makeup x hair condition x intrasexual competitiveness ($F(2,365) = 5.830$, $p = .003$, $\eta_p^2 = .031$). *Post hoc* comparisons showed that when hair was in good condition, men cut more hair off bare faces than faces with makeup ($p = .032$), but not when hair was in poor condition ($p = .751$). For clients with makeup and without makeup, more hair was cut off attractive clients than medium or low attractiveness clients, but the effect was greater for faces with makeup ($\eta_p^2 = .186$) than bare faces ($\eta_p^2 = .075$).

To investigate the four-way interaction, *post hoc* comparisons using separate ANCOVAs (attractiveness x condition x client wishes with intrasexual competitiveness as covariate) on the makeup and barefaced conditions, revealed a significant main effect of intrasexual competitiveness for faces with makeup ($F(1,187) = 4.955$, $p = .030$, $\eta_p^2 = .025$), but none for

bare faces ($F(1,183) = .093$, $p = .760$, $\eta_p^2 = .001$), and highly intrasexually competitive men cut more hair off highly attractive clients wearing makeup whose hair was in good condition (i.e. there was little difference in the amount of hair cut off clients with and without makeup). As the attractiveness of the client decreased, and the intrasexual competitiveness of the participant decreased, makeup had a greater effect in reducing the amount of hair that was cut off when clients hair was said to be in good condition but not when it was in poor condition, as shown in Figure 4.4.

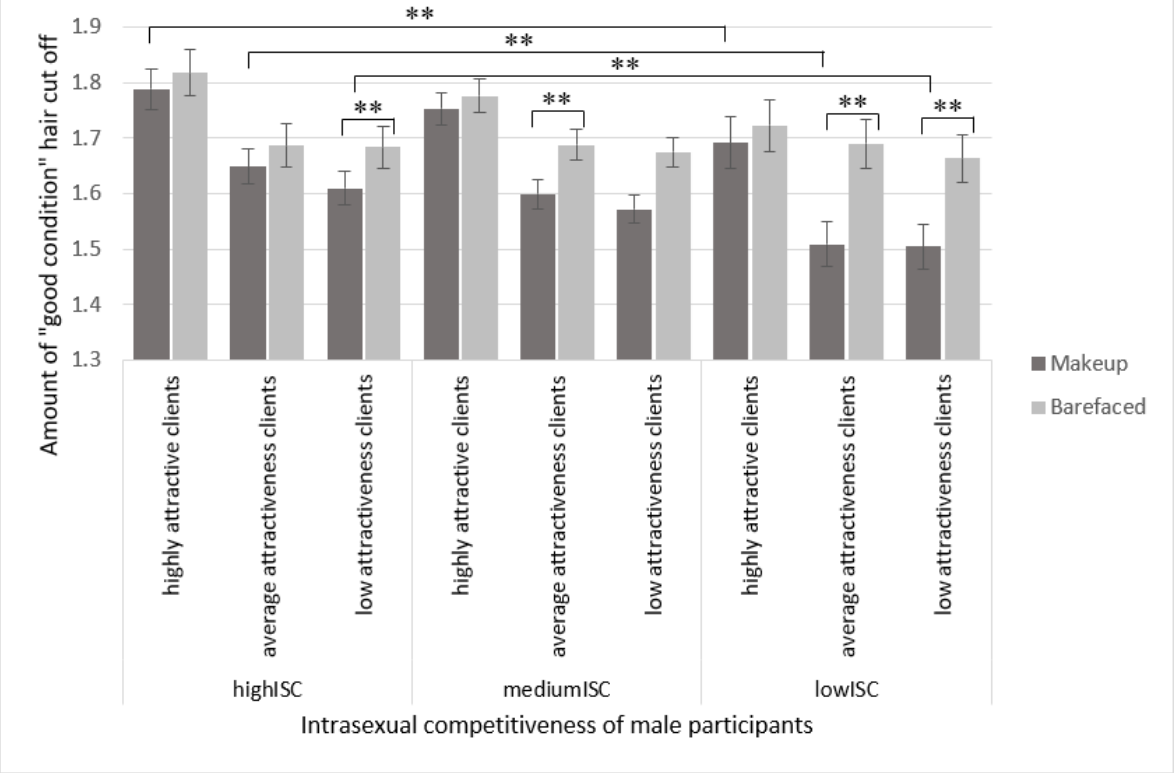

Figure 4.4. Mean length of hair cut off high, average, and low attractiveness clients with hair in good condition and makeup or no makeup ± SE, by men at high (z-SIC = 1), medium (z-SIC = 0) and low (z-SIC = -1) intrasexual competitiveness

** $p < .001$

The final two-way interaction that reached significance was between the covariates: mate value and intrasexual competition. Investigation of estimated marginal means at 3 levels of mate value (the mean, one standard deviation above and below the mean) for 3 levels of intrasexual competitiveness (as above), revealed that at low mate value, increased intrasexual

competitiveness results in more hair being cut off, while as high mate value increases, this effect becomes non-significant, as illustrated in Figure 4.5.

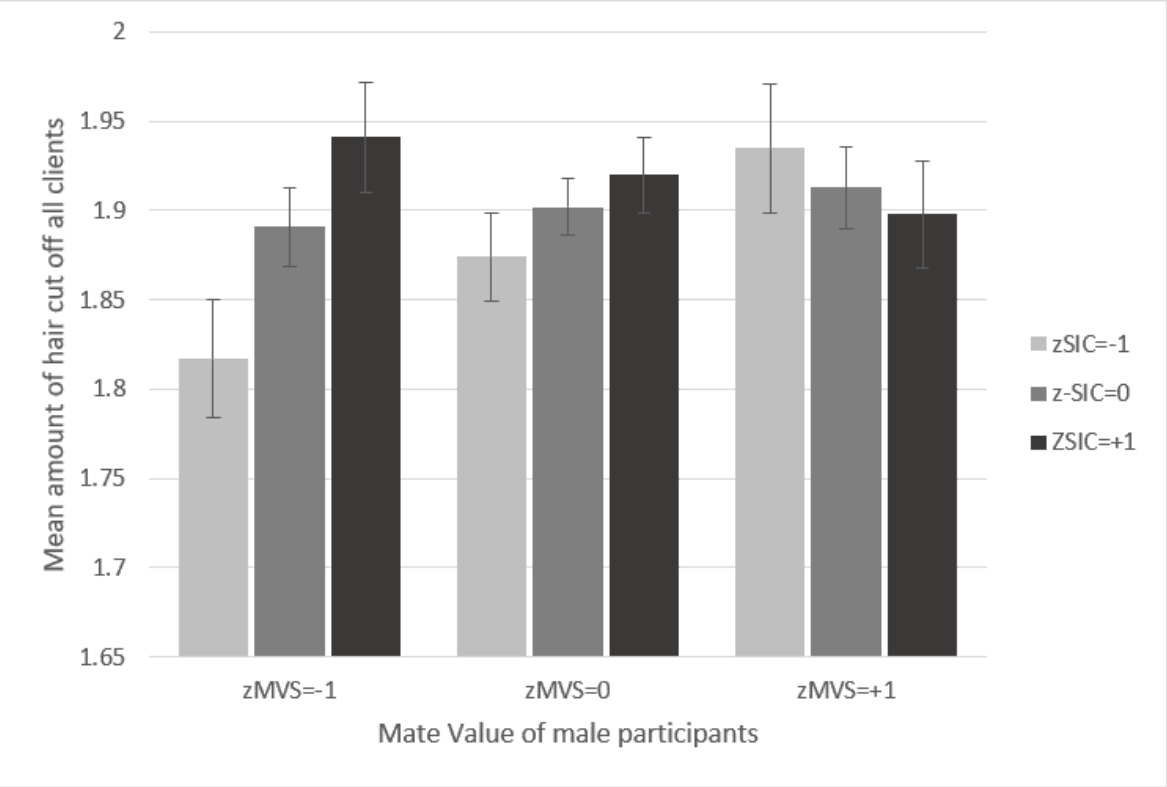

Figure 4.5. Mean length of hair cut off all clients ± SE, by men of increasing mate value at high (*z*-SIC = 1), medium (*z*-SIC = 0) and low (*z*-SIC = -1) intrasexual competitiveness ** $p < .001$

3.3 Effect of relative attractiveness on female participant responses

To investigate whether female participants' perception of their own attractiveness affected the amount of hair they cut off "clients", we used their relative attractiveness scores to calculate a mean amount of hair cut off from all faces they rated as less attractive than themselves (relative attractiveness scores of less than 1), as attractive as themselves (between -1 and 1), and more attractive (greater than 1). The stimulus faces included in each of the three levels were unique to each participant, and in some cases, participants did not rate any faces any faces as being either higher or lower attractiveness than themselves and these levels were empty. As described in the paper for the preceding study (see Appendix C2), in order to maximise valid

responses across the three attractiveness levels, the faces were averaged over the different hair and client wish conditions.

Table 4.4 shows the correlations between the individual difference variables and the amount of hair cut off in each condition. The correlation between intrasexual competitiveness and mate value approached, but did not reach significance, $r = .097$, $p = .068$. As intrasexual competitiveness increased the amount of hair cut off clients of the same attractiveness increased ($r = .154$, $p = .005$), but not the amount of hair cut of either clients of lower ($p = 243$) or higher attractiveness ($p = .521$), providing evidence of greater competition and hence sabotage within the same level of attractiveness.

Table 4.4

Pearson r correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study 1b using the mean amount of hair cut off clients (average across all conditions) judged by the female participants (N=264) as being less attractive, as attractive, and more attractive than themselves.

	Age	**SIC**	**MVS**
Individual difference variables			
Age	-		
SIC (Scale for Intrasexual Competitiveness)	-.004	-	
MVS (Mate Value Scale)	.056	.097#	-
Dependent variable – Amount of hair cut off based on client attractiveness relative to participant			
Less attractive	-.004	-.068	-.030
As attractive	-.022	**.154****	-.033
More attractive	-.051	.085	-.036

Note. **$p<.01$, #$p<.1$

A mixed repeated measures ANCOVA used with makeup/no makeup as the between-subjects factor, relative attractiveness as the within-subjects factor (less attractive/as attractive/more attractive than me) and intrasexual competitiveness (z-SIC) and mate value (z-MVS) as covariates. Age was not controlled for as it showed no correlation with any of the variables in the model (see Table 4.4). A total of 262 women had valid responses for all three levels of relative attractiveness. 130 participants saw faces with makeup and 132 participants saw faces without makeup. The model satisfied conditions for covariance matrix equality (Box's

M = 7.149, *F*(6,489470.708) = 1.177, *p* = .315) and variance homogeneity (all Levene's F's < 2.53, all p's ≥ .113).

We saw no significant main effect of relative attractiveness (*F* (2, 253) = 1.121, *p* = .328, η_p^2 = .009) and no interaction effects of relative attractiveness and any of the other variables. There was a significant main effect of makeup, (*F* (2, 254) = 4.715, *p* = .031, η_p^2 = .018) with participants cutting more hair off barefaced clients (*M*=4.229, *SE*=.121) than clients wearing makeup (*M*=3.844, *SE*=.122). The interaction between makeup and mate value approached significance, *F* (1, 254) = 3.628, *p* = .058, η_p^2 = .014) and *post hoc* investigations revealed that low mate value participants (*z*MVS=-1.5) cut significantly less hair off faces with makeup than faces without (p =.006), this effect is reduced, but still significant at mean mate value (p = .026), but disappears at high mate value (at *z*MVS = 1.5, *p* =.704).

Next we used the relative attractiveness ratings to investigate the degree to which they were related to participants' intrasexual competitiveness. The mean relative attractiveness score was calculated for each stimulus attractiveness group (high/medium and low as designated from Part 1). The ratings were subjected to a mixed measures ANCOVA with attractiveness group as the within-subjects' measure and makeup/barefaced as the between subjects' measure while controlling for age, with mate value and intrasexual competitiveness as the covariates. Due to multiple violations of the assumption for sphericity, we adopted multivariate comparison procedures (Wilks' λ) for the repeated measures effects in this model.

As expected, there was a significant main effect of attractiveness group, (λ = .765, *F* (2, 341) = 52.234, *p* < .001, η_p^2 = .235) with participants rating the high attractiveness group higher than the low or medium attractiveness groups (all pairwise simple effects were significant with all p < .001). There were also main effects of age, (*F* (2, 342) = 7.075, *p* = .005, η_p^2 = .023) and mate value (*F* (2, 341) = 39.129, *p* < .001, η_p^2 = .105), with younger women and high mate value women providing lower ratings. These main effects were qualified by several two and three-way interactions which included: attractiveness group x age, ((λ = .981, *F* (2, 341) = 3.239, *p* = .040, η_p^2 = .019), mate value x age (*F* (2, 342) = 12.502, *p* < .001, η_p^2 = .035), intrasexual competitiveness x mate value (*F* (2, 342) = 4.267, *p* = .040, η_p^2 = .012), attractiveness group x makeup x mate value (λ = .963, *F* (2, 341) = 6.496, *p* = .002, η_p^2 = .037) and finally intrasexual competitiveness x mate value x age (*F* (1, 342) = 5.222, *p* = .023, η_p^2 = .015). *Post hoc* investigations determined that attractiveness ratings decreased with increased intrasexual competitiveness for all three attractiveness groups: *r* = -.105, *p* = .047 (high attractiveness

group), $r = -.236$, $p < .001$ (average attractiveness group), and $r = -.304$, $p < .001$ (low attractiveness group) with the size of the effect increasing as attractiveness decreased. Increased mate value also resulted in decreased attractiveness in each of the stimulus photo groups: $r = -.437$, $p < .001$ (high attractiveness group), $r = -.444$, $p < .001$ (average attractiveness group), and $r = -.390$, $p < .001$ (low attractiveness group), with mate value having the largest negative impact on the average attractiveness group, followed by high attractiveness and then smallest at low attractiveness. A combination of these effects would see the average group's attractiveness rating the most negatively affected by increased intrasexual competitiveness and mate value together.

To explore the attractiveness group x makeup x mate value interaction, the data set was split into makeup and barefaced conditions and separate ANCOVAs run on each. For both the barefaced and makeup conditions, the main effects of mate value and attractiveness groups remained (all $p<.001$). For the makeup condition, there was a main effect of both intrasexual competitiveness (F (1,167) = 5.250, p = .023, η_p^2 = .030) and age (F (1,167) = 10.154, p = .002, η_p^2 = .057), qualified by a two-way- mate value x intrasexual competitiveness, and a three-way- age x mate value x intrasexual competitiveness interaction. Further investigations showed that at a younger age (-1SD), increased intrasexual competitiveness caused a decrease in attractiveness rating at all levels of mate value. However, as age increased (+1SD), participants with low mate value (-1.5SD) and high intrasexual competitiveness (+1.5SD) showed increased attractiveness ratings for clients, while high mate value, highly competitive clients showed a decrease in attractiveness ratings of others.

When clients were not wearing makeup there was neither a main effect of intrasexual competitiveness (p = .592) nor age (p = .131), however there was a mate value x age interaction (F (1,172) = 7.415, p = .007, η_p^2 = .041) which revealed that at a younger age there is a greater decrease in attractiveness rating with increased mate value, i.e. mate value appeared to have the biggest impact on younger participants' attractiveness ratings than older participants, when clients were barefaced.

3.4 Summary of results

For women, as mate value was increased, less hair was cut off average and low attractiveness women without makeup. Clients of higher attractiveness had significantly more hair cut than clients of low and average attractiveness (who did not differ significantly) under every condition of client wish and hair condition, however the greatest effect was for highly

attractive clients whose hair was in good condition and requested the minimum amount cut off. This represents the condition under which the greatest sabotage could occur. Wearing makeup decreased the amount of hair cut off in general by women, but was dependent on the mate value of the "hairdresser". For low and medium mate value participants more hair was cut off bare-faced clients. However, for female participants of high mate value the same amount of hair was cut off clients wearing makeup as those without. The more intrasexually competitive the female participant, the more hair she would recommend the client cut off.

Relative attractiveness ratings rather than absolute attractiveness ratings, revealed a positive correlation between intrasexual competitiveness and the amount of hair cut off clients of the same attractiveness, but not clients of lower or higher attractiveness. This suggests greater competition and hence sabotage within the same level of attractiveness. Participants cut more hair off barefaced clients than clients wearing makeup, especially when participants were of low mate value. This effect of makeup disappears at high mate value.

For men, in both good and poor hair conditions more hair was cut from highly attractive clients than from clients of either medium or low attractiveness (which did not differ). This effect was exacerbated by the client wearing makeup: with a greater effect size for faces with makeup ($\eta_p^2 = .186$) than bare faces ($\eta_p^2 = .075$). For male participants, intrasexual competitiveness was positively correlated with amount of hair cut off women wearing makeup but not barefaced women across all three attractiveness levels. Highly intrasexually competitive men cut more hair off highly attractive clients wearing makeup whose hair was in good condition. Mate value and intrasexual competition interact such that at low mate value, increased intrasexual competitiveness results in more hair being cut off, while as high mate value increases, this effect becomes non-significant.

4. Discussion

This study explored the combined effects the attractiveness of the client, whether or not they were wearing makeup, as well as the sex, mate value and intrasexual competitiveness of the "hairdresser" on how much hair was recommended they cut off. In Part 1 the data set consisted of both men and women. Overall, more hair was recommended to be cut from the highest attractiveness group, followed by the average then low attractiveness groups. The effect of attractiveness was particularly noticeable for highly attractive women with hair in good condition who only wished for a little to be cut off – resulting in the greatest level of sabotage.

However, when using relative attractiveness ratings most hair was cut from women of the same attractiveness by women who were highly intrasexually competitive. This provides evidence for same-level intrasexual competitiveness where women are specifically targeting the rivals who would be the most threat to them. Offering disingenuous beauty advice might only sabotage them for a short while, but it still allows for a strategic advantage when there is not much difference between your physical attractiveness and that of your rival.

Men and women differed in which conditions affected the amount of hair cut off . Of particular interest is that clients wearing makeup had less hair cut if the woman cutting was of average or lower attractiveness, but highly attractive women cut the same amount of hair regardless of whether or not the client was wearing makeup. This seems to suggest that makeup has an intimidatory effect on low/average mate value women, who then refrain from sabotaging these clients.

Men also cut more hair off highly attractive clients. However, client makeup resulted in more (not less, as for women) hair being cut. Highly competitive men cut more hair off highly attractive clients wearing makeup whose hair was in good condition which suggests that they may also be using sabotage as a way of lowering the self-perceived attractiveness of women. This might result in the woman's self-perceived mate value being lowered and she might be more receptive to a lower mate value partner.

Study 2

In this study we investigated whether qualified female hairdressers and aestheticians working in the beauty industry would respond in the same way as women who had not been professionally trained when advising hypothetical clients how much hair to cut off. We explored the effects of client attractiveness, hairdresser mate value and intrasexual competitiveness on likeliness to sabotage a client with disingenuous beauty advice.

5. Materials and method

5.1 Participants

Initially, to try and maximise access to hairdressers, the survey was printed in colour and mailed to the business addresses of hair salons across Australia with a reply-paid envelope included for returning the completed survey. Following a poor response from this method (7 responses from over 200 mailed surveys), we mailed just the information page with a QR code linking to the survey, to 500 hair salons which resulted in a further 61 responses from women

hairdressers. The remainder of the responses were collected through a paid participant bank (Prolific Academic) by filtering based on occupation.

A total of 484 female participants completed the questionnaire. Only female participants were recruited for this study because accessing sufficient heterosexual male hairdressers, even through a participant bank like Prolific Academic was not anticipated to yield a big enough sample. Fourteen participants were excluded for not completing the intrasexual competitiveness and mate value measure of the survey. 48 women were excluded for having a same-sex current partner or ideal partner. 47 participants were removed for neither having a hairdressing/beauty qualification nor working in the beauty industry.

The final analyses included data from 375 female participants (aged 18-67, M_{age} = 30.81, *SD* = 10.34). Of the participants 71% reported being in a long-term relationship, 5% in a short-term or casual relationship/s and 24% were single. All participants worked in the beauty industry: 133 were qualified hairdressers, 72 were hairdressers in training and 169 were beauty therapists, salon managers and makeup artists (including trainees). All participants provided informed consent under HREC protocol number **H18039** (approved by the Charles Sturt University Human Research Ethics Committee).

5.2 Instruments and Measures

As in Part 1, The Mate Value Scale (Edlund & Sagarin, 2014) was used to measure Mate Value and the Scale for Intrasexual Competition (Buunk & Fisher, 2009) was used to assess participant intrasexual competitiveness. Consistent with values reported by the authors, and findings in Part 1, strong internal consistencies were found for both the MVS (Cronbach's alpha = .883) and the SIC (Cronbach's alpha = .917) in the current sample.

5.3 Stimuli

Stimulus photos for Study 2 were drawn from the photos used in Study 1. To minimise the length of the questionnaire especially for printing and mailing, participants saw eight photos of high attractiveness client faces and eight photos of low attractiveness faces. The medium attractiveness faces were excluded. As before, each face was accompanied by a "magnified hair" photo. Hair condition (good/poor) and preference for the amount to be cut (as much as necessary/ as little as possible) were counterbalanced through the photos. Again, participants saw either all make-up photos or all bare-faced photos.

5.4 Procedure

Demographic questions remained unchanged but also included a question about qualifications in the fields of hairdressing or beauty therapy: "Are you a qualified hairdresser or beauty therapist (or do you otherwise work in the beauty industry)" with multiple choice answers as: no, training to be a hairdresser, qualified hairdresser, training to be a beauty therapist, qualified beauty therapist, Diploma of Hairdressing/Beauty Salon Management. Participants were then shown 16 faces (8 each from the high and low attractiveness faces) and asked to report how much hair they would cut off each "client". Participants then completed the SIC and the MVI.

Again, to constrain the length of the survey, instead of having participants rate each face for attractiveness or comparative attractiveness, a single final question was added to ascertain participants self-perceived attractiveness: "How attractive would you rate your own face to be?", scored on a 7-point scale with 1 = "very much lower than average" and 7 = "very much higher than average".

5.5 Data Analysis

To investigate the effect of client attractiveness on amount of hair aestheticians would cut off, the amount of hair each participant recommended to be cut off each condition was averaged across the two faces of each condition (high/low attractiveness x good/poor hair condition x client preference for maximum/minimum length cut x makeup/barefaced).

The mean MVS score was calculated, converted to a z-score and used as a measure of mate value. The mean SIC score was also converted to a z-score across and used as a measure of intrasexual competitiveness.

The MVS and SIC scores were then entered as covariates into a full-factorial 2 (attractiveness of stimulus face: high or low) x2 (condition of hair: poor or good) x2(client's wishes: as little as possible or as much as needed) (all within-subjects' factors) x2 (makeup/barefaced: between subjects' factor), mixed repeated-measures ANCOVA. Since age did not correlate with the dependent measure across any of the conditions (see below) age was not controlled for in the analyses reported below.

6. Results

6.1 Correlations

Exploration of the correlations between the individual difference variables in the study found that age, mate value and intrasexual competitiveness are not correlated in the participant group. Hairdresser self-rated attractiveness was significantly positively correlated with mate value (r = .649, p < .001), confirming well-established findings that physical attractiveness is an important component of mate value in women. Self-rated attractiveness was not correlated with age (r = .037, p = 472) or intrasexual competitiveness (r = .068, p = .191). The mean self-rated attractiveness of the aesthetician participants was 4.31 (SD = 1.278) (measured on a scale of 1 to 7) suggesting that in general participants rated their attractiveness as higher than average. As shown in Table 4.5, intrasexual competitiveness was not correlated with amount of hair cut off under any conditions.

Table 4.5

Pearson r correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study2 for female hairdressers and aestheticians (N = 375)

Individual difference variables				**Age**	**SIC**	**MVS**
1. Age				-		
2. SIC (Scale for Intrasexual Competitiveness)				-.083	-	
3. MVS (Mate Value Scale)				.007	-.008	-
4. Self-rated attractiveness				.037	.068	**.649****
Dependent variables						
Client Attractiveness	Makeup	Hair Condition	Client Wishes			
Highly Attractive	Makeup	Good	Max	-.050	.115	-.045
			Min	-.021	-.016	**-.160***
		Poor	Max	**-.146***	.061	.111
			Min	-.125	.051	.024
	Barefaced	Good	Max	-.016	.059	.111
			Min	-.124	.025	.137
		Poor	Max	-.059	-.041	.062
			Min	-.140	-.035	.000
Unattractive	Makeup	Good	Max	-.123	.080	.015
			Min	-.041	.124	-.043
		Poor	Max	**-.148***	.074	.061
			Min	-.110	.081	.047
	Barefaced	Good	Max	-.003	.071	.064
			Min	-.088	.106	**.156***
		Poor	Max	-.025	-.001	.072
			Min	**-.146***	-.003	-.003

Note. *p<.05, **p<.01, #p<.

Mate value was negatively associated with the amount of hair cut off attractive women with hair in good condition asking for the minimum to be cut (r = -.160, p = .031, N = 182). As this is the condition where the most sabotage can be done, low mate value women seemed more inclined to engage in this upward competition. By contrast, for low attractiveness clients, without makeup under the same hair conditions (good condition and minimum cut off) mate value was positively correlated with amount cut off (r = .156, p = .030, N = 193), indicative of downward competition.

6.2 Effect of client attractiveness on hairdresser responses

For the ANCOVA model (N = 375), 193 participants saw faces without makeup and 182 responded to faces with makeup. Levene's F statistics (all ≤ .724, all $p \geq .395$) indicated variance homogeneity and Box's M (p = .617) showed that the model satisfied requirements for equality of covariance. There were significant main effects of attractiveness ($F(1,367) = 65.706$, $p < .001$, $\eta_p^2 = .152$), hair condition ($F(1,367) = 1037.077$, $p < .001$, $\eta_p^2 = .739$) and client wishes ($F(1,367) = 616.315$, $p < .001$, $\eta_p^2 = .627$). More hair was cut off higher (versus lower) attractiveness clients, more hair was cut when hair was in poor condition and more hair was cut when the client indicated they were happy with having as much as necessary trimmed off (all following the same pattern described in Study 1). Again similar to Study 1, these main effects were qualified by two-way attractiveness x hair condition ($F(1,367) = 26,592$, $p < .001$, $\eta_p^2 = .068$) and client wishes x hair condition ($F(1,367) = 95.481$, $p < .001$, $\eta_p^2 = .206$) interactions, and further qualified three-way and four-way interactions involving mate value. There was no main effect of makeup and the makeup by mate value interaction was not significant at any level of mate value. Figure 4.6 is included to provide a direct comparison with Figure 4.3 of the same effect in Study 1. [On a side note: What can be noted when comparing Figure 4.3 and Figure 4.6 is that hairdressers cut off far more hair than women in the general public. Hairdressers cut approximately 4 to 4.4 cm off whereas women in general cut less than 2.1cms across all levels of mate value].

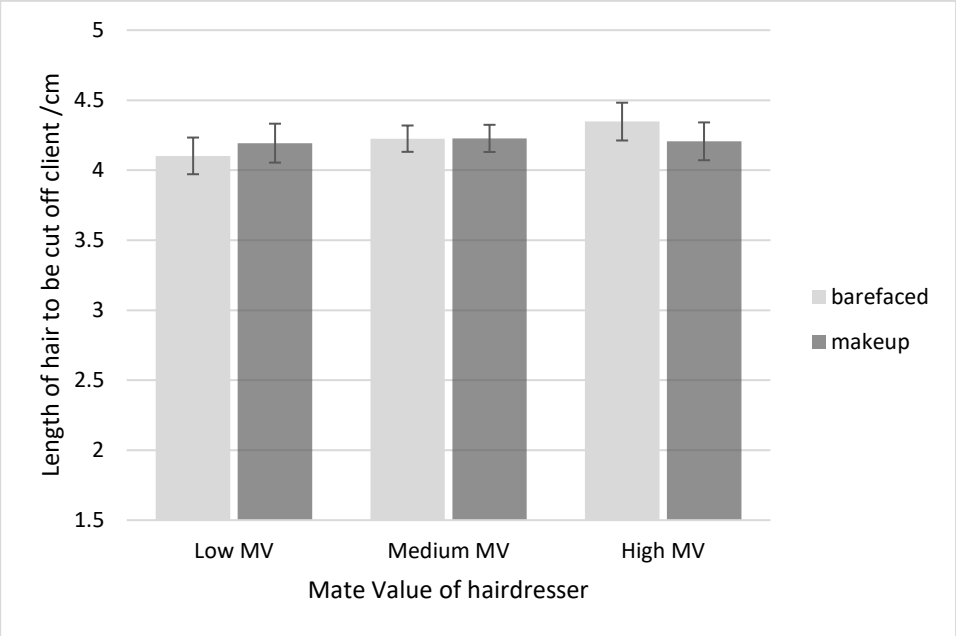

Figure 4.6. Mean length of hair cut off clients with no makeup and with makeup ± SE, by hairdressers at low (z-MVS = -1), medium (z-MVS = 0) and high mate value (z-MVS = 1), all *p*'s > .05 , not significant.

There was a significant three-way interaction between hair condition, makeup and mate value ($F(1,367) = 4.256$, $p = .040$, $\eta_p^2 = .011$) which was further qualified by a four-way interaction between client attractiveness, hair condition, makeup and mate value ($F(1,367) = 4.155$, $p = .042$, $\eta_p^2 = .011$). *Post hoc* investigations involved splitting the data set into barefaced and makeup groups and completing a 2x (client attractiveness) x2(hair condition) ANCOVA model with MVS as the covariate and comparing the effect at high (zMVS=1), medium (zMVS=mean) and low (zMVS=-1) mate value. For the bare-faced condition, the client attractiveness x hair condition x zMVS interaction was not significant ($F(1,191) = .997$, $p = .319$, $\eta_p^2 = .005$), leaving the client attractiveness x hair condition interaction as the highest order significant interaction, ($F(1,191) = 15.461$, $p \leq .001$, $\eta_p^2 = .075$): when hair was in good condition significantly more was cut off high attractiveness clients than low attractiveness clients ($M = 3.237$, $SD = 1.332$ and $M = 2.724$, $SD = 1.895$, respectively), but there was no significant difference when hair was in poor condition ($M = 5.512$, $SD = 1.895$ and $M = 5.413$, $SD = 1.858$, respectively).

For faces with makeup, the attractiveness x hair condition x mate value interaction was significant ($F(1,180) = 4.295$, $p = .040$, $\eta_p^2 = .023$) with low mate value aestheticians (zMVS = -1) cutting off more hair from high attractiveness clients when hair is in good condition ($F(1,180)$

= 32.304, $p \leq .001$, $\eta_p^2 = .152$), but not in poor condition ($p = .170$). Medium mate value (zMVS=mean) and high mate (zMVS=1) value aestheticians cut significantly more hair off high attractiveness clients with hair in both good and poor conditions (all p's $\leq .036$).

To explore the three-way interaction between client attractiveness, intrasexual competitiveness and mate value, estimated marginal means were compared for high attractiveness and low attractiveness clients at three levels of mate value (zMVS = -1, 0 and 1) and three levels of intrasexual competitiveness (zSIC = -1, 0 and 1). Results are shown in Figure 4.7. At each level of mate value and intrasexual competitiveness, more hair is cut off attractive clients than less attractive clients, however the effect of this becomes smaller at higher intrasexual competitiveness with client attractiveness having less impact on the highly competitive aestheticians. In general, amount of hair cut off increases with intrasexual competitiveness, except when the client is highly attractive and the aesthetician has low mate value (i.e. is likely less attractive), then intrasexual competitiveness is associated with a decrease in hair cut off.

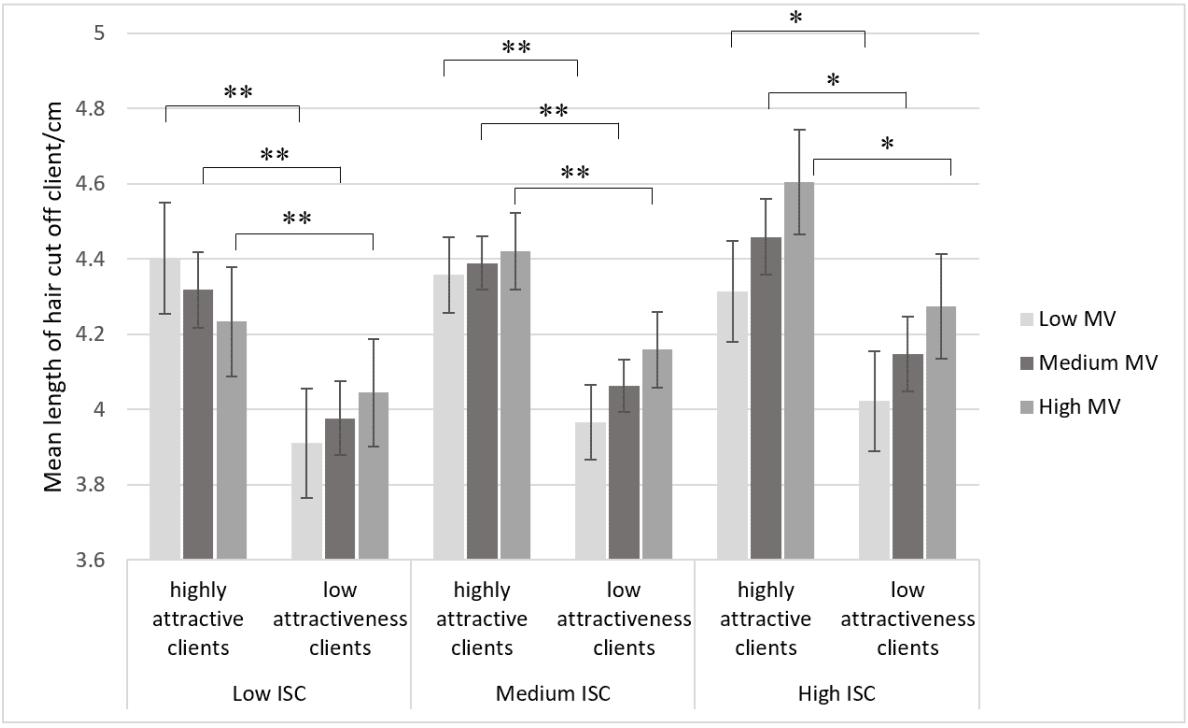

Figure 4.7 Mean length of hair cut high and low attractiveness clients ± SE, by hairdressers of increasing mate value at high (z-SIC = 1), medium (z-SIC = 0) and low (z-SIC = -1) intrasexual competitiveness (ISC)

** $p < .001$, *$p < .05$

6.3 Summary of results

Intrasexual competitiveness was not correlated with amount of hair cut off under any conditions. Mate value was negatively associated with the amount of hair cut off highly attractive women, wearing makeup with hair in good condition asking for the minimum to be cut. However, mate value was positively correlated with amount of hair cut for low attractiveness clients with bare faces under the same hair conditions (good condition and minimum cut off).

There was no main effect of makeup. In general, for the **barefaced** condition, when hair was in good condition significantly more was cut off high attractiveness clients than low attractiveness clients, but there was no significant difference when hair was in poor condition, lending weight the idea of sabotage by disingenuous beauty advice. For clients with **makeup**, low mate value aestheticians cut more hair off high attractiveness clients wearing makeup when hair is in good condition ($F(1,180) = 32.304$, $p \leq .001$, $\eta_p^2 = .152$), but not in poor condition ($p = .170$). Medium mate value and high mate value aestheticians cut significantly more hair off high attractiveness clients with hair in both good and poor conditions (all p's $\leq .036$).

The effects of **client attractiveness, intrasexual competitiveness and mate value** interacted such that at each level of mate value and intrasexual competitiveness, more hair is cut off attractive clients than less attractive clients. However, this effect becomes smaller at higher intrasexual competitiveness with client attractiveness having less impact on the highly competitive aestheticians. In general, amount of hair cut off increases with intrasexual competitiveness, except when the client is highly attractive and the aesthetician has low mate value (i.e. is likely less attractive), then intrasexual competitiveness is associated with a decrease in hair cut off.

7. Discussion

The purpose of study 2 was to provide ecological validity to the findings that client attractiveness and intrasexual competitiveness of the "hairdresser" affect the amount of hair cut from a client, by examining the responses of female professional hairdressers and aestheticians currently working in the beauty industry. Results from this study confirm that the attractiveness of the client affects amount of hair cut off by hairdressers, with more attractive clients having more hair cut off. However, the hairdressers on a whole rated themselves as above average physical attractiveness, suggesting that more hair was being cut off clients they considered to be the same attractiveness as themselves. Increased intrasexual competitiveness resulted in more

hair being cut, except when the client is highly attractive and the aesthetician has low mate value (i.e. is likely less attractive), when intrasexual competitiveness is associated with a decrease in hair cut off.

In agreement with findings in Study 1, the amount of hair recommended to be cut was significantly affected by the attractiveness of the client for both women in the general public and professional hairdressers. In both cases clients of higher attractiveness were advised to cut off more hair than less attractive clients. Also, in Study 1 when considering the relative attractiveness of clients to themselves, participants with higher intrasexual competitiveness recommended cutting off more hair from clients that they rated "as attractive" as themselves. This concurs with hairdressers in Study 2 cutting most hair off more attractive clients when the hairdressers generally rated their own attractiveness as higher than average. In both the current studies, as intrasexual competitiveness increased, more hair was cut overall. This was especially true when the hair was in a good condition and the client wished for the minimum to be cut off, and removing more would be a greater sabotage than when hair was in a poor condition, and removing more might actually constitute an enhancement to client attractiveness

There were also common effects of hair condition and client wishes between Parts 1 and 2, with clients whose hair was in poor condition and clients who asked to have the maximum amount needed cut off, having more hair cut overall than clients whose hair was in good condition or wishing for the minimum to be removed. This provides evidence that participants read and considered the information in the vignettes when providing their answers. However, these main effects were qualified by many complex interactions involving mate value, intrasexual competitiveness, client attractiveness, hair condition and client wishes as explored in detail before.

The biggest area of difference between the female general public data set and the professional aesthetician data set is in the reaction to makeup. For the general public less hair was cut off women wearing makeup than bare-faced women, and makeup had a bigger impact on reducing length of hair cut off by less attractive (low mate value) women. At high mate value the effect of makeup disappeared. For hairdressers there was no overall effect of makeup, with bare-faces and made-up faces having the same amount of hair cut off. However, because the hairdressers rated their attractiveness higher than average, and at high mate value the effect of makeup disappears, this dataset may not have had enough lower mate value hairdressers to confirm an effect of makeup.

When comparing the results of study 1 and 2 it is notable that hairdressers cut off far greater lengths of hair in general than the public. This observation aligns with the stories presented at the start of the chapter, that hairdressers and ordinary women differ in their perceptions about how much hair should be cut off.

8. General Discussion

Effects for women

Effect of attractiveness of client

The findings regarding client attractiveness were consistent across both studies 1 and 2 reported here, but were not consistent with our findings in the earlier studies of this series (Sulikowski et al., under review) In both of the current studies the more attractive the client, the more hair was recommended to be cut off. This was true for both men and women. For female participants, clients of higher attractiveness had significantly more hair cut than clients of low and average attractiveness (who did not differ significantly) under every condition of client wish and hair condition, however the greatest effect was for highly attractive clients whose hair was in good condition and requested the minimum amount cut off. This represents the condition under which the greatest sabotage could occur and concurs with our previous findings.

There is agreement across our studies that women actually target same-attractiveness level rivals. When the relative attractiveness ratings were used in the both study 1 here and the prior study (Sulikowski et al., under review) , there was a positive association between intrasexual competitiveness and amount of hair cut from the clients who participants rated as being “the same attractiveness as me” (not the “more attractive than me” or the “less attractive than me” groups). In the hairdressers’ study, where the women were asked to rate how attractive they considered themselves to be, overall they rated themselves above average attractiveness and targeted above average attractiveness clients, lending weight to this explanation. Hence, findings that more or less hair generally is being cut from highly attractive, or less attractive clients overall – are potentially misleading. When collectively interpreted in light of the relative attractiveness ratings, the findings across all four studies in this series actually point to a consistent effect of client attractiveness – with women cutting the most hair off women they perceive to be about as attractive as themselves. The samples for the two studies in Sulikowski et al., (under review) were primarily students from the undergraduate pool of a regional Australian university while participants in the studies presented here were sourced from Prolific Academic and are likely to be more metropolitan. (Since all else being equal more people are metropolitan than regional across the countries recruited from.) Perhaps regional Australian university

students are systematically lower in mate value than Prolific participants, resulting in their cutting more hair from low attractiveness rivals (who are actually matched in relative attractiveness).

More competitive women cut more hair off their clients. This was also true for the hairdressers, except when the client is highly attractive and the aesthetician has low mate value (i.e. is likely less attractive), then intrasexual competitiveness is associated with a decrease in hair cut off. These findings suggest that implicitly women (both professional hairdressers and general women) do attempt to manipulate other women into making decisions which would decrease their attractiveness to potential mates, especially when motivated by their own intrasexual competitiveness When the hairdresser is of low mate value, they may realise that no amount of sabotage of an attractive client will be effective, and they are better served by maintaining alliances and retaining their business.

Effect of makeup

In the general population, makeup served to decrease the amount of hair cut-off. This effect was particularly strong for participants at low and medium mate value, while for female participants of high mate value the same amount of hair was cut off clients wearing makeup as those without. The mate value of the participant determined how makeup affected the length of hair cut from the client. In both studies the effects of makeup decreased as participants increased in mate value. In the hairdressers' sample, most hairdressers considered themselves of higher physical attractiveness, suggesting that because of their higher mate value, the overall the effect of makeup may have been diminished. Previous research shows that women wearing makeup are seen as more dominant and their use of makeup incites insecurity in less attractive women. Perhaps the more dominant women come across as riskier to sabotage, especially by lower mate value participants who stand the most to lose through negative social consequences of giving bad beauty advice. Or more simplistically, we know that women wearing makeup are perceived by other women as more attractive than barefaced women, so low and medium mate value women might simply choose not to sabotage them as they are so far out of their league that they wouldn't be competing for the same men anyway. The impact of makeup may be reduced for hairdressers and aestheticians for second reason - familiarity. People working in the beauty industry would likely be more experienced with application of makeup and would likely wear it every day to work. In many cases the aestheticians were qualified makeup artists. This may result in women wearing makeup being the norm for them, reducing the intimidating effects of makeup application and hence there was no difference in the length of hair which they

recommended barefaced women and made-up women cut off (or no difference in the degree to which they attempted to manipulate competitors with or without makeup).

Effects of relative attractiveness

There was no main effect of makeup in the relative attractiveness analyses in Study 1. There is no way of knowing whether women who saw the makeup stimulus photos imagined themselves to be wearing makeup too when rating their own attractiveness relative to the client. If women were picturing themselves wearing makeup this may have affected their own behaviour – making them feel more competitive. However, the relative attractiveness questions came last and so the idea of explicitly comparing themselves to the stimuli wasn't raised until after the hairdresser advice had been given out. However, in a hypothetical study, when seeing stimulus photos of all hypothetical women wearing makeup, would this make a woman think of herself as made up too? In the real world, if one were to find oneself barefaced in a room full of made-up women, you can't just imagine yourself in makeup, but in the pretend world of this study, maybe participants imagined themselves just as done up as their clients when giving this advice? This would account for the lack of effect of makeup if they were essentially imagining themselves made-up to the same extent as the face in the photo.

As intrasexual competitiveness increased participants also rated the attractiveness of other women (of all attractiveness levels) lower. Hence the more competitive you the harsher you are in your attractiveness judgements of other women. The same was true of increased mate value: women of higher mate value showed decreased attractiveness ratings for other women of all attractiveness levels, but especially the average attractiveness level. Several of the interactions in the findings showed that mate value and intrasexual competitiveness interact differently at different levels and that women of low mate value but high competitiveness (who are motivated to compete but are likely to have to compete upwards) behave quite differently to women of high intrasexual competitiveness and high mate value (who are motivated to compete but will predominantly do so at their same level). While women of high mate value and low intrasexual competitiveness may refrain from competition as they can attract the mates of high quality and build social alliances with same-sex compatriots.

Effects for men

Men were not expected to show effects for intrasexual competitiveness . However, for men intrasexual competitiveness and mate value interacted such that at low and medium mate value, increased intrasexual competitiveness resulted in more hair recommended to be cut off,

but not at high mate value. Perhaps, lower mate value men who are also highly competitive might be trying to manipulate attractive women into temporarily lowering their mate value so that these men might become more viable potential mates (even for a short time) while the women's self-esteem is negatively impacted. This may also imply that more intrasexually competitive men might be more likely to engage in mate manipulation than less intrasexually competitive men. Female intrasexual competition is generally regarded as indirect and of the four types (Fisher & Cox, 2011) two of these types "self-promotion" and "mate manipulation" are behaviours that are not directed at competitors at all. They are very passive types of intrasexual competition. Men's strategies have generally been believed to be more active, but these data suggest that more intrasexually competitive men are also more likely to manipulate potential female mates. High mate value men would have no need to try this strategy as these women would be attainable to them already. But we can't tell from these data whether women who are more intrasexually competitive are also more likely to engage in mate manipulation not just competitor manipulation. This would be a question for future studies.

Effect of makeup

Makeup also affected men's haircutting decisions. Highly intrasexually competitive men cut more hair off highly attractive clients wearing makeup whose hair was in good condition. Makeup increases perceptions of dominance and prestige (Mileva et al., 2016). Perhaps this dominance triggered highly competitive men to engage in mate manipulation to a greater extent than their less competitive peers. Perhaps, in this instance, highly competitive men are relying on the indirectness and plausible deniability that women often rely on in their intrasexually competitive manoeuvres, to sabotage the most sought after potential mates whilst minimising the negative consequences.

Conclusion

In this study we explored how women and men sabotage hypothetical clients through disingenuous beauty advice which would detrimentally impact the clients' physical attractiveness. General public women and female hairdressers cut most hair off women who were of the same-attractiveness level as them. They sabotaged women whose hair was in good condition and requested a smaller amount cut off to a greater extent than women with hair in poor condition. Makeup caused lower mate value lay women to cut off less hair, suggesting the dominance incited by women wearing makeup resulted in reduced sabotage. More competitive women, including hairdressers cut off more hair confirming competitor manipulation as the intrasexual competitiveness strategy being employed. Lower mate value men who were also

highly competitive engaged in mate manipulation by sabotaging highly attractive women, wearing makeup, whose hair was in good condition, by cutting off more hair.

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Chapter 5: To Buy or not to Buy - Conspicuous Consumption as a Female Intrasexual Competitiveness Strategy

In this study I examine whether mate value and intrasexual competitiveness affect women's spending on non-essential items in two different scenarios – in preparation for a women-only social event to be hosted in their home, and at a charity function. In the first scenario I explore how the type of function, and whether the woman has children affects spending on three items of varying cost – a kitchen renovation, a new outfit and makeup. In the charity scenario I explore whether the presence of an audience, the perception of judgement and the amount spent by others affects spending. Across both studies I explore the effect of age to assess how conspicuous consumption strategies change with life-stage.

1.1 Background

Veblen's Theory of the Leisure Class (1899) proposed that "conspicuous consumption" signals high status to others by acquiring and advertising expensive items. The high cost of these luxury objects gives no greater functional value than does a less expensive version (Basmann, Molina, & Slottje, 1988) and squandering your own economic resources compromises survival, provided such resources are limiting (De Fraja, 2009; Grafen, 1990; Trigg, 2001). For this strategy to persist it must serve some other adaptive function (Wang & Griskevicius, 2014). Conspicuous consumption may confer a reproductive advantage (De Fraja, 2009) either by increasing the consumer's appeal to a high-quality mate (Barrett, Dunbar, & Lycett, 2002) or by signalling superiority to same-sex rivals (Griskevicius et al., 2007). These signals function as highly visible indicators of reproductive fitness like the male-peacock's tail. Zahavi's handicap principle (Zahavi & Zahavi, 1999) requires costly signals to be a burden for the signaller – with their signalling value coming from the fact that they demonstrate an individual to be of sufficient strength/health that they can afford to bear the cost of the signal. Hence, from this perspective, conspicuous consumption signals wealth because the signaller can afford to "waste" resources on expensive items that don't contribute to survival or reproductive success. However, dishonest signals can effectively mimic costly signals, without being such a burden on the signaller (Penn & Számadó, 2020). In the world of conspicuous consumption this is reflected in counterfeit versions of luxury goods, which, although economically more accessible, are not the preferred version (My Pham & Nasir, 2016). Hence, honest signals of

conspicuous consumption must be easy to observe and expensive to acquire (De Fraja, 2009). In the current study I propose and test a novel reproductive function for conspicuous consumption. I contend that female conspicuous consumption serves female intrasexual competitive goals as women create social standards, that are expensive for other women to meet, but once set, these standards must be met to avoid social ostracism. The wealthiest women can effectively compel less wealthy women to spend resources on status maintenance, to avoid those social costs. But this leaves the less wealthy women with less money to actually invest directly in their children. This affords the wealthy women's children a competitive advantage – not only can they best afford to keep up with the expensive social standards of consumption set by their mothers, doing so does not impose as much of a cost on them, as it does on less wealthy families.

1.1 Sex differences in conspicuous consumption

Men reportedly participate in conspicuous consumption more than do women (Clingingsmith & Sheremeta, 2018; Grinblatt, Keloharju, & Ikäheimo, 2008; Heffetz, 2011; Sundie et al., 2011). This fits with the evolutionary explanation of economic resources being an important mate selection criterion for women. Hence men, more than women seek to advertise their wealth. However, studies demonstrating these sex differences have investigated spending on items such as luxury cars and watches (Grinblatt et al., 2008; Heffetz, 2011). Sex differences in conspicuous consumption, however, may be product specific. Clinginsmith and Sheremeta (2018) attempted to use a gender neutral stimulus in their study, namely the purchase of expensive luxury chocolates and found men to engage in higher conspicuous consumption. Conceptualising chocolates as gender neutral, however, is unconvincing. Women (more than men) have a complex relationship with chocolate (Cairns & Johnston, 2015) with negative ideas about gluttony (Prentice & Jebb, 1995) and with perceived judgement by peers for consuming high caloric foods (Roininen, Lähteenmäki, & Tuorila, 1999). Chocolates, especially luxury chocolates, also feature in sex role stereotypes as a romantic gift for men to bestow upon women (Otnes & Arias, 2018). Greater male conspicuous consumption for luxury chocolates is neither surprising, nor is it convincing evidence for greater male conspicuous consumption across the board.

Female conspicuous consumption of female focused products is evident. Women use the consumption of luxury clothes to communicate status and identity (Cass, 2001) and women's conspicuous consumption of fashion is greater than men's (Lewis & Moital, 2016). The purchase of luxury branded fashion accessories is motivated by social and personal factors with

consumers citing this as a means to reflect their high social status, convey a positive self-image, and, enhance their self-esteem (Souiden, M'Saad, & Pons, 2011).

Makeup is another avenue for female conspicuous consumption. The rise of Instagram Influencers and YouTube vloggers (video bloggers), (often with lucrative contracts with cosmetics houses and, in some cases, millions of followers), has inflated the market for high-end makeup (Cooley & Parks-Yancy, 2019). Exposure to makeup vlogs on YouTube increased luxury brand perceptions and purchase intentions, and was found to be positively associated with self-esteem (Lee & Watkins, 2016). Women who are more exposed to luxury cosmetics on Instagram are also more likely to subsequently purchase luxury cosmetics, and intrasexual competitiveness positively predicts conspicuous consumption of luxury cosmetics (Wagstaff & Sulikowski, 2022). Women perceive luxury cosmetics brands to be of higher quality (Mobil, Kasuma, Adenan, Mejri, & Rajan, 2019) and the price is significantly higher than off brand products (for example, a limited edition "Clé de Peau Beauté" lipstick can be purchased for US$6800) making it an effective signal of exclusivity. Hence, luxury makeup is a way for women to advertise their prestige and superior access to resources through conspicuous consumption and also a way to incite envy in other women (Pozharliev, Verbeke, Van Strien, & Bagozzi, 2015).

Signalling through conspicuous consumption plays a changing role over the mating life cycle. Conspicuous consumption is well recognised as a display of resources for single men (Griskevicius et al., 2007; Sundie et al., 2011). In heterosexual couples, however, women typically control the majority of a couple's resource expenditure (Blacklow & Ray, 2003; Pahl, 1990). Wang and Griskevicius (2014) propose that women use luxury products to deter female rivals. They found that activating a motive to guard one's mate triggered women to seek and display lavish possessions. They also found that women used the display of expensive items to show that their partner was especially devoted to them and that this exhibition of luxury goods was effective at deterring other women from poaching a relationship partner. In these ways conspicuous consumption in women functions as an intrasexual competitive strategy through self-promotion (high quality ornamentation enhances physical attractiveness), mate guarding (my partner spends so much on me because I am so important to him), and rival deterrence (I have dominance and prestige, your efforts would be better used elsewhere) .

Competitor manipulation is being proposed as another important intrasexual competitiveness strategy evident through conspicuous consumption. By purchasing and

advertising their acquisition of expensive items, women create social standards, that are expensive for other women to meet (Ulph, 2014). Women perceive that there is a social cost to not meeting these standards which may result in social ostracism. The “Keeping up with Joneses Effect” (Matt, 2003) results in having to work harder and saving less (Ulph, 2014) . The wealthiest women can manipulate less wealthy women to squander resources on status maintenance.

1.2 Intrasexual competition and mothering

When women are young and single, physical attractiveness is the main focus of both mate attraction (Gutierres, Kenrick, & Partch, 1999; Singh, 2002; Thornhill & Grammer, 1999) and intrasexual competition (Campbell, 2004; Fernandez, 2014; Fink, Klappauf, Brewer, & Shackelford, 2014). Women compete by self-promotion through enhancement of physical attractiveness through wearing flattering clothes, makeup, and styling their hair (Fisher & Cox, 2011). Derogation of female rivals is also heavily focused on physical appearance and chastity (Buss, 2012; Fisher & Cox, 2009) suggesting that women devalue the attractiveness of rivals to secure access to high quality mates for themselves. In partnering up, women are seeking to acquire resources from their mates (Buss, 1988). Once partnered their attention turns to mate retention, in order to retain the resources they won during mate choice.

Partnered women’s intrasexually competitive tactics change from primarily advertising physical attractiveness. Strategies important in the next life stage are those focused on mate-guarding to ensure the retention of acquired resources, successful reproduction and rearing of children (Campbell, 2004; Chae, 2022; Linney, Korologou-Linden, & Campbell, 2017).

Partnered mothers may also be expected to compete with their rivals in ways that are explicitly targeted towards their children's competitive success. Because offspring represent their mother’s reproductive success, hobbling their growth, development and eventual mating prospects is an attack on their mother’s reproductive success. Reproductive success is relative. In evolution, the absolute number of offspring is not as important as the number of offspring you have compared to your competition. If you have three offspring in an environment where every other woman has four, you’ve done worse than a woman who has two offspring in an environment where everyone else has just one. The relative nature of fitness does not only hold for the number of children, in a society where most people have enough to cover the necessities, it also holds for number of resources. Women with high amounts of resources would be prepared to squander their own resources, just to put pressure on other women to squander theirs.

Manipulative consumption sets up standards which other mothers are compelled to adhere to, and intensive/competitive mothering sets up the intrasexually competitive field on which this plays out.

Intensive mothering is a labour-intensive, time-consuming, child-centred model of mothering. Intensive mothering ideas are often disseminated through social media "mommy bloggers" with self-ascribed expertise. Intensive mothering is an extreme version of the "good mothering" ideology in which the mother is the expert-caregiver who must dedicate herself completely to the successful raising of her children. Women who adopt intensive mothering ideology may be doing so as an intrasexual competitiveness tactic. Complete (and public) devotion to the betterment of her offspring functions as a signal to her rivals of her dominance and superiority in the area of greatest importance at that particular life-stage (Linney et al., 2017). Chae (2022) describes the "three C's of contemporary motherhood" as comparison (social comparison with other mothers), competition and consumption using the context of children's education. In this context the mother is responsible for sourcing the best school for her children, ensuring their acceptance to said school by outcompeting other families and spending whatever it takes to send them there. Many other contexts exist such as birthday parties (Clarke, 2007), baking competitions (Fisher, Burch, & Sokol-Chang, 2017) and Parents and Citizens Associations in schools. The social comparison, competition with other mothers and their children, as well as the use of consumption to set up or meet social standards attest to the potential for manipulative consumption. Women have to spend money on elaborate birthday parties, suitable gifts for teachers, music and other lessons, branded clothing and the latest technology to show that their children can keep up.

Manipulative consumption as an intrasexual competitiveness strategy is dependent on everyone having excess resources. It is only likely to occur when resources are sufficiently plentiful that needs such as food and shelter have been met. Women convince other women to fritter away all of the excess on consumption with zero utility, bringing the available resources back down to where they are no longer excessive. I expect this type of resource-frittering competition to manifest among the wealthy and when excess resources are present for at least some families. Thus keeping up with "good" mothers comes at a cost.

Good mother ideology has other negative consequences for the mother and the children. These include lower parental self-efficacy (Henderson, Harmon, & Newman, 2016), higher levels of maternal depression and stress (Rizzo, Schiffrin, & Liss, 2013) and greater parental

burn-out (Meeussen & Van Laar, 2018).Given that the mental health of a mother is integral to the wellbeing of the child (Leis, Heron, Stuart, & Mendelson, 2014) these negative impacts are passed down the line.

There has been a suggestion that intensive mothering or competitive mothering may function as a mate retention strategy, highlighting a mother's full dedication to the success of her offspring as a signal to her mate of her high quality (Fisher & Moule, 2013). However, no direct research could be found confirming fathers' perceptions of higher mate quality or greater maternal commitment with more intensive mothering. One of the main ideologies of intensive mothering is that mothers are intrinsic to their children's wellbeing, while fathers, "as a result of their perceived incompetence, can only provide additional help." (Verniers, Bonnot, & Assilaméhou-Kunz, 2022). Intensive mothering is associated with gender hierarchy-enhancing beliefs and attitudes (Verniers et al., 2022). This might be expected to cause a rift between a couple as mothers seek to dictate and constrain what the father can and can't do as well as they can. Importantly, positive paternal involvement has in fact been found to be "highly beneficial" to children and families (Wilson & Prior, 2011) so constraining this causes further detriment to the child.

In light of these negative consequences of competitive mothering, I propose that proponents of this ideology may be using it to manipulate other mothers, not only into squandering resources, but also into bad parenting. Women are promoting false ideals on social media of their intensive parenting, and shaming other women for not being as intense as they are (Abetz & Moore, 2018). This has the impact of having women with less self-confidence and more of a motive to "fit in" to actually embody these intensive mothering ideals, which produce poorer outcomes for their children (Henderson et al., 2016) and relegate fathers to traditional roles of resource-provider only.

So, women engage in intrasexual competition in the form of competitor manipulation and conspicuous consumption to secure their place, and the places of their children, in the social hierarchy, even when this comes at a financial cost and a cost to their wellbeing. Their behaviour induces expenditure of resources by their competition too. But even relatively wealthy women would need to engage in some sort of cost-benefit analysis for this behaviour so that they don't invest too many resources on expensive social displays, leaving behind too little for direct investment in their offspring.

One thing that may determine how much wealth mothers need to reserve for direct investment, as opposed to much they can use for manipulative consumption is whether they have sons or daughters. High-quality daughters need to be immaculate (healthy, attractive, well-educated), but, theoretically, they don't need to bring as much excess family wealth to the mating market as high-quality sons. High-quality sons, on the other hand, also need to be relatively immaculate but MUST also bring that excess wealth with them to the mating bargaining table (since women value wealth and resources in prospective long-term mates, more than men do). This suggests that wealthy mothers of sons may be relatively less intent on inducing competition to spend conspicuously than wealthy mothers of daughters. Similarly, assuming equal wealth, women with fewer offspring overall should be more intent on inducing consumption in others, as should women with more resources overall at their disposal (assuming equal numbers and sex of children).

Study 1

In the first part of this study I investigate the impacts on consumption of three types of products (a kitchen renovation, a new outfit for a dinner party, a new lipstick) of the audience for the consumption (extended family or a group of women peers who are known to you through an activity of your children e.g. the mothers of your child's soccer team), and the sex and number of the participants' children. As women's priorities for spending might be expected to change as their life-situation changes, I measure how these effects vary with age, mate value and intrasexual competitiveness.

Because conspicuous consumption is used as an intrasexual competition strategy I expected to find that as participants' intrasexual competitiveness increased, tendency to spend on luxury items would increase. I expected that women would spend more when anticipating an event which would be attended by same-sex peers rather than family members only, as same sex peers are more likely to be perceived as being judgemental, and there would be a greater social cost to not meeting peer standards. Women with daughters were expected to spend more than women with sons, as women with sons would be more likely to have to conserve their resources for the future reproductive benefit of their sons.

Study 1 and Study 2 were conducted together on one sample but are reported sequentially for ease of understanding.

2. Materials and method

2.1. Participants

A total of 2187 female participants were recruited through a paid participant bank (ProlificAcademic.com). Participants were drawn from English-speaking countries, mostly the United Kingdom, Australia, USA and Canada, resulting in a predominantly westernised sample. Thirty-four participants were excluded for not completing the intrasexual competitiveness and mate value measures of the survey, and 159 participants were excluded for having a same-sex partner or ideal partner. The final analyses included data from 1994 heterosexual female participants (aged 18-79, M_{age} = 39.39, *SD* = 11.633). Of the participants 1403 (70.4%) reported being in a long-term relationship, 53 (2.7%) in short-term or casual relationship/s and 538 (27.0%) were single. 1063 women reported having children and 931 did not have any children. All participants provided informed consent under HREC protocol number **H21202** (approved by the Charles Sturt University Human Research Ethics Committee).

2.2. Instruments and Measures

2.2.1. Mate Value Scale

Edlund and Sagarin's (2014) *Mate Value Scale* (MVS) was used to assess global mate value through a short four-item self-report measure of mate value where participants rate global statements about their attractiveness as a potential partner (such as "Overall, how would you rate your level of desirability as a partner?) on a 7-point rating scale ranging from 1 (extremely undesirable) to 7 (extremely desirable). In the current sample I observed strong internal consistency for participants (Cronbach's alpha = .921). The mean MVS score was calculated, converted to a z-score and used as a measure of mate value.

2.2.2. Scale for Intrasexual Competition (SIC)

Bunnk and Fisher's (2009) Scale for Intrasexual Competition was used to calculate the degree to which participants feel competitive towards members of the same sex for access to opposite sex attention. Participants rated the applicability of 12 statements to them, on a 7-point rating scale ranging from 1 (not at all applicable) to 7 (completely applicable). The mean across the 12-items was calculated for each participant and used as their intrasexual competitiveness score throughout. The current sample showed good internal consistency (Cronbach's alpha = .917). The mean SIC score was also converted to a z-score and used as a measure of intrasexual competitiveness.

2.2.3 Likeliness to spend on a kitchen, outfit and makeup.

Participants rated how likely they would be (0 = not at all to 10 = highly likely on a sliding scale) to spend money on their kitchen at four levels:1) a major renovation on a high-end kitchen, 2) a mid-range kitchen, 3) minor upgrades or 4) nothing at all (which was reversed scored).

Participants rated their likeliness to spend money at four levels (same scale as above) on a new outfit for the party: 1) a designer outfit, 2) a mid-range outfit, 3) an inexpensive but new outfit, and 4) to wear something they already own (reversed scored).

The final set of questions concerned likeliness to spend on new makeup (lipstick) that was 1) a high-end expensive brand, 2) a mid-range brand, 3) an inexpensive unbranded product, 4) not buy any lipstick (reverse scored).

The total likeliness to spend on a kitchen was calculated by summing the likeliness to spend at each of the four levels (with the last item reversed so that high likeliness to spend nothing scored 0 and highly unlikely to spend nothing score 10). The Cronbach's alpha of the four items was .818 indicating high reliability between the 4-items. I chose to sum the four items as this allowed me to capture likeliness to spend at all levels (so for a woman with limited means who was still determined to spend but couldn't afford the highest level, likeliness to spend at mid-level would still represent a financial commitment which I was interested in measuring). The likeliness to spend money on an outfit and makeup were calculated in the same way across all four items(Cronbach's alpha = .530 for the outfit and .515 for the makeup).

2.3 Stimuli

Vignette 1 described planning to host a party and deciding if and how to spend money on three different items in anticipation of the event: a kitchen renovation, an outfit for the party, and makeup for the party. In these vignettes the type of party differed to represent different levels of intrasexual competitiveness within the group. The four events were a family Christmas party, the end of year social gathering for the soccer mums of their daughter's soccer team, the end of year social gathering for the soccer mums of their son's soccer team, and the end of year social gathering for the mothers in the Parents and Citizens Association (P&C) at their children's co-ed school. Allocations of participants to groups was quasi-random, with constraints placed on allocation as a function of whether participants reported having sons, daughters, both, or neither. Participants with no children, or with both sons and daughters were allocated to any one of the four groups with equal probability. Participants with daughters only were allocated to one of

three groups (excluding the boys' soccer team group) with equal probability, and the participants with sons only were allocated to one of three groups (excluding the girls' soccer team). These constraints were in place so that for all parents with children the hypothetical scenario did not conflict with the actual sex of their children. Participants without children were instructed to imagine that they had children for the sake of the exercise. After reading the vignette, participants answered questions about how likely they would be to spend money on each of the three different items.

The four vignettes are shown below and were each preceded by the same instruction:

Please read the following passage very carefully. Try to imagine yourself in that exact scenario. Afterwards we will ask you some questions about how you think you might behave.

Family Christmas Party *You have been elected to host your annual family Christmas party. This is a big deal each year with the whole family coming together to share a beautiful meal and connect with each other to celebrate the festive season. The following people will be attending: your immediate family including your partner and your children, your adult brother and sisters, your parents, your uncles and aunts and your great aunt Mildred. You really enjoy cooking and entertaining a crowd. Your family is warm and close, except your Great Aunt Mildred can be quite judgemental. As you look around your kitchen, you notice it is rather tired and rundown, despite still being mostly functional. You are considering whether or not you might renovate it in anticipation of the event. The kitchen is the heart of your home where everyone will be gathered to chat and nibble while the main meal is prepared. While pondering your kitchen dilemma, your thoughts turn to what you might wear for the event. You will have to go shopping for a suitable outfit, probably a party dress of some kind. Your whole family generally makes quite an effort to dress up and make a special occasion out of the Christmas party. You probably also need some new makeup, especially lipstick. You can decide the colour once you've chosen the dress. You make a mental to-do list as you start planning.*

Girls' Soccer Team Dinner *You have been elected to host the annual end of season party for all the mothers of the girls on your daughter's soccer team. You know these women pretty well after several years of all cheering from the sidelines of soccer matches together and working together on fund raising events for the team. This is the big social event of the season for the soccer mums and each year the host puts in lots of effort to make the occasion special.*

You really enjoy cooking and entertaining a crowd. As you look around your kitchen, you notice it is rather tired and rundown, despite still being mostly functional. You are considering whether or not you might renovate it in anticipation of the event. The kitchen is the heart of your home where everyone will be gathered to chat and nibble while the main meal is prepared. While pondering your kitchen dilemma, your thoughts turn to what you might wear for the event. You will have to go shopping for a suitable outfit, and the ladies generally put in some effort to dress up and make an occasion out of the party. You probably also need some new makeup, especially lipstick. You can decide on the colour once you've chosen the dress. You make a mental to-do list as you start planning.

Boys' Soccer Team Dinner *You have been elected to host the annual end of season party for all the mothers of the boys on your son's soccer team. You know these women pretty well after several years of all cheering from the sidelines of soccer matches together and working together on fund raising events for the team. This is the big social event of the season for the soccer mums and each year the host puts in lots of effort to make the occasion special. You really enjoy cooking and entertaining a crowd. As you look around your kitchen, you notice it is rather tired and rundown, despite still being mostly functional. You are considering whether or not you might renovate it in anticipation of the event. The kitchen is the heart of your home where everyone will be gathered to chat and nibble while the main meal is prepared. While pondering your kitchen dilemma, your thoughts turn to what you might wear for the event. You will have to go shopping for a suitable outfit, and the ladies generally put in some effort to dress up and make an occasion out of the party. You probably also need some new makeup, especially lipstick. You can decide on the colour once you've chosen the dress. You make a mental to-do list as you start planning.*

Annual P&C Dinner *You have been elected to host the annual end of year party for all the members of the P & C (Parents and Citizen's Association) of your child's co-ed school. You are a long-standing member as your child is nearing the end of their time at the school. Despite trying really hard to get more fathers to join, you remain a group of women only. You know some of these women pretty well after several years of meetings and working together on fund raising events but there are some new members too. This is the big social event of the season for the P&C mums and each year the host puts in lots of effort to make the occasion special. You really enjoy cooking and entertaining a crowd. As you look around your kitchen, you notice it is rather tired and rundown, despite still being mostly functional. You are considering whether or not you might renovate it in anticipation of the event. The kitchen is the heart of your home*

where everyone will be gathered to chat and nibble while the main meal is prepared. While pondering your kitchen dilemma, your thoughts turn to what you might wear for the event. You will have to go shopping for a suitable outfit, and the ladies generally put in some effort to dress up and make an occasion out of the party. You probably also need some new makeup, especially lipstick. You can decide on the colour once you've chosen the dress. You make a mental to-do list as you start planning.

2.4 Procedure

Participants initially provided demographic information about themselves: age, sex, sex of their partner/ideal partner and their relationship status. Participants then indicated whether they had children, and if yes, how many children, each child's sex and the nature of their relationship to their parent (biological, step-, adopted and foster children).

Participants then read their allocated vignette. Following this they rated how likely they would be (0 = not at all to 10 = highly likely) to spend money on their kitchen at four levels: a major renovation on a high-end kitchen, a mid-range kitchen, minor upgrades or nothing at all (which was reversed scored). Participants then rated their likeliness to spend money at four levels on a new outfit for the party: designer outfit, mid-range outfit, inexpensive but new outfit, wear something they already own (reversed scored). The final set of questions concerned likeliness to spend on new makeup (lipstick) that was 1) a high-end expensive brand, 2) a mid-range brand, 3) an inexpensive unbranded product, 4) not buy any lipstick (reversed scored).

Participants were then presented with Vignette 2 and completed the associated questions (see Section 5.2 for details).

Participants then completed the MVS and the SIC.

3. Results

Table 5.1 shows the correlations between the individual difference variables and the dependent variables for the study. Mate value decreased with increasing age (r = -.094, $p \leq .001$) as expected, however intrasexual competitiveness was not correlated with either age nor mate value. Spending on a kitchen, outfit and makeup all decreased with age (all p's $\leq .001$) but increased with both mate value and intrasexual competitiveness (all p's $\leq .001$). Neither the number of children in total, number of sons, nor number of daughters was correlated with likeliness to spend on a kitchen, outfit or makeup all (p's $\geq .01$).

Table 5.1

Pearson r correlations between individual difference variables and between the individual difference variables and the dependent variables for Study Part 1

	Age	MVS	SIC	Kitchen	Dress	Makeup
Individual difference variables (*N*=1994)						
Age	1	-.094**	-.019	-.235**	-.153**	-.088**
MVS (Mate Value Scale)	-.094**	1	.030	.122**	.144**	.104**
SIC (Scale for Intrasexual Competitiveness)	-.019	.030	1	.094**	.138**	.139**
Number of daughters	.310**	.020	-.040	-.031	-.021	-.021
Number of sons	.341**	.038	-.024	-.032	-.012	-.001
Number of children in total	.167**	.008	-.006	.009	-.013	-.003
Dependent variables						
Likeliness to spend on a kitchen (*N*=1994)	-.233**	.122**	.094**	1	.433**	.360**
Likeliness to spend on a dress (*N*=1993)	-.153**	.144**	.138**	.433**	1	.586**
Likeliness to spend on makeup (*N*=1994)	-.088**	.104**	.139**	.360**	.586**	1

Note. ** $p \leq .001$

3.1 Effect of age, mate value, intrasexual competitiveness and children on spending

To investigate the effects on likeliness to spend in anticipation of the social event, a univariate analysis of covariance was conducted three times separately, with likeliness to spend money on i) a kitchen, ii) clothing and iii) makeup as the dependent variable in each case. The between subjects' variables were 2 x children (yes/no), and 4 x social event (family Christmas party, girls' team soccer mums' party, boys' team soccer mums' party, annual P&C party). The covariates were age, mate value (z-MVS) and intrasexual competitiveness (z-SIC).

Spending on a kitchen

Homogeneity of variance was observed (Levene's $F = .827$, $p = .565$). The model showed a significant main effect of age ($F(1,1930) = 88.986$, $p < .001$, $\eta_p^2 = .044$), with likeliness to spend on a kitchen decreasing with age. There was no effect of type of social event ($p = .986$), having children ($p = .297$), intrasexual competitiveness ($p = .276$), nor mate value ($p = .111$. There were no significant interaction effects either.

Spending on an outfit

Once again, homogeneity of variance was observed (Levene's $F = .211.$, $p = .983$). The model showed a significant main effect of age ($F(1,1929) = 41.271$, $p < .001$, $\eta_p^2 = .021$), with likeliness to spend on an outfit decreasing with age. There was also a main effect of having children ($F(1,1929) = 6.872$, $p = .009$, $\eta_p^2 = .004$), with women without children more likely to spend on an outfit than women with children. However, there was a two-way interaction

between age and children which qualified these two main effects, ($F(1,1929) = 4.368$, $p = .037$, $\eta_p^2 = .002$). The main effect of mate value, ($F(1,1929) = 6.305$, $p = .012$, $\eta_p^2 = .003$) was qualified by a social event x mate value two-way interaction ($F(1,1929) = 3.895$, $p = .009$, $\eta_p^2 = .006$), and a social event x mate value x age three-way interaction, ($F(1,1929) = 4.717$, $p = .003$, $\eta_p^2 = .007$).

Spending on makeup

Variance satisfied conditions for homogeneity, (Levene's $F = .211.$, $p = .983$). Once again the model showed a significant main effect of age ($F(1,1930) = 12.225$, $p < .001$, $\eta_p^2 = .006$), with likeliness to spend on makeup decreasing with age. There was a three-way social event x children x intrasexual competitiveness interaction, ($F(1,1930) = 3.464$, $p =. 016$, $\eta_p^2 = .005$), qualified by a four-way social event x children x intrasexual competitiveness x age interaction ($F(1,1930) = 4.060$, $p =. 007$, $\eta_p^2 = .006$).

Age

Given the findings of a main effect of age for all three items, the many interactions involving age and our initial finding that age was positively correlated with mate value, and spending on kitchen, outfit and makeup (Table 5.1), *post hoc* follow up involved exploring what was happening within various age ranges. Age was split into three groups for this purpose: 18-34 (to capture women still partnering up, reproducing and early stages of raising children), 35-45 (most women have had their children and children are generally school-aged), ≥46 (most women are post-reproduction and their children are becoming increasingly independent). Descriptive statistics for the three groups are shown in Table 5.2.

Table 5.2

Descriptive statistic for the three age groups for post hoc analyses

Event	M_{age}	SD	$N_{with\ children}$	$N_{no\ children}$
Early Adulthood (18-34 years)	27.38	4.151	202	582
Family Christmas			64	148
Girls' soccer team mothers' dinner			35	136
Boys' soccer team mothers' dinner			37	145
P & C dinner			66	153
Mid-Adulthood (35-45 years)	40.13	3.038	367	187
Family Christmas			95	47
Girls' soccer team mothers' dinner			71	45
Boys' soccer team mothers' dinner			90	48
P & C dinner			111	47
Post-reproductive age (47-79 years)	53.11	4.644	494	162
Family Christmas			154	41
Girls' soccer team mothers' dinner			94	47
Boys' soccer team mothers' dinner			102	33
P & C dinner			144	41

To further investigate the effects of mate value, intrasexual competitiveness and whether or not the women had children, a univariate analysis of covariance was conducted separately for the three age groups (18-34 years, 35-45 years, ≥ 46 years). The ANCOVA was conducted three times separately, with likeliness to spend money on i) a kitchen, ii) clothing and iii) makeup in anticipation of the event described in the vignette as the dependent variable. The between subjects' variables were 2 x children (yes/no), and 4 x social event (family Christmas party, girls' team soccer mums' party, boys' team soccer mums' party, annual P&C party). The covariates were the z-MVS and z-SIC modelling the effects of mate value and intrasexual competitiveness, respectively. For all the *post hoc* follow-up analyses that follow the interactions involving the continuous covariates were explored by estimating the relevant simple effects at low, medium, and high levels of the covariate, where low medium and high were defined as 1.5 standard deviations below and above the mean.

3.2 Spending on a kitchen by the three different age groups

Homogeneity of variance was satisfied for all three age groups (all Levene's $F \leq .869$, all p's $\geq .530$).

Early Adulthood and spending on kitchens

The model showed a significant main effect of mate value ($F(1,752) = 10.228$, $p < .001$, $\eta_p^2 = .013$), with likeliness to spend on a kitchen increasing with increasing mate value. The was no effect for type of social event ($p = .728$), having children ($p = .920$), or intrasexual competitiveness ($p = .829$). There were no significant interaction effects either.

Mid-Adulthood and spending on kitchens

The model showed a significant main effect of mate value ($F(1,522) = 7.268$, $p = .007$, $\eta_p^2 = .014$), with likeliness to spend on a kitchen again increasing with increasing mate value and an effect size comparable to that in the younger age group. In addition, there was a significant main effect of intrasexual competitiveness ($F(1,522) = 6.417$, $p = .012$, $\eta_p^2 = .012$), with higher competitiveness associated with a greater likeliness to spend money renovating a kitchen. The main effects of mate value and intrasexual competitiveness were qualified by a three-way MVS x SIC x children/no children interaction, ($F(1,522) = 7.153$, $p = .008$, $\eta_p^2 = .014$). *Post hoc* investigation at low, medium and high levels of mate-value for participants with children and without children are shown in Figure 5.1. At medium levels of mate value there was no significant difference in spending with or without children, and spending increased as intrasexual competitiveness increased. However, contrasting effects of children were observed for low versus high mate value women. For low mate value women, increased intrasexual competition was associated with a decrease in spending for childless women, but an increase in spending for women with children. For high mate value women, increases in intrasexual competitiveness were associated with increases in spend for childless women, but less so for women with children.

Finally, there was also a main effect of social event, ($F(3,522) = 2.859$, $p = .036$, $\eta_p^2 = .016$). *Post hoc* simple comparisons showed that participants who read the Family Christmas vignette showed significantly less likelihood of spending money on a kitchen renovation than participants who read the girls' soccer team mothers' dinner ($p = .011$), the boys' soccer team mothers' dinner ($p = .016$) and the P&C dinner ($p = .056$) vignettes. There were no significant differences in spending between the other three vignettes (all p's $\geq .465$). As predicted by theories of conspicuous consumption serving a female intrasexual competition motive the family Christmas is least likely to incite intrasexual competition, while all other circumstances involve women compatriots who are peers. This happened regardless of whether the participants had children or not.

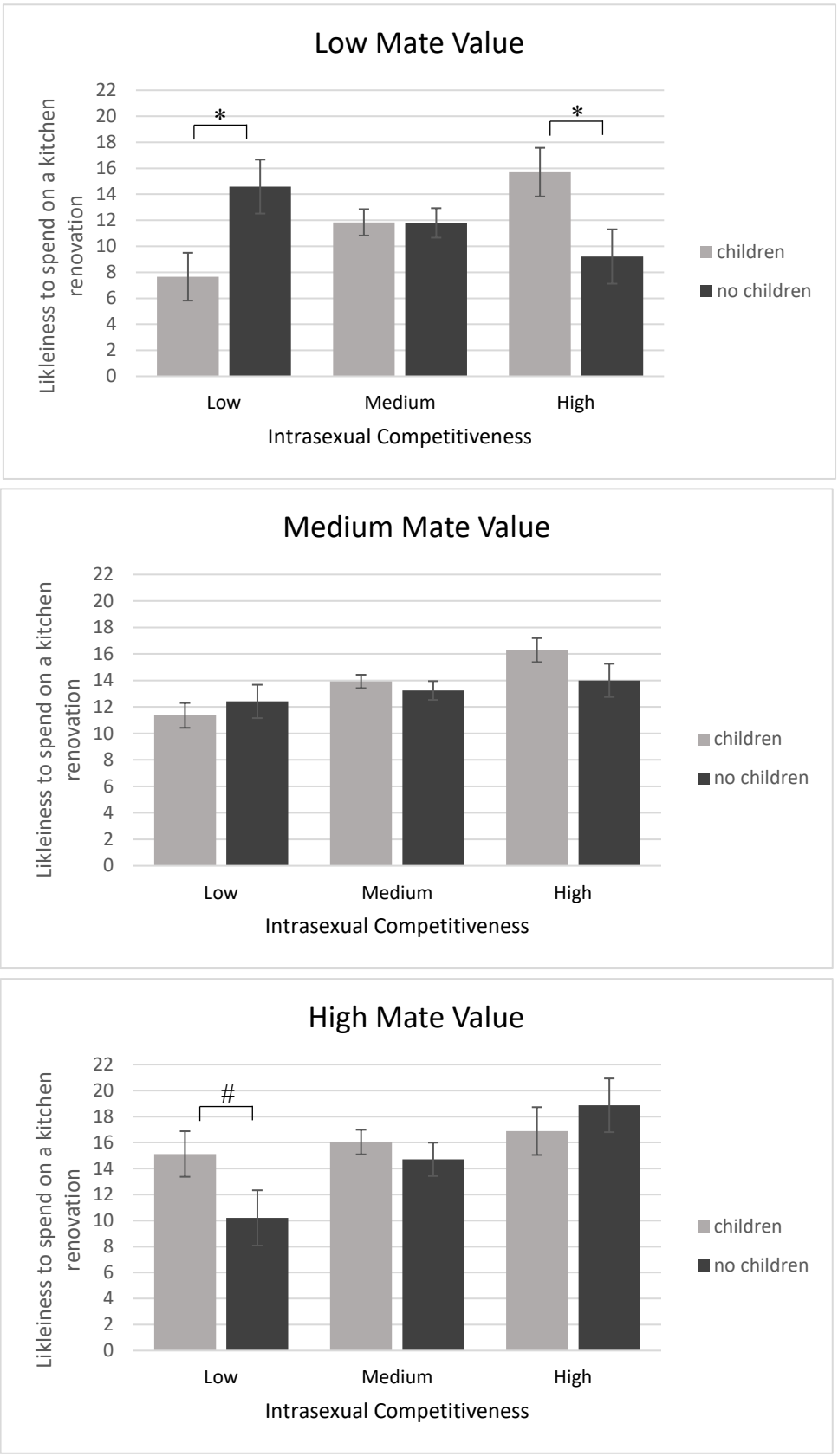

Figure 5.1. Mean likeliness to spend on a kitchen renovation ± SE with increasing intrasexual competitiveness, by female participants of low medium and high mate value ** $p \leq .001$, * $p \leq .05$, # $p \leq .01$.

Post-reproductive age and spending on kitchens

In the post-reproductive age-group, the ANCOVA model showed no significant main effects or interaction effects. Mate value ($F(1,624) = 1.055$, $p = .305$, $\eta_p^2 = .002$, *ns*), intrasexual competitiveness ($F(1,624) = 2.712$, $p = .100$, $\eta_p^2 = .004$, *ns*), having children or not ($F(1,624) = .278$, $p = .598$, $\eta_p^2 = .000$, *ns*) and social event ($F(1,624) = 2.090$, $p = .100$, $\eta_p^2 = .010$, *ns*) were found not to effect the likeliness of spending on a kitchen renovation.

3.3 Spending on clothing by the three different age groups

Homogeneity of variance was satisfied for all three age groups (all Levene's $F \leq .891$, all p's $\geq .513$).

Early Adulthood and spending on clothing

The model showed significant main effects of mate value ($F(1,751) = 9.872$, $p = .002$, $\eta_p^2 = .013$) and intrasexual competitiveness ($F(1,751) = 7.142$, $p = .008$, $\eta_p^2 = .009$), with likeliness to spend on a new outfit increasing with increasing mate value and increasing intrasexual competitiveness. The was no effect of type of social event ($p = .851$) or having children ($p = .531$). There were no significant interaction effects either.

Mid-Adulthood and spending on clothing

The model showed significant main effects of mate value ($F(1,522) = 4.813$, $p = .029$, $\eta_p^2 = .009$) and intrasexual competitiveness ($F(1,522) = 5.486$, $p = .020$, $\eta_p^2 = .010$) in the same directions and of comparable effect sizes to the likeliness to spend on an outfit in the young adult age group. In addition, there was a main effect of having children ($F(1,522) = 4.503$, $p = .034$, $\eta_p^2 = .009$), with women who have children being more likely to spend on an outfit ($M = 19.266$, $SE = .401$) than women without children ($M = 17.748$, $SE = .561$). While there was no main effect of type of social event ($p = .600$), there was a significant 3-way interaction between mate value, having children and social event: ($F(3,522) = 2.652$, $p = .048$, $\eta_p^2 = .015$). *Post hoc* exploration of this effect using simple comparisons at low, medium and high mate value revealed that mate value had the largest effect on likeliness to spend when participants without children responded to reading the boys' team soccer mothers' dinner vignette. At low mate value, women with children were significantly likely to spend more money on an outfit than women without children ($p = .018$), and low mate value women without children rated their likelihood to spend significantly lower having read the boys' soccer team condition than the annual P&C dinner event ($p = .030$). However, at high mate value spending on a dress had

increased to the degree that women without children spent more money after viewing the soccer condition, than women who responded to the family Christmas event (p = .029) (see Figure 5.2).

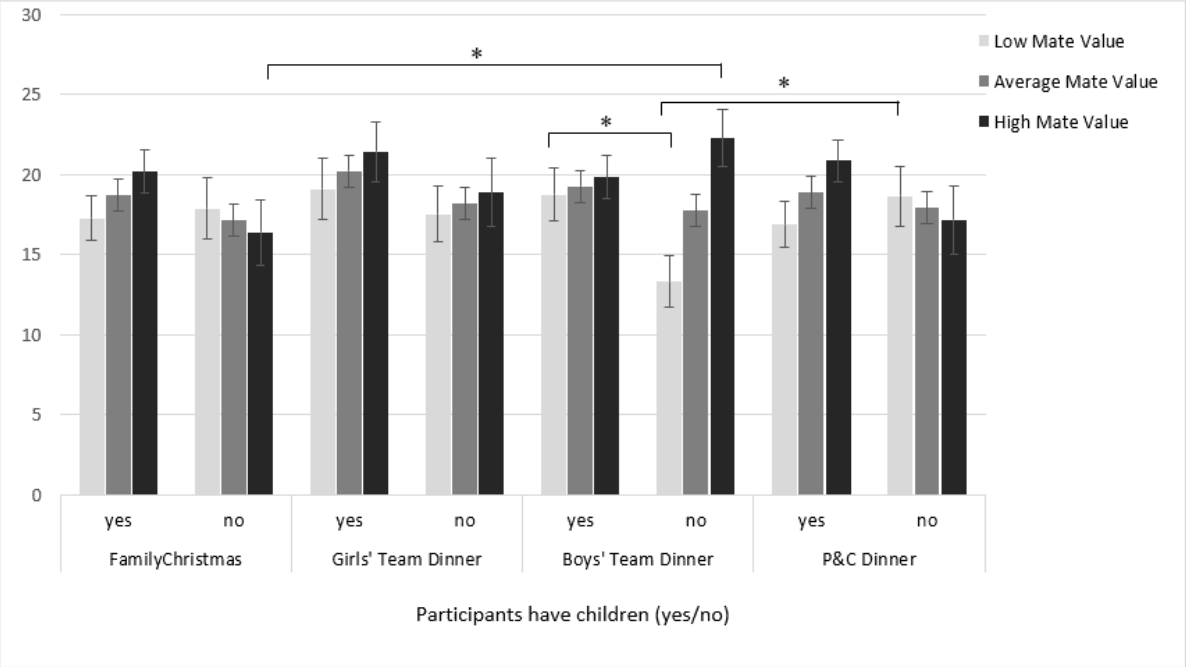

Figure 5.2. Mean likeliness to spend on an outfit ± SE for participants with and without children, with increasing mate value, after reading the vignettes for the four different social events for women in the 35 -45 year group

** $p \leq .001$, * $p \leq .05$.

Post-reproductive age and spending on clothing

When reporting their likelihood of spending on a new outfit in anticipation of the social event, there was only one significant main effect, namely of intrasexual competitiveness ($F(1,624) = 5.991$, $p = .015$, $\eta_p^2 = .010$). More competitive women were more likely to buy a new outfit than less competitive women. This main effect was qualified by a two-way social event x intrasexual competitiveness interaction shown in Figure 5.3. For all events except girls' soccer team mothers' dinner, likeliness to spend increased with increased intrasexual competitiveness. Low mate value participants spent significantly less when exposed to the family Christmas vignette than when they responded to the girls'(p = .020) and the boys' (p = .047) soccer team mothers' dinners. In the high mate value group, women responding to the

girls' soccer team mothers' dinner spent significantly less those responding to each of the other 3 vignettes.

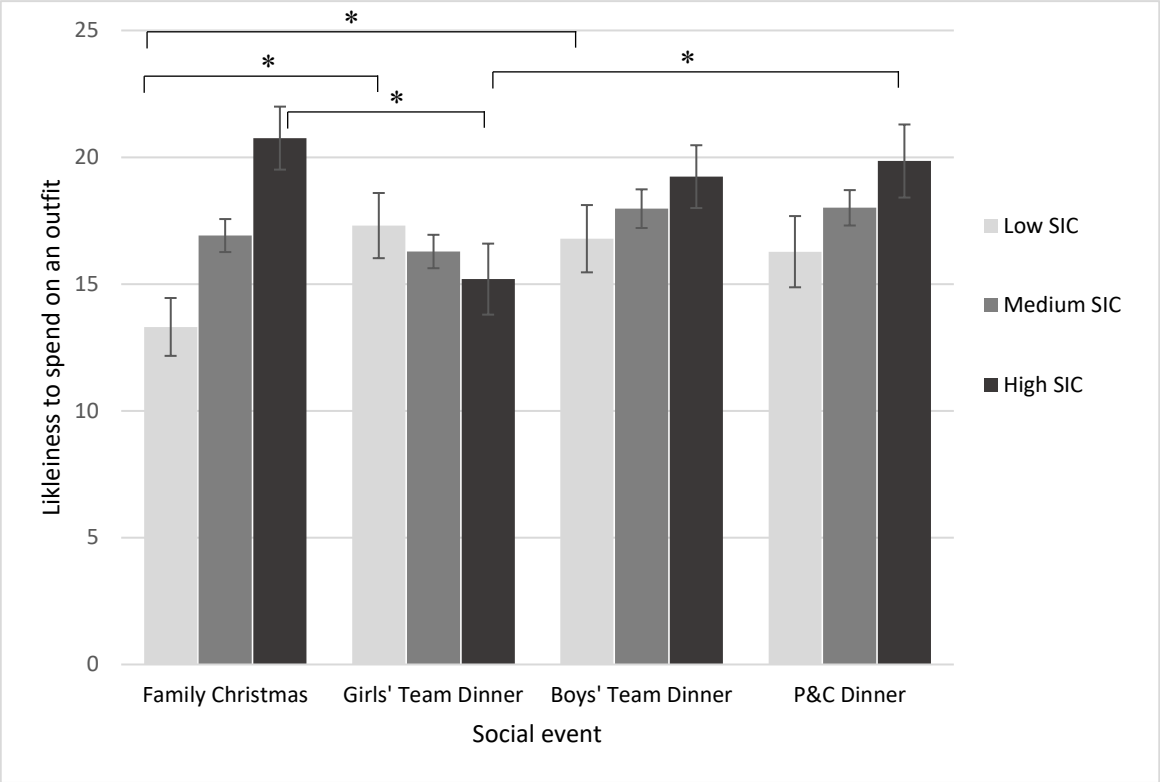

Figure 5.3. Mean likeliness to spend on an outfit ± SE for post-reproductive age women, with increasing intrasexual competitiveness (as measured by the Scale for Intrasexual Competitiveness, SIC) (-1.5 SD, mean SIC, +1.5 SD), after reading the vignettes for the four different social events

** $p \leq .001$, * $p \leq .05$.

As with the middle age group, there was also a significant 3-way interaction between mate value, having children and social event: ($F(3,624) = 3.165$, $p = .024$, $\eta_p^2 = .015$), illustrated in Figure 5.4. For all four vignettes, mate value had a more pronounced effect on amount spent for women with no children, than for women with children. In general, increased mate value resulted in higher likeliness to spend on an outfit, except in the no children condition of the girls' soccer mothers' dinner, where increased mate value resulted in a decrease in likeliness to spend. Women responding to this vignette were also significantly less likely to spend than high mate value women with no children responding to the boys' team mothers' dinner ($p = .003$), and the P &C dinner ($p = .009$), although possibly not the family Christmas dinner ($p = .056$).

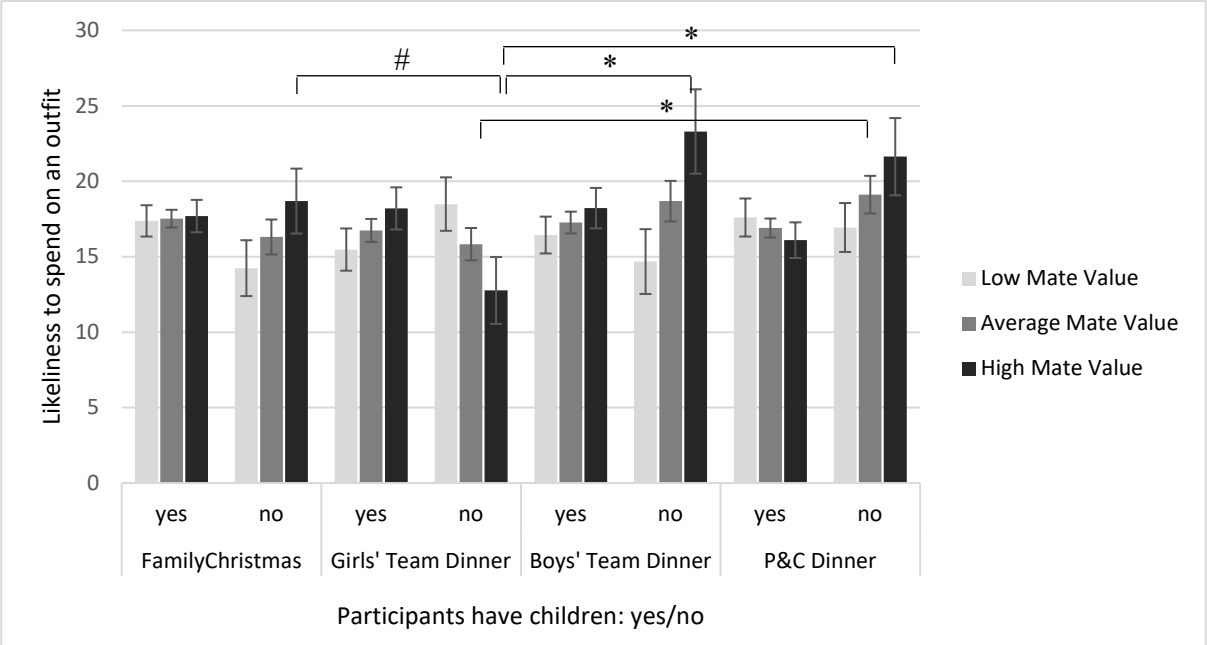

Figure 5.4. Mean likeliness to spend on an outfit ± SE for post-reproductive age women, with and without children, with increasing mate value (as measured by the Mate Value Scale) (-1.5 SD, mean SIC, +1.5 SD), after reading the vignettes for the four different social events

** $p \leq .001$, * $p \leq .05$, # $p \leq .01$.

3.4 Spending on makeup by the three different age groups

Homogeneity of variance was observed for all three age groups: all Levene's $F \leq 1.457$, all p's $\geq .180$).

Early Adulthood and spending on makeup.

As with spending on clothing, increasing intrasexual competitiveness significantly positively affected the likeliness to spend money on new makeup in anticipation of the social event ($F(1,752) = 7.356$, $p = .007$, $\eta_p^2 = .010$), however, the main effect of mate value did not reach significance ($F(1,752) = 2.838$, $p = .092$, $\eta_p^2 = .004$, *ns*). The was no effect of type of social event ($p = .790$) or having children ($p = .721$). There were no significant interaction effects either.

Mid-Adulthood spending on makeup

The model showed a main effect of intrasexual competitiveness ($F(1,522) = 10.727$, $p \leq .001$, $\eta_p^2 = .020$), with likelihood of spending on makeup increasing with intrasexual competitiveness, as before. However, there was no main effect of mate value ($F(1,522) = 2.129$, $p = .145$, $\eta_p^2 = .004$, *ns*). The was also no main effect of type of social event ($p = .250$) or having children ($p = .311$). As with spending on an outfit, there was a significant 3-way interaction between mate value, having children and social event: ($F(3,522) = 3.888$, $p = .009$, $\eta_p^2 = .022$). Again, *post hoc* simple comparisons at low, medium and high mate values revealed that the condition significantly affected by mate value was the boys' soccer team mothers' dinner. At low mate value, participants *with* children were significantly more likely to spend on makeup for the soccer mothers' dinner than the family Christmas dinner ($p = .040$). At medium and high mate value, participants *without* children were significantly more likely to spend on makeup for the soccer mothers' dinner than a family Christmas dinner ($p = .046$ and $p = .002$, respectively). After reading this vignette (but no others), high mate value women spent significantly more if they did not have children than if they did ($p = .001$).

Post-reproductive age and spending on makeup

The ANCOVA model with likeliness to spend on makeup as the dependent variable, in the post-reproductive age group showed main effects of mate value and intrasexual competitiveness ($F(1,624) = 5.388$, $p = .021$, $\eta_p^2 = .009$ and $F(1,624) = 4.343$, $p = .038$, $\eta_p^2 = .0107$, respectively). These were qualified by several two and three-way effects involving social event and having children.

There was a significant two-way interaction between the social event and having children, $F(3,624) = 3.611$, $p = .013$, $\eta_p^2 = .017$. Follow-up investigation using simple comparisons revealed that only women *without* children differed significantly in their likeliness to spend on makeup in response to different social events, $F(3,624) = 3.343$, $p = .019$, $\eta_p^2 = .016$. In this case the P&C event elicited higher spending than all three other events (all p's $\leq .021$), which did not differ significantly from each other. The P&C dinner was also the only event in which spending by participants without children differed significantly to participants with children ($p = .023$) .Women *with* children responded indifferently to the four events ($p = .716$).

The highest order interaction was the four-way mate value x intrasexual competitiveness x having children x social event vignette interaction ($F(3,624) = 3.756$, $p = .019$, $\eta_p^2 = .016$). I probed this interaction by estimating the three-way interactions, at low and high levels of each

covariate. The only social event which was affected by mate value (while intrasexual competitiveness was constant at the mean) was the P&C dinner and only for women *without* children. The difference in spending between women with and without children was only significant at mean mate value but not at high mate value (p = .075) or low mate value (p = .445). At medium mate value and low intrasexual competitiveness there were no effects of social event for the women who did have children or those who did not. At high intrasexual competitiveness (and medium mate value), there was a significant effect of social event in the group without children (but not with children), with participants *without* children who responded to the girls' (M=10.246, SE = 2.781) and the boys' (M=13.714, SE = 2.189) soccer team mothers' dinners spending significantly less on makeup than those on the Family Christmas (M = 20.459, SE = 2.459) and P & C dinner (M= 22.341, SE = 2.781) (all p's ≤ .041) conditions.

3.5 Effects of sex of children on likeliness to spend

To test our hypothesis that mothers of boys should be motivated to retain as many resources to optimise their son's future mate value, while mothers of girls only should want to spend more to advertise the high mate value of their daughters and potentially manipulate their competition into spending money to deplete resources, I used a data set containing only women with children and divided it into three groups: mothers of girls only (N = 248), mothers of boys only (N = 332), mothers of both (N = 478). There were five participants who had children whose sex they did not indicate. These were excluded from the analysis. Sex of children (x 3: girls, boys, both) was used as a between subjects' variable, along with Vignette event (x 4) in a univariate ANCOVA, with the dependent variable being the likeliness to spend on a kitchen, while controlling for age, intrasexual competitiveness and mate value.

Significant main effects of intrasexual competitiveness, mate value and vignette event were found in the same directions as discussed before. There was no main effect of sex of children, $F(2,1045) = .054$, $p = .948$, $\eta_p^2 = .000$, and no interaction effects involving the sex of children (all p's > .838). The model was completed twice more, using spending on an outfit and spending on makeup as the dependent variables, respectively. In neither case was there a main effect of the sex of children ($F(2,1044) = .074$, $p = .928$, $\eta_p^2 = .000$ for spending on clothing and $F(2,1045) = .114$, $p = .892$, $\eta_p^2 = .000$ for spending on makeup). There were no significant interaction effects for either the clothing model (all p's > .993) or the make-up model (all p's > .912) suggesting that this hypothesis was not supported.

3.6 Summary of main results from Part 1

Overall, increased age was associated with lower mate value, as anticipated, but also with decreased spending on all three items: kitchen, outfit, makeup. Likeliness to spend on all three items increased with both increased mate value and intrasexual competitiveness.

When rating likeliness to spend on a kitchen, (which represents the highest financial commitment) the early adulthood group spent more as mate value increased, but there were no other effects. Similarly, the mid-adulthood group spent more with increased mate value, but also with intrasexual competitiveness. Women in this middle group spent significantly less after reading the Family Christmas vignette than any of the other three events. Highly competitive women of low mate value with children spent more than the same group without children. In the older adulthood group, there were no significant main effects or interactions for likeliness to spend on a kitchen.

When rating likeliness to spend on an outfit or makeup (both of which represent a smaller financial outlay than a kitchen, making them more accessible to most women), there were main effects in the positive direction of mate value and /or intrasexual competitiveness for all three age groups for both items. Having children made women in the middle age group more likely to spend on an outfit. In both the middle and older age groups there were some differences between how women with and without children responded to different events especially as their mate value changed.

For mothers, likeliness to spend on a kitchen, outfit or makeup was not affected by the sexes of their children.

4. Discussion

In this study I adopted a vignette methodology to investigate how female intrasexual competition predicts spending intentions in scenarios especially relevant to partnered women with children. I predicted that spending would increase with intrasexual competitiveness and that women with daughters would spend more than women with sons. I also predicted that in the non-competitive scenario (family only) women would spend less than in the competitive scenarios (with same-sex peers) Findings were consistent with predictions to the extent that likeliness to spend increased with intrasexual competitiveness (and increased with mate value too). Women in the middle-age group spent less in the family scenario, and highly competitive women in this group spent more when they had children than when they did not. Contrary to predictions, however, there were no differences in spending between mothers of boys and girls.

Effects of intrasexual competition and mate value

As predicted, intrasexual competitiveness resulted in an increase in spending on all three items – the kitchen, the outfit and makeup. This suggests that participants viewed the scenarios presented in the vignetttes as situations in which social comparisons were likely to be made (Matt, 2003; Ulph, 2014)). More intrasexually competitive women were likely to want to present themselves in a way that advertised their status and attractiveness perhaps with a view to inciting greater upward social comparisons by attendees of their event, using these displays to induce other women to spend.

In general, spending on all three items (a kitchen, an outfit and makeup) increased with mate value, and considering that mate value and intrasexual competitiveness were not correlated this could not have been due to increased competitiveness. High mate value women would expect to secure high mate value partners (Buss & Shackelford, 2008; Waynforth, 2001) and therefore have access to more resources, making greater spending less of a cost to them. High mate value women may also feel additional pressure to maintain their superior standing within their mate value stratum through their actions and display of status (Buss & Shackelford, 2008), resulting in greater spending when faced with a scenario in which they anticipated social comparison to take place (Gutierres et al., 1999; Wang & Griskevicius, 2014)

Three of the four scenarios presented in the first part of the study were chosen to represent situations in which women with children might find themselves in a social situation with other women likely to be of approximately the same age and socio-economic level, whilst not being together because they had chosen to be friends. I theorised that these situations would incite intrasexual competition (which they did), but I was interested to see that the event being restricted to mothers of girls, mothers of boys or mothers of both did not have an effect on how competitive the situation was perceived by participants. The Family Christmas situation was expected to incite less competition because all other attendees would be family – which it did, especially for mothers between 35 and 45 years of age (the prime target group of these vignettes). Anecdotally, some women do seem to experience competition with their sisters-in-law, and while the attendance of a sister-in-law was not explicitly mentioned, it is possible that this would have implicitly influenced the responses of some participants.

Spending on a kitchen

When rating likeliness to spend on a kitchen, (which represents the highest financial commitment of the three items) the early adulthood group spent more as mate value increased,

but there were no other effects. It is likely that for this age-group (two-thirds of whom didn't have children) they had little experience with scenarios involving competitive mothering, mothers of children's peers or little experience with expensive renovations such as kitchens so no effects were seen. It's also the case that theoretically, I wouldn't be expecting this group to be investing heavily in the type of competition designed to drive down excess resources. They don't likely have many excess resources at that stage and are more focused on securing a good long-term mate. So theoretically, I did not expect this group to compete in terms of the renovated kitchen and this was confirmed by our findings.

The mid-adulthood group indicated greater likeliness to spend on a kitchen with increased mate value and intrasexual competitiveness. The three competitive scenarios presented in the vignettes were chosen to resonate with the women in this age group, most of whom were partnered with children. Women in this middle age group spent less after reading the Family Christmas vignette than any of the other three events. This was predicted as women would be expected to compete less with kin, than with same-sex rivals.

The differences in spend on a kitchen between low mate value women with and without children revealed interesting patterns of competitive consumption. If intrasexual competition in women undergoes a shift to targeting rivals' resources once women are partnered with children, then I would predict highly competitive women with children to spend more than those same women without children and this is precisely what I saw: highly competitive, middle-aged women of low mate value with children spent more than the same group without children. By contrast, women of low mate value and low intrasexual competitiveness spent less when they had children than when they didn't have children. In the absence of highly competitive motives, these low mate value women (who are likely to be resource limited) did not exhibit the same competitive consumption tendencies, showing a greater tendency to conserve resources once they had children.

In the older adulthood group intrasexual competitiveness did not impact intended spend on a new kitchen. This is also consistent with our framing of kitchen spend as a competitive consumption tactic designed to promote standards that deplete rivals of the resources they need to raise their children. By the time most women are in this age group, their children have grown up and are financially independent. There is little doubt that grandparents contribute to fitness (Brussoni & Boon, 1998; Hodgson, 1992), and there is every likelihood that female intrasexual competition between grandmothers continues to play out. The current data however, suggest that

it does not play out as it does for younger mothers. In this age group mate value had stabilised and potentially intrasexual competitiveness would now be associated with different attributes (such as where they travelled to, how perfect their grandchildren were etc). This lack of effect of spending on a kitchen renovation could also be associated with a decreased need to impress peers, or having forgotten how competitive groups of women in social situations like those presented in the vignettes could be. For this age group spending in order to induce resource depletion in rivals might come at too high a cost for potential reward when women's future resource accrual options are becoming limited (and it is likely their children are moving towards independence and are less in need of having their social status promoted by their mother).

Alternatively, they may already have accrued a good kitchen and nice clothes which are superior to those around them, particularly if they are of high mate value and have had access to extra resources throughout their partnership. Highly intrasexually competitive women might also be expected to already have accrued higher quality possessions by this age given the positive relationship between intrasexual competitiveness and conspicuous consumption (Wang & Griskevicius, 2014).

Spending on clothes and makeup

Intention to spend on items related to physical appearance enhancement (clothes and make-up) were positively associated with intrasexual competitiveness across all three age groups. When rating likeliness to spend on an outfit and on makeup (both of which represent a smaller financial outlay than a kitchen, making them more accessible to most women), all three age groups spent more with increased mate value and /or intrasexual competitiveness. Clothes and makeup are both related to physical appearance enhancement. Given that each competitive scenario involved only women, no men, there could be no mate attraction motivation, leaving the use of both makeup and clothing as an intrasexual competitiveness strategy. Lower mate value women in the middle age group spent more on makeup in the competitive scenario than the family scenario and in the oldest age group less was spent on a dress for the family event than the competitive scenarios by lower mate value women. This highlights that in a competitive scenario women perceive there to be social standards which they need to meet. Given the appearance of these effects particularly for low mate value women it seems they are more likely to arise as a result of avoiding social ostracism and conserving social status for themselves and their children.

Having children made women in the middle age-group more likely to spend on an outfit. This is consistent with our theory that partnering and having children is the trigger that switches competitive tactics from being mate attraction focused to being resource depletion focused. While expensive clothing can certainly be conspicuously consumed, it is also very relevant to physical appearance and so an effect of parity for this item was not specifically predicted by out theory. It should also be considered that women with young children have bodies that have relatively recently changed and may be less likely than women without children to find themselves without suitable attire that fits well, and this may have driven responding in this instance. Women without children may not have experienced the highly competitive nature of these all-mothers groups. At low mate value, women with children were significantly more likely to spend more money on an outfit than women without children again attesting to their need to compete indirectly through strategic self-presentation to rivals.

Differences in mate value with life stage

Unsurprisingly, increased age was associated with lower mate value. Female mate value is largely dependent on physical attractiveness signally reproductive fitness, which naturally decreases with age. However, I anticipated that this might be more complex than just a linear relationship. When the women were grouped based on their life-stage I found that within each life stage different relationships existed with mate value. In the early adulthood (18 years to 34 years) group more women were single and less than a third of them had children. In this stage women would be involved in mate attraction and relationship establishment followed by mate-guarding (as many other women of their age would still be single). Within this age group, mate value did not change as women aged, likely because physical attractiveness was fairly constant – an attractive woman at 30 years old is still objectively attractive. In the mid-adulthood group (35 to 45 years), I did see a decline in mate value with age, suggesting that the physical attractiveness of women at 35 years is significantly greater than at 45 years (which also makes sense in that many women at 35 are still actively producing viable offspring, while this is markedly reduced at 45 years). I theorise that in the middle age-group most women have partnered, making mate attraction less of a focus. Two-thirds of the women had young children, with high demands of care, and so access to adequate resources is particularly important. Shared emotional and practical parental responsibility would make mate retention important too. Once women passed 45 years, there was stabilisation of mate value with no further reductions with age. After the age of 45 years when women have aged beyond advertising their reproductive value it may be that they start basing their self-perceived mate value on other attributes like

accomplishments and life-experiences, so fields of competition change, and intrasexual competitiveness becomes focused on mate/resource retention rather than mate attraction and finding other measures of personal value than how they look.

Effects of the sexes of their children

The prediction that mothers of sons (as opposed to daughters) would be less likely competitively consume, because their offspring required greater excess wealth to subsequently attract their own mates, was not supported. For mothers, likeliness to spend on an a kitchen, outfit or makeup was not affected by the sexes of their children: mothers of daughters were not found to spend more than mothers with sons, or mothers of both on any of the three items. However, I know from the results discussed above that having children did result in more spending than not having children in certain scenarios. This indicates that spending must be felt by women in some situations to offer them the competitive edge be it by signalling status, or by maintaining social standards so that they can maintain advantageous social alliances for their children which women who weren't mothers would not have to worry about. This part of the theory will need to be considered more carefully. It could be that sons and daughters do require differential resource investment but that this mode of intrasexual competition simply isn't sensitive to that, or it could that the differential investment that they require is more sensitive and nuanced than our theory presumed and so further research will need to consider whether and how intrasexual competition around resource depletion is influenced by offspring sex.

Study 2

In the second study I consider spending on a charity. Previous research confirms status-signalling as a motivation for charitable giving (Ariely, Bracha, & Meier, 2009; Karlan & McConnell, 2014; Samek & Sheremeta, 2016). People give more when they receive public recognition (Karlan and MacConnell), and hospital wings, libraries, university buildings named after wealthy/generous donors attest to this This was also excluded this as being a result of their desire to influence others to give more, confirming social status not prosociality, as the central motivating factor (Karlan and MacConnell). Giving to a charity has been identified as a form of conspicuous consumption (Heffetz, 2011). In this study I measured how many raffle tickets participants would buy at a charity function when there was an audience present or not, when they were with their partner or at a table of only women peers, and when the number of tickets purchased by the other women varied. I investigated the extent that participants believed they

were being judged by the other women to identify the perception of a social cost to not spending, as well as exploring the effects of age, mate value and intrasexual competitiveness as before.

I hypothesised that highly intrasexually competitive women will be more likely to spend more money on charitable donations, especially when an audience is present. Women who perceive that they will be judged by peers are expected to spend more when their peers spend more. When there is no audience, women will spend less.

5. Method

5.1 Stimuli

The situation in this vignette described participants attending a charity lunch. A charity raffle ticket seller was approaching each table of women to sell tickets. Participants were randomly allocated to one of sixteen different groups: half the conditions involve only women present and the other half involve women with their partners present. The second manipulation involves the participant buying raffle tickets in front of the other people at her table or in private, so the other women do not know how many she bought. The final condition involves how many raffle tickets are purchased by the other people at the table, with four levels – a high number (10-20 each), a low number (1-2 each), a variable number with a high mate value women (Carol) buying the most, and a variable number with a lower mate value woman (Beth) buying the most . Table 5.3 shows the conditions for each of the vignettes (see Appendix for all versions of the vignette).

Table 5.3

Vignette conditions for Study 2

Vignette	People at table	Audience during purchase	Number of tickets bought by others
2.1	Women only	yes	low
2.2	Women only	no	low
2.3	Women only	yes	high
2.4	Women only	no	high
2.5	Women only	yes	variable - Carol
2.6	Women only	no	variable - Carol
2.7	Women only	yes	variable - Beth
2.8	Women only	no	variable - Beth
2.9	With partners	yes	low
2.10	With partners	no	low
2.11	With partners	yes	high
2.12	With partners	no	high
2.13	With partners	yes	variable - Carol
2.14	With partners	no	variable - Carol
2.15	With partners	yes	variable - Beth
2.16	With partners	no	variable - Beth

The following example represents the women-only, with an audience, low number of tickets bought by all condition:

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the other women at your table buy one or two tickets each.

Table 5.4 shows the alternative wording for the different conditions presented in the vignettes.

Table 5.4

Wording for the different Vignette conditions for Study 2

People at table	
Women only	*You are sitting at a table of six, with women you socialise with a couple of times a year."*
Partners	*You and your partner are attending a fund-raising lunch for your favourite charity… You are sitting at a table of six couples, with women you socialise with a couple of times a year.*
Number of tickets bought by others	
Low	*The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the other women at your table buy one or two tickets each.*
Variable (Beth - low mate value)	*Beth is also of a similar age, she is plain-looking and down-to-earth… When the host comes around to your table, Beth buys 20 tickets, while all the other women buy one or two tickets each.*
Variable (Carol -high mate value)	*Carol is about your age, immaculately presented. She exudes success and confidence and seems to talk a lot. …When the host comes around to your table, Carol buys 20 tickets, while all the other women buy one or two tickets each.*
High	*The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the other women at your table buy 20 tickets each.*
Audience during purchase	
Yes	*During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity.*
No	*While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought.*

5.2 Procedure

After completing the demographic information and responding to the vignette for Study 1 (see Section 2), participants were presented with Vignette 2.

Participants reported on how many tickets they would buy after reading one of the randomly allocated vignettes. The remaining questions were all measured on a sliding scale. They reported the degree to which they thought the other women at their table noticed how many tickets they had bought ["To what extent do you think the other women noticed how many tickets you bought?" 0 = not at all to 10 + a great deal"] and the degree to which they believed

they would be judged by the other women for the number of tickets they bought ["To what extent do you think the other women judged you for how many tickets you bought? 0 = not at all to 10 + a great deal"].

Next there were three questions assessing wealth:

i. "Compared to my CLOSEST FRIENDS, my household tends to earn the following income" (0 = very much less to 5 = very much more)
ii. "Compared to your peers (those at the same stage of life, but not necessarily your friends), where do you see yourself in terms of wealth?" (0 = much less wealthy than most peers to 10 = much more wealthy than most peers
iii. "Compared to other people in your own suburb, (who might have children at the same school or the same type of other expenses as you), how much discretionary income do you have? [Discretionary income is the money left over after you've paid necessities like mortgage/rent, food, electricity etc.]" (0 = much less than most people to 10 = much more than most people).

Participants then completed the MVS and the SIC which were converted to z-scores as before.

6. Results

6.1 Correlations

This study involved presenting a randomly allocated vignette to participants concerning buying raffle tickets for charity and investigating the conditions under which participants bought greater or fewer tickets . Initially, Pearson's correlation coefficients were calculated for the individual difference variables and dependent variables. Individual difference variables included age, mate value and intrasexual competitiveness and the three measures of wealth: the participant's household income compared to their friends (N = 1983, M = 2.41, SD = 1.14, range 0 – 5), their self-rated wealth compared to their peers (but not necessarily their friends) (N = 1982, M = 4.25, SD = 2.08, range 0 – 10) and their discretionary income compared to their peers (to get an idea of how much "free" money they had available to spend) (N = 1988, M = 4.25, SD = 2.21, range 0 – 10). The dependent variables for Part 2 were number of tickets bought after reading one of the vignettes (N = 1993, M = 4.99, SD = 6.70, range 0 – 120), the degree to which they thought the other women at their table noticed how many tickets they had bought (N = 1986, M = 4.86, SD = 3.06, range 0 – 10) and the degree to which they believed they would be

judged by the other women for the number of tickets they bought (N = 1976, M = 4.10, SD = 3.00, range 0 – 10). Correlation coefficients are shown in Table 5.5.

Table 5.5

Pearson r correlations between individual difference variables and between the individual difference variables and the dependent variables for Study 2

	Age	**MVS**	**SIC**	**House-hold income vs friends**	**Wealth vs peers**	**Discre-tionary income vs peers**	**No. Tickets purchased**	**Extent women noticed**	**Extent women judged**
Individual difference variables (N=1994)									
Age	1	-.094**	-.019	-.086**	-.032	-.024	-.055*	.037	-.003
MVS (Mate Value Scale)	-.094**	1	.030	.265**	.322**	.279**	.058*	-.016	-.036
SIC (Scale for Intrasexual Competitiveness)	-.019	.030	1	.059*	.043#	.027	.055*	.165**	.223**
Household income vs friends	-.086**	.265**	.059*	1	.643**	.586**	.010	-.024	-.027
Wealth vs peers	-.032	.322**	.043#	.643**	1	.696**	.019	-.017	-.012
Discretionary income vs peers	-.024	.279**	.027	.586**	.696**	1	.029	-.012	-.023
Dependent variables									
No. Tickets purchased	-.055*	.058*	.055*	.010	.019	.029	1	.140**	.205**
Extent other women noticed	.037	-.016	.165**	-.024	-.017	-.012	.140**	1	.713**
Extent other women judged	-.003	-.036	.223**	-.027	-.012	-.023	.205**	.713**	1

Note. MVS is the Mate Value Scale, SIC is the Scale for Intrasexual Competition

** $p \leq .001$, * $p \leq .05$, # $p \leq .01$

Correlations between age, mate value and intrasexual competitiveness have already been discussed in Part 1. Increased age was associated with a decline number of tickets purchased as well as decrease in household income compared to friends, but not wealth or discretionary income. As women reached retirement age, their income would decrease compared to *friends* who may be still working, when comparing themselves to *peers*, they are likely to have been comparing themselves to similarly retired people in the same life-stage. Higher mate value was

associated with higher reports on all three wealth measures (all *r*'s ≥ .265, all *p*'s ≤ .001) – suggesting that high mate value women do in fact find (or anticipate finding) high mate value partners and have access to more resources. Increased mate value also saw an increase in number of tickets purchased ($r = .058$, $p = .010$), and because wealthier people were not inclined to donate more, this may not be simply as a result of the increased resources.

Increased intrasexual competitiveness was not only associated with increased number of tickets bought ($r = .055$, $p = .014$), but interestingly, was the only individual difference variable associated with the degree to participants believed other women noticed ($r = .165$, $p \leq .001$), and judged ($r = .223$, $p \leq .001$) how many tickets they bought. More intrasexually competitive women rated their wealth higher compared to their friends but not their peers ($r = .059$, $p = .008$ versus $r = .043$, $p = .057$) , potentially indicating a tendency to make friends with women with fewer economic resources who are less able to withstand competitive consumption. In light of my proposed theory of resource depletion, women high on intrasexual competition would want to surround themselves with rivals who they could sabotage with their excessive expenditure – there would be little benefit to surrounding themselves with women who could easily meet their spending standards with no detrimental effects. Unsurprisingly, the three wealth measures were highly correlated (all *p*'s ≤ .001). Participants who believed the other women noticed their purchases also believed that this was done with judgement ($r = .713$, $p \leq .001$), and the positive correlation between the degree to which women believed they were being judged and the number of tickets bought ($r = .205$, $p \leq .001$) highlights that the stronger the perception of a social cost to not meeting the expectations of other women, the higher the likeliness of trying to avoid that cost by buying more tickets. Interestingly, number of tickets purchased was not correlated with any of the measures of wealth, suggesting that wealthier people were not inclined to donate more.

To investigate the impact of age on these relationships, the correlations were conducted on the data after splitting it into the three age groups used in Part 1 young adulthood: 18 – 34 years, mid-adulthood: 35 -45 years, post reproductive age: ≥ 46 years). The age by mate value relationship disappeared for the youngest ($r = -.042$, $p = .244$) and oldest age groups ($r = .003$, $p = .947$), however, was still present in the middle age group ($r = -.105$, $p = .013$) suggesting that the ten year period between 36 and 45 years represents a decline in self-perceived mate value for women as they age and presumably their physical attractiveness declines. As women then age further, their mate value seems to stabilise and likely becomes based on attributes such as achievements, accrued wealth and life experience and less based on physical attractiveness. All

other significant correlations between intrasexual competitiveness, wealth and perceived judgement remained in all three age groups. In each age group, mate value was significantly correlated with all three measures of wealth (.195 ≤ all *r*'s ≤ .362, all *p*'s ≤ .001) providing evidence that throughout their lifespan women of higher mate value do accrue greater financial resources compared to their same-aged peers.

Next, I explored the extent to which the vignette the participant read affected the dependent variables. Because the degree to which participants felt their donation was noticed and perceived judgement were so highly correlated (*r* =.713) I elected not to use both separately and chose perceived judgement as the more direct measure of a person's perception of a social cost. Two separate univariate analyses of covariances (using number of tickets bought, degree and perception of judgement as the dependent variable in each case) were used to explore the effects of an audience (x 2 audience/ no audience), presence of partners (x 2 women only/partners present) and number of tickets bought by other women at the table, which I will refer to as vignette amount (x4: low number bought by all, variable number with high mate-value woman buying the most, variable number with low mate-value woman buying the most, high number bought by all). Age, mate value and intrasexual competitiveness were modelled as covariates in the analyses.

6.2 Effect of vignette on number of tickets purchased

The ANCOVA model revealed main effects of vignette amount ($F(3, 1884) = 29.059$, $p = .001$, $\eta_p^2 = .044$), with and age ($F(1, 1884) = 6.043$, $p = .014$, $\eta_p^2 = .003$- number of tickets purchased decreased with age.). Participants viewing the high amount condition ($M = 10.265$, $SE = .270$) bought a significantly greater number of tickets than participants in the both variable conditions ($M = 3.493$, $SE = .269$ and $M = 3.803$, $SE = .271$, for the high mate-value (Carol) and low mate-value (Beth) variable conditions respectively) and in the low amount condition ($M = 2.228$, $SE = .274$). *Post hoc* simple comparisons showed all *p*'s ≤ .001 for the high condition vs the other conditions. There were no significant differences between the other levels (all *p*'s > .05).

These main effects were qualified by a two-way interaction between vignette amount and age ($F(3, 1884) = 3.700$, $p = .011$, $\eta_p^2 = .006$). The two-interaction involving a covariate (age) indicates a possible violation of the assumption of homogeneity of regression slopes As discussed in previous chapters, such a violation tends to make the significance tests of lower

order effects in the model more conservative (Glass et al 1972, Hollingsworth, 1980; although the two-way interaction itself is reliable and interpretable, Johnson, 2016). *Post hoc* means comparisons estimating the effects of vignette type at at three-ages (25 years, 40 years and 55 years) revealed that young women spent significantly more than medium age and older women in the high amount condition but not in any of the other three conditions as shown in Figure 5.5.

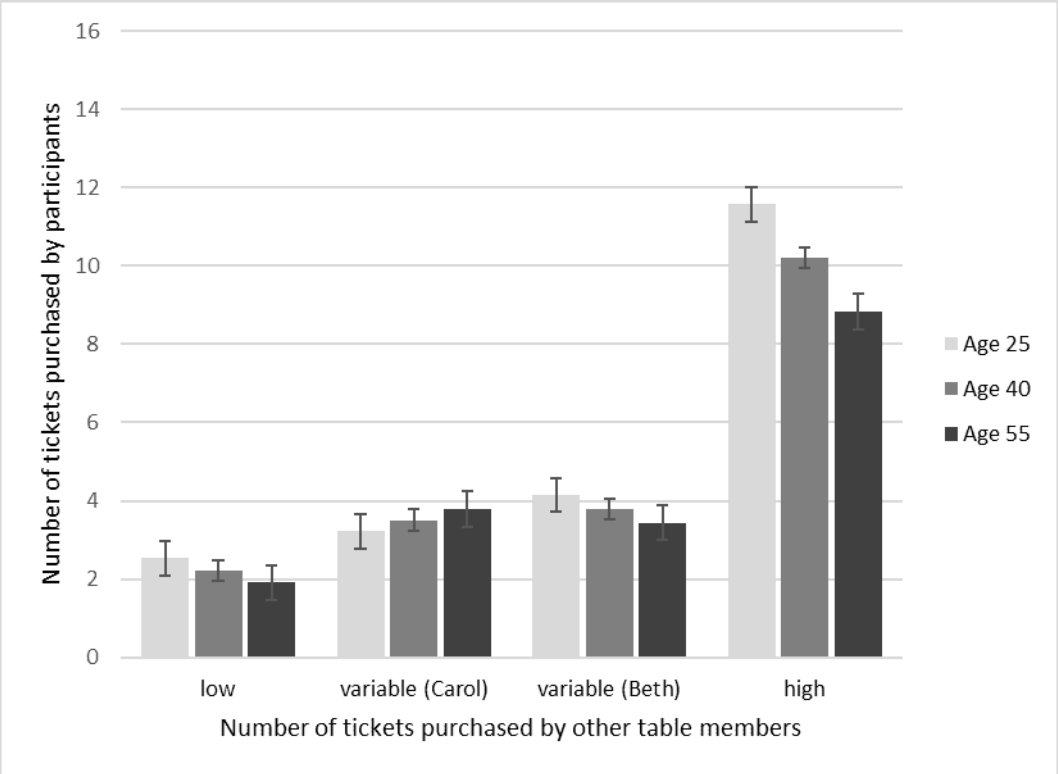

Figure 5.5. Mean number of tickets purchased by participants ± SE in response to reading the vignette in which i) all other tables members purchase a low number of tickets (one or two), ii) a variable number of tickets with Carol (high mate-value) buying 20 and everyone else buying one or two), iii) a variable number of tickets with Beth (low mate-value) buying 20 tickets and all the others buying one or two) and iv) all buying 20 tickets, using estimated marginal means at age 25 years, 40 years and 55 years
** $p \leq .001$, * $p \leq .05$, $^{\#}$ $p \leq .01$.

There was also a partner x audience two-way interaction ($F(1, 1884) = 4.845$, $p = .028$, $\eta_p^2 = .003$) qualified by a three-way partner x audience x age interaction ($F(1, 1884) = 3.997$, $p = .011$, $\eta_p^2 = .002$). Figure 5.6 shows that the presence of a partner and the absence of an audience

resulted in younger women buying more tickets, but this effect disappeared with increased age. Perhaps at the youngest age the women are looking to impress a partner either for mate acquisition or early establishment of a relationship by advertising their prosocial nature through their generosity, resulting in this increase in tickets purchased when partners are present. To rule out that this effect might be due to a larger proportion of women in this age-group being single rather than related to the mating/competition strategy specific to this age-group, an independent samples t-test was conducted on the youngest age group from Part 1 (18 – 35 years) to compare the difference in number of tickets purchased between partnered and single women. There were no significant differences between partnered (N = 220, M = 5.35 SD = 6.529) and single (N = 564, M = 5.14, SD = 7.831) participants: $t(782) = .360$, $p = .719$, two-tailed.

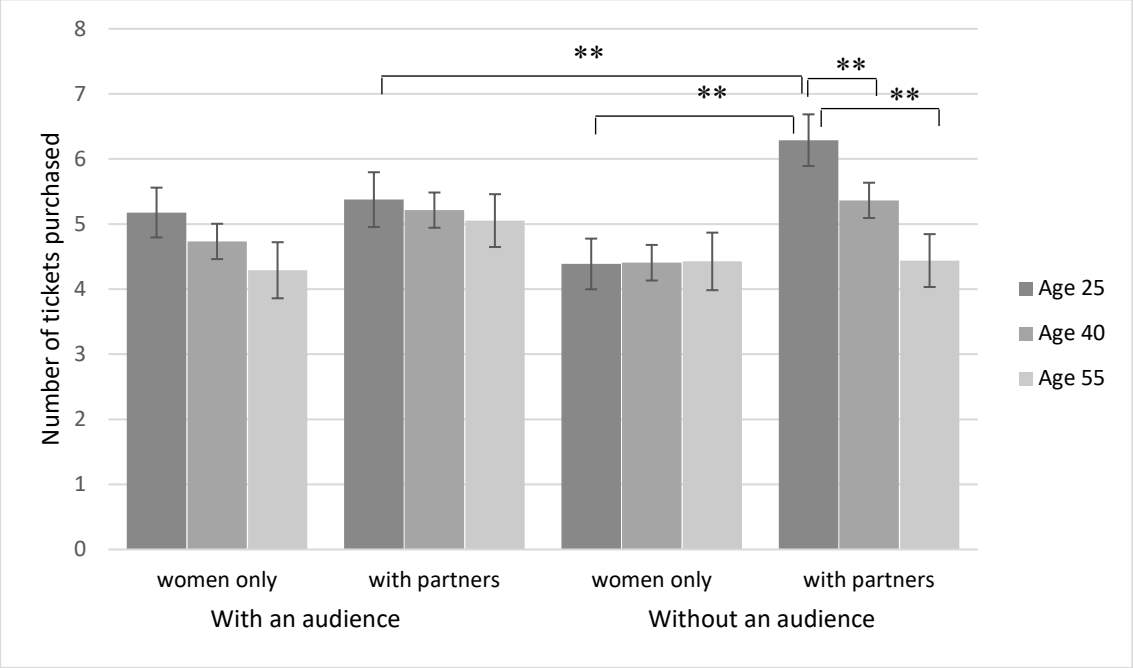

Figure 5.6. Mean number of tickets purchased by participants ± SE in response to reading the vignette in which the table was made up of women only or women with partners present, and tickets were purchased in front of an audience or without an audience, using estimated marginal means at age 25 years, 40 years and 55 years

** $p \leq .001$.

In the women-only scenario, when there was an audience present, young women bought more tickets than the older women. However, there were no differences in ticket purchases

across the age groups in the women-only, suggesting that age effects on the number of tickets purchased were entirely attributable to the audience present.

6.3 Effect of perception of judgement on number of tickets purchased

As with number of tickets purchased, participants' perceptions of judgment were significantly affected by the scenario presented in the vignette, ($F(3, 1905) = 13.765$, $p \leq .001$, $\eta_p^2 = .021$). When the vignette described all other women purchasing a higher number of tickets, participants reported higher levels of perceived judgement than in response to vignettes describing low or variable numbers of tickets purchased (all p's $\leq .001$ for follow up simple comparisons). There were no significant differences between other three scenarios (all p's $> .099$). The main effect of vignette amount was qualified by a two-way interaction between vignette amount and age which approached significance, ($F(3, 1905) = 2.600$, $p = .051$, $\eta_p^2 = .004$). *Post hoc* examinations of the effect of vignette amount estimated at ages 25 years, 40 years and 55 years revealed that at all age levels participants perceived significantly higher levels of judgement in the high amount condition but this effect was greater for younger women where levels of perceived judgement were significantly higher ($p < .001$, $\eta_p^2 = .057$) than for women at at 55 years ($p < .001$, $\eta_p^2 = .022$).). There were no significant differences between age groups in the low or variable conditions.

There was also an audience x age interaction ($F(1, 1905) = 8.900$, $p = .003$, $\eta_p^2 = .005$) and an audience by mate value interaction ($F(1, 1905) = 4.102$, $p = .043$, $\eta_p^2 = .002$), qualified by a three-way mate value, audience and age interaction ($F(3, 1905) = 3.882$, $p = .049$, $\eta_p^2 = .002$). The three-way interaction was probed by examining estimated marginal means at low medium and high mate values at 25 years, 40 years and 55 years. At the two older ages there was a significant effect of audience at all levels of mate value, with the presence of an audience resulting in an increased perception of judgement. For younger women of low and medium mate value the audience effect was not significant, but at high mate value followed a similar pattern as for older women, as shown in Figure 5.7.

There was a significant main effect of intrasexual competitiveness ($F(1, 1905) = 8.645$, $p = .003$, $\eta_p^2 = .005$) confirming that as intrasexual competitiveness increased participants perceived higher levels of judgement from other women at the table. Given that highly intrasexually competitive women may be more judgemental of other women, and view their interactions with other women through a lens of competition, this increased perception of

judgement may be a projection of their own tendencies to judge others, or they might just be more sensitive to judgement.

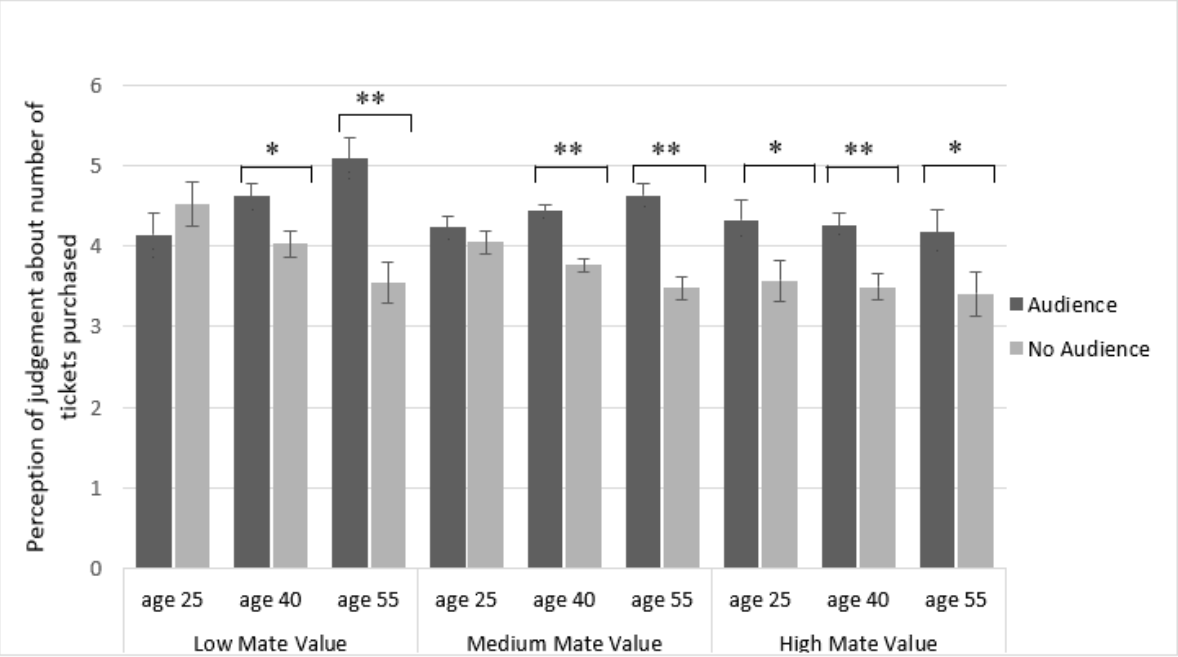

Figure 5.7. Mean perception of judgement about the number of tickets purchased ± SE in front of an audience or without an audience, with increasing mate value using estimated marginal means at age 25 years, 40 years and 55 years

** $p \leq .001$, * $p \leq .05$.

6.4 Summary of main findings in Part 2

Pearson's correlations showed that number of raffle tickets purchased by the participants increased with increased mate value, intrasexual competitiveness, perception of judgement and the degree to which participants believed the other women noticed how many tickets they bought. Number of tickets decreased with increased age. Highly competitive women believed that other women noticed to a greater extent than less competitive women, and their perception of judgement was higher The significant main effect of intrasexual competitiveness in the ANCOVA model confirmed that as intrasexual competitiveness increased participants perceived higher levels of judgement from other women at the table.

In terms of the effect of the vignette on numbers of tickets purchased: participants viewing the vignette in which all other women bought a high number of tickets purchased a

significantly greater number of tickets than participants in all other conditions (which did not differ between them). Young women spent significantly more than medium age and older women in the high amount condition but not in any of the other three conditions. Overall, there was an audience effect resulting in the purchase of more tickets with an audience than without, except that the presence of a partner and absence of an audience resulted in younger women buying more tickets, but this effect disappeared with increased age.

At all ages participants reported significantly higher levels of social judgement when responding to the high amount scenario but this was greatest for younger women, while the effect of age was not significant for participants who viewed the low amount or variable amounts conditions. The presence of an audience interacted with mate value such that at 40 years and 55 years, at all levels of mate value, the presence of an audience resulted in an increased perception of judgement. For younger women of low and medium mate value the audience effect was not significant, but at high mate value followed a similar pattern as for older women.

7. Discussion

In this study I adopted a vignette methodology to investigate how intrasexual competitiveness predicts spending at a charity function when there was an audience present or not, when they were with their partner or only women peers, and when the number of tickets purchased by the other women varied. I investigated the extent that participants believed they were being judged by the other women to identify the perception of a social cost to not spending, as well as exploring the effects of age and mate value as before. I predicted that highly intrasexually competitive women will be more likely to spend more money on charitable donations, especially when an audience is present. Women who perceive that they will be judged by peers are expected to spend more when their peers spend more. When there is no audience, women will spend less. Findings were consistent with predications to the extent that intrasexual competitiveness and perception of judgement were positively associated with each other and with the amount of money spent. When other women spent larger amounts of money, women were induced to spend more too. The presence of an audience resulted in an increased perception of judgement as women got older. For younger women of low and medium mate value the audience effect was not significant, but at high mate value followed a similar pattern as for older women.

Charity giving and intrasexual competition

Study 2 examined the extent to which giving to charity was an act competitive conspicuous consumption. The amount participants spent without the promise of getting anything in return, is highly dependent on how much the women around them spend. As expected, women purchased more tickets when other women could see their purchase, and when the women around them also purchased a high number of tickets. When there is no audience, women will spend less, (with a description of one exception to follow), suggests that giving to charity is an intrasexual competitiveness strategy which signals women's perception of social standards and their ability maintain them, as well as their superiority to rivals. Given that it's not clear what benefit arises to women by simply signalling their wealth and status to other women, who are already paired up, these purchases are ultimately motivated to drive other women to consume and to deplete their resources. In this scenario the "raffle" vignette did not describe any prize to be won to ensure that this was not the motivation for the purchase of a greater number of tickets, and no description of the type of charity association was given to minimise the emotional connection participants might have with different causes, thereby reducing the prosocial effect.

This study confirmed that charity giving represented an intrasexually competitive scenario for women too. Women who were higher in intrasexual competitiveness bought more tickets. They also perceived they were being noticed to a greater extent and believed they were being judged more. The greater perception of judgement by highly competitive women may be a projection of their own judgemental tendencies towards imagined rivals. The other interesting finding was that highly intrasexually competitive women rate their friends as being less wealthy than them but not their peers in general, indicating that when choice is involved they surround themselves with women who represent less of a threat and form social alliances with them. This finding supports our theory of rival resource depletion. More competitive women surround themselves with friends whose resources they can manipulate into being squandered, and who don't have the capacity to drive their resources into the ground.

The number of raffle tickets purchased by the participants increased with increased mate value. This mirrors the findings in Study 1 of likeliness to spend on a kitchen, outfit and makeup all increasing with mate value. Mate value was associated with greater wealth (at all ages), with women rating their household income compared to friends, their wealth compared to peers and their discretionary income all as being higher as their mate value increased. Interestingly though, number of tickets bought did not increase with increased wealth (wealthier women were not found to be more generous did not purchase more tickets). This implies that mate value

influences spending directly, not just indirectly through increased wealth. Greater competitive spending as higher mate value women is also consistent with our theory of conspicuous consumption as a form of competitive resource depletion. Women occupying higher rungs on the mate value ladder will have wealthier mate quality peers, regardless of their personal wealth. To maintain such a position in the hierarchy, therefore, greater competitive spending would be required, whether the focal individual is a highly competitive woman looking to set a standard, or a less competitive woman looking to work out how well she can meet the standard set by her more competitive peers.

Effect of age

Consistent with Study 1, spending decreased with increased age. Older women were less affected by what others at their table were spending, spending less than younger women did in the scenario where all the others at their table bought a high number of tickets. The number of tickets purchased by older women were also less affected by the presence of partners. Compared to younger women (who were the most affected by the presence of male partners) and middle-aged women, who I theorise are most prone to competitive consumption, older women appeared the least motivated to use the donation as a signalling tool at all. Quite paradoxically then, older women of low mate value perceived the most judgement of their purchase coming from the audience of any participant group. But unlike younger women, this perceived judgement did not induce them to buy more tickets. Low mate value older women probably represent the most powerless group in the female hierarchy. They have neither youth nor beauty, and their access to resources may be limited by the quality of partner they were able to attract. Hence conspicuous consumption is unlikely to be a competitive technique they can afford to participate in. However, their perception of judgement suggests that they are aware of the social standards being applied and the negative cost of not being able to meet those standards. Whether this awareness would predict other competitive or defensive responses (such as being likely to deride the charity's integrity to offset the judgment, for example) not measured in the current study is unclear. Whether and how intrasexual competition manifests between older women generally is poorly understood, and so future research has much to consider in this space.

Effect of an audience

In one exception to the general trend that the presence of a female audience increased the number of tickets bought, younger women bought the most tickets when in the presence of a partner and the absence of a female audience. Perhaps at the youngest age the women are looking to impress a partner with their generosity and kindness ((Buss, 1988; Li et al., 2013)

either for mate acquisition or early establishment of a relationship by advertising their prosocial nature through their generosity, resulting in this increase in tickets purchased when partners are present. Perhaps they felt that when there was also an audience present this might be interpreted by their partner as boasting or virtue-signalling and have a negative effect instead, so this only occurred in the partner but no audience scenario. Partnered and single young women did not differ in the amount they spent in this scenario, disconfirming the possibility that single women might be optimistically projecting how generously they might behave in front of a fantasy partner.

General comments

The high number of participants involved in this study make it substantially larger than most female intrasexual competitiveness studies allowing for the observation of small but significant effects. Given how complex the balance between mate attraction and retention, competing with rivals and ensuring same-sex social alliances is, women would need to have evolved many different strategies and need the flexibility to select and use the most advantageous ones in any particular situation. The findings in both parts of this study show just how sophisticated these mechanisms are with women intrinsically knowing their mate value and the need to spend in order to maintain the status associated with a high mate value or put up with the social cost of not keeping up if their mate value is low and their resources limited, weighing up social costs vs benefits. Whether an audience is present or not matters, and whether you are prioritising mate attraction over competition also matters. While I did not find the sex of the children to affect the spending, I did find differences in strategy between women with and without children – with women who have children rating their likeliness to spend in a competitive scenario as higher than women who did not have children. Women without children might be expected to have fewer financial commitments and more to spend, so the finding that mothers spend more in competitive scenarios suggests that there is some perceived intrasexually competitive benefit to be gained by spending.

The relationship between mate value and age found in this study provides the springboard for another area of future research, if women's mate value is fairly stable before 35, when youth and attractiveness are at their peak, declines between about 35 and 45 years with aging and the loss of physical attractiveness, but then restabilises afterwards, it would be very interesting to investigate what contributes to a post-reproductive aged woman's mate value. Female intrasexual competitiveness was traditionally less well understood than male intrasexual competitiveness and that situation is now being rectified, but in psychological studies (where

female participants are often university students with a mean age in their early twenties), less is known about older women. This study provides evidence that older women do not compete in the same way as younger women even though they still perceived social judgement, they were less disposed to respond to it.

In this study women were found to use spending at a charity event as an intrasexual competitiveness strategy. I propose this spending serves as a competitor manipulation strategy by socially compelling resource depletion in rivals. Intrasexual competitiveness and perception of judgement were positively associated with each other and with the amount of money spent, acknowledging that women perceived there to be social standards being set, which they avoided not meeting by increased spending (except for older women, who were not induced to spend more in spite of acknowledging social judgement). More competitive women reported having friends with less wealth, enabling them to induce resource depletion in their closest rivals without risking being outspent. Increased wealth was not associated with increased generosity.

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Chapter 6: General Discussion

People have evolved highly complex strategies to solve problems around maximising quality mate acquisition and relative reproductive success. Mechanisms of intrasexual competition central to these goals. Fisher (2011) identified four strategies of intrasexual competition that women use: self-promotion, derogation, competitor manipulation and mate manipulation. This thesis aimed to explore how intrasexual competitiveness strategies manifest in four modern-day contexts – the use of makeup, hairdressing salons, social media, and conspicuous consumption. I was also interested in how tactics of intrasexual competition were used depending on the relative difference in mate-quality between competitors. In this chapter I discuss all of my findings in more detail.

6.1 Key Findings

Makeup, Ovulation and Intrasexual Competitiveness

In Chapter 2 I explored how make up and ovulation status affect judgements of female faces on physical attractiveness, flirtatiousness, date-ability, trustworthiness, friendliness, conscientiousness, parenting ability, and overall attractiveness, and how these ratings are affected by the sex, mate value, and intrasexual competitiveness of the assessor. In general, makeup enhanced perceptions of physical attractiveness by female participants in agreement with prior findings (Cash, Dawson, Davis, Bowen, & Galumbeck, 1989; Etcoff, Stock, Haley, Vickery, & House, 2011; Russell, 2003) except for highly intrasexually competitive female participants – see later discussion). But this was not uniformly the case for men. Only highly intrasexually competitive men judged female faces with makeup to be more attractive. Most men rated bare-faces more favourably. From an adaptive perspective, makeup masks or otherwise obfuscates female facial signals of health and fertility, thereby misrepresenting a woman's genetic quality to a potential mate. A male aversion to made-up female faces, could reflect an aversion to an adornment that turns a female face into an unreliable indicator of male value.

Preferences for made-up female faces by highly intrasexually competitive men may be as a result of the perceived positive relationship between unrestricted sociosexuality and makeup (Aguinaldo & Peissig, 2021; Batres et al., 2018). Such men may be more inclined than other men to assess potential partners for short-term relationships and so perceive the use of makeup by a woman favourably, as a signal of potential sexual availability. Alternatively, highly

competitive men might be seeking partners who wear a lot of make-up. More intrasexually competitive women tend to wear more make-up (Wagstaff & Sulikowski, 2022) and tend to view make-up as a signal of aggression (Sulikowski et al., 2022). It may be that higher intrasexually competitive men, seek highly intrasexually competitive women as partners and use behavioural cues of female competitiveness to guide them to such women. If this is the case, then further theoretical and empirical work would be needed to understand the functional relevance of this preference.

Most men don't prefer made-up female faces but most women regard makeup as appearance-enhancing. This lends weight to theories that most women use makeup more as a tool of intrasexual competitive, than as a mate attraction tactic. Further, women low on intrasexual competitiveness rated female faces with makeup as more attractive, but the effect of make-up on perceived attractiveness decreased with increasing competitive intent. Highly competitive women rated bare-faces and made-up faces as equally attractive on average. Faces with makeup are judged to be more interpersonally aggressive (if they are attractive, Sulikowski et al., 2022); more dominant and elicit more jealousy (Mileva, Jones, Russell, & Little, 2016). Perhaps an increase in jealousy in highly competitive women, incited by other women wearing makeup, causes these highly competitive women to derogate other women wearing makeup, leading to lower attractiveness scores. Whether these lower attractiveness scores were given in spite of highly competitive women perceiving made-up female faces as just as attractive as other women perceived them to be (conscious derogation), or whether these scores do reflect lower perceived attractiveness per se (unconscious derogation), is not entirely clear from the current data. This makeup–intrasexual competitiveness relationship was only observed when highly competitive women rated physical attractiveness, not when they rated any of the seven other attributes. This could imply unconscious derogation, as conscious derogation in response to make-up may be expected to apply across all ratings given.

Results from studies on the effect of attractiveness with ovulation vary to some extent with the method of determining ovulation accurately (see Section 6.4 Consideration of Limitations), however we expected to find that ovulating faces would be judged to be more attractive than non-fertile faces by both men and women in the barefaced condition. We theorised that if make-up masked the cues to ovulation then this same difference would not be seen in the makeup condition. Contrary to what was predicted, women and men both rated non-fertile faces as more physically attractive than fertile faces when the faces were bare. But there was no difference in women's ratings of fertile and non-fertile faces when the faces were made-

up (as predicted). However, for men, application of makeup resulted in fertile faces being judged to be significantly *more* attractive than non-fertile faces. From these results it is evident that makeup does alter the impact of fertility-related facial cues on physical attractiveness for both men and women, and that makeup application enhanced perceptions of physical attractiveness in ovulating faces (women went from preferring bare faces to rating ovulating faces with makeup as equal, and men from equal ratings for bare and made-up faces to preferring made-up faces). We did not find any differences in perceptions of attractiveness with fertility that were affected by the intrasexual competitiveness of the participant, potentially indicating that highly competitive people are not more perceptive to visual cues of ovulation than anyone else.

That physical attractiveness was lower in the images taken at ovulation, compared to non-fertile images, challenges theories suggesting that individual women's attractiveness positively covaries with fertility. However, this challenge is somewhat confounded by the observation that **overall** attractiveness was linked to fertility in the direction predicted: in general ovulating photos were judged to be more attractive overall than non-fertile photos and this effect was not mediated by either sex of the rater or makeup. The attractiveness percept has different aspects to it that are differentiable (Sulikowski, Burke, Havlíček, & Roberts, 2015), and maybe the fact that participants rated all these things at once encouraged a differentiation of different aspects of "attractiveness" that doesn't happen in other studies where only basic "attractiveness" is rated – maybe that's why "overall attractiveness" showed the predicted effects of fertility, but physical attractiveness didn't?

When assessing the other characteristics, ratings on overall attractiveness, flirtatiousness, and desire to date most closely resembled physical attractiveness. Women rated faces with makeup higher on these three traits, than faces without makeup. This in line with prior findings that women wearing makeup are judged by other women to be more attractive to men and more promiscuous (Mileva et al., 2016). Men of low to medium levels of intrasexual competitiveness rated bare-faces higher on overall attractiveness than faces with makeup. Highly competitive men, though, perceived the made-up faces as higher on overall attractiveness, more flirtatious and as more desirable to date (again potentially as a miscue for high socio-sexuality) (Aguinaldo & Peissig, 2021; Batres et al., 2018). The similarity in findings across the ratings of physical attractiveness, overall attractiveness, and desire to date is in line with theory and past findings that physical attractiveness is one of the key mate selection criteria that men look for in women (Buss, 1989; Shackelford, Schmitt, & Buss, 2005; Williams & Sulikowski, 2020).

Overall, findings that makeup generally enhances attractiveness of female faces for most women (except when highly competitive women rate physical attractiveness but nothing else), but not for most men (except highly intrasexually competitive men) suggests that makeup serves an intrasexual signalling function targeted at other women. This signal, whatever purpose it may be serving, might even be costly to women in terms of mate attraction since most men reported perceiving the bare faces as more attractive than the made up ones. Makeup had the most effect on judgements of physical attractiveness for women who were low on intrasexual competitiveness. Such women may be more susceptible to yielding to social dominance signals. Make-up as a signal of social dominance and aggression was also implied by Sulikowski et al (2022, study 1). From this perspective, makeup would be most effective as a downward competitive strategy, serving to maintain the higher status of more competitive or higher mate value women, and reinforcing existing strata.

From the first study it became clear that assessments of qualities in a same-sex rivals are influenced to a great extent by characteristics of the assessor, particularly their own mate value and intrasexual competitiveness. It was also evident that women sometimes prioritise intrasexual competition over mate attraction, in that they spent vast amounts of money and time to perfect makeup when men prefer bare faces, in order to accrue benefits of dominance and status maintenance over other women. In terms of the four strategies of intrasexual competitiveness (Fisher & Cox, 2011) makeup wearing seems to be less about self-promotion (especially self-promotion towards a potential mate) and more about competitor manipulation. By wearing makeup and signalling social status and dominance, high mate value women can effectively intimidate potential rivals into believing they would never win a competition for a mate, resulting in them withdrawing to conserve their energy and resources on intrasexual competitions they might win. Our previous work on implicit and explicit compromises in mate selection (Williams & Sulikowski, 2020) highlights that women subconsciously adjust their preferences in line with mates they believe are achievable, making them susceptible from withdrawing from competing for high mate value mates in a situation where they are manipulated into lowering their own mate value (or into incorrectly perceiving their mate value to be lower than it is).

Instagram and intrasexual competition

In Chapter 3 I explored the photo-sharing social media platform, Instagram, as a vector for female intrasexual competition. Given the ability to self-promote by carefully curating and filtering photos, I was interested in exploring the extent to which intrasexual competitiveness

affected the number and types of photos posted on Instagram. For women, when rating the hypothetical photos in the first part of the study, as intrasexual competitiveness increased they were less likely to "like"/acknowledge another woman's photo of herself, but more likely to post a solo-appearance-related photo of their own. In contrast, while women of high mate value were also more likely to post an appearance-related photo than those of lower mate value (probably because they rate their physical attractiveness higher than low mate value women do), they were also more likely to comment on other women's attractiveness photos. High mate value women may be most able to afford to highlight another woman's attractiveness, since they may be just as attractive, or even more attractive than most rivals. They may also have the most to gain by consolidating advantageous alliances, with other high mate value women.

There were no such connections between mate value or intrasexual competitiveness and behaviour related to hypothetical appearance-related photos for men. Physical appearance is less important as a mate-attraction criterion for men, and thus not as important a feature for them to signal to either potential mates or potential competitors. When comparing likeliness to post photos from different categories, men (in both the hypothetical and actual studies) were more likely than women to post photos of luxury products (mostly their cars and motor bikes), highlighting their material resources. This reflects female mate preferences. Of all the categories of photos, the biggest sex-difference was in the likelihood of posting solo-appearance photos, with women doing this to a much greater extent than men. This reflects the dual importance of physical appearance to women, as a female intrasexual competition strategy and a mate attraction strategy. Collectively, the male and female findings strongly support the use of Instagram by both sexes, as a mechanism for mate attraction and intrasexual competition.

Both mate value and intrasexual competitiveness impacted how many photos women posted in total from all categories. Lower mate value was associated with posting more photos and for these women, the number of photos posted increased with increasing intrasexual competitiveness. The ability to curate and filter photos may allow lower mate value women to artificially increase their perceived mate value online, engaging is more effective self-promotion online than perhaps they are able to offline. If such women are also highly intrasexually competitive, then they would be expected to be even more motivated to do this more than women who are less competitive. Perhaps the ability to curate only certain aspects of one's life and use filters to enhance appearance images gives low mate value women the opportunity to artificially increase their perceived mate value, thereby lessening the gap between high and low

mate value women. Low intrasexually competitive women may not be motivated to do this to the same extent.

For high mate value women though, higher intrasexual competitiveness actually predicted a decrease in the number of photos posted on Instagram. Applying the above argument to this finding: perhaps women who are already very physically attractive, have less to gain in terms of the opportunities for image manipulation offered by a highly curated, filtered Instagram feed. These women may engage in just as much self-promotion as low mate value women, but may do relatively more of this offline. While online self-promotion can be effective, reproductive success depends on the offline attraction of mates in the real world, and the offline outcompeting of rivals. So online self-promotion that ultimately can't be matched by offline presentation can only go so far in reaching these goals. For high mate value women, where the attractiveness gain is less, spending time promoting yourself in the virtual world instead of the real world may not be as appealing.

Social comparison orientation and social media engagement (Lee, Lee, Choi, Kim, & Han, 2014; Sherlock & Wagstaff, 2019) are positively associated. Research also suggests that women reduce their self-perceived mate value when exposed to highly attractive same-sex rivals (Fink, Klappauf, Brewer, & Shackelford, 2014; Vaillancourt & Sharma, 2011). These observations collectively suggest that women consuming highly filtered images of same-sex "friends" on their social media feeds may be induced to adjust their own self-perceived mate value, calibrating it downwards in line with what they are seeing. In addition, studies showing that women "stalk" other women on social media in a form of social knowledge acquisition (McAndrew & Jeong, 2012) suggests that women are posting images knowing they are likely to be seen by same-sex rivals. Overall, these findings provide strong evidence for the use of social media as a platform for intrasexual competitiveness in women. Mate value interacts with intrasexual competitiveness to suggest that those women who have the most to gain by manipulating their reality through filters and careful selection of how they represent their lives are the ones who post more photos on Instagram. To my knowledge, this was the first Instagram study which analysed the actual Instagram feeds of consenting participants (feeds for three months prior to their completion of the electronic survey), in addition to measuring their responses to a hypothetical Instagram feed. A study like this has much higher ecological validity than a study based on hypothetical images. However, there were several similarities between the two studies: higher intrasexual competitiveness in women was related to an increased likelihood of posting in general, both when responding to the hypothetical scenario and in reality (although

because the number of real-life appearance photos was generally small and highly variable between participants we did not find that women's actual number of appearance-related photos on their own increased with intrasexual competitiveness).Women were also more likely than men to post an appearance-related photo and men were more likely to post a photo of luxury items across both studies. Hence, hypothetical Instagram studies are valuable tools for finding out about real Instagram behaviour.

In terms of personality, participants consenting to the analysis of their Instagram feed were lower on Honesty/Humility than those who did not consent. Such participants may have been less troubled for the likely-distorted and excessively favourable images portrayed on their Instagram account to reflect them, and be paired with their survey data. They may also have been more likely to believe that their Instagram did reflect them accurately. People higher on honesty/humility may have been more hesitant to permit their Instagram account to represent their reality. Even though there were some systematic differences between who did and did not give permission for the second part of the study, there was still a good spread of mate value and competition across the second sample and so good reason to trust the concordance of findings across both parts of this study.

Sabotage at the Salon?

In Chapter 4, I examined the effect of intrasexual competitiveness in the context of a hairdressing salon, to create a scenario in which appearance advice is readily sought, offered, and taken. Participants (firstly men and women from the general public and then women who were professional hairdressers and aestheticians working in the beauty industry) played the role of the hairdresser. They advised hypothetical female salon clients how much hair they ought to have cut-off, under a number of experimentally manipulated conditions, including whether or not the client was depicted wearing make-up. Disingenuous appearance advice may be an effective competitor manipulation tactic if the advice results in a decrease in a same-sex rival's actual or self-perceived attractiveness (Fisher & Cox, 2011).

For female participants, their own intrasexual competitiveness and mate value positively predicted how much hair they recommended the female client cut-off. But for men there were no main effects for these factors – suggesting an intrasexually competitive motive in this task for female participants only. Men and women also differed in which conditions of the experiment caused them to cut-off the most amount of hair. Female participants cut more hair from more attractive clients, than from clients of low to medium attractiveness. The effect of client

attractiveness was greatest for clients whose hair was in good condition and who requested the minimum amount cut off. This represents the condition under which the greatest sabotage could occur and concurs with our previous findings (Sulikowski et al., in prep). For men, in both good and poor hair conditions more hair was cut from highly attractive clients than from clients of either medium or low attractiveness (which did not differ). This effect was exacerbated by the client wearing makeup.

For female participants from the general public and for aestheticians intrasexual competitiveness positively predicted, the amount of hair they recommended be cut off. The one exception to this pattern was observed for aesthetician participants only when the client was highly attractive and the aesthetician self-reported being of low mate value themselves (i.e., likely to be less physically attractive). In this one circumstance, the aesthetician's intrasexual competitiveness was negatively associated with how much hair they cut off. One explanation is that the upward competition would be attempting to bridge too large gap. The low mate value aesthetician may have more to gain by forming an alliance with a high mate value client instead. Also, if there is too big a difference in physical attractiveness between the client and the hairdresser a bad haircut is unlikely to have a drastic enough effect of lowering her mate value too much, and given that these two women are unlikely to be competing for the same pool of men, it might be advantageous for the hairdresser to keep a high mate value woman well out of her "hunting ground".

When the relative attractiveness ratings were analysed (to reveal how participants responded to clients they perceived as more attractive, less attractive, or of similar attractiveness to themselves) increased intrasexual competitiveness was associated with more hair cut from the clients who participants rated as being "the same attractiveness as me" (not the "more attractive than me" or the "less attractive than me" groups). This result provides strong evidence for within-stratum intrasexual competition. Given the small difference one bad haircut would make, it is likely to give temporary advantage only over women who are relatively close in physical attractiveness. The finding of overall more hair cut from the high attractiveness group may be because this sample of women considered themselves to be of higher attractiveness than average, and they were in fact targeting women of equivalent attractiveness. In the hairdressers' study, where the women were asked to rate how attractive they considered themselves to be, they rated themselves as above average attractiveness overall, lending weight to this explanation.

The use of makeup had the biggest differential effect between women in the general public and aestheticians. In the general population low and medium mate value women cut less hair off clients who wearing makeup, while high mate value women did not. Given the effects of makeup on dominance perception, perhaps made-up clients were perceived as riskier to sabotage, especially by lower mate value participants. Low mate value participants would be more likely to have lower overall social standing (Rahal, Fales, Haselton, Slavich, & Robles, 2021) and so may be poorly placed to resist any negative social consequences that retaliation from a socially dominant woman involve. More simplistically, women wearing makeup are perceived by other women as more attractive than barefaced women, so low and medium mate value women might simply choose not to sabotage them as the gap in attractiveness and mate value would be too far for this type of competitor sabotage to bridge. The interesting finding was that this was not true for hairdressers and aestheticians, for whom makeup showed no main effect. People working in the beauty industry would likely be more experienced with application of makeup and very likely wear it every day to work. In many cases the aestheticians/hairdressers were also qualified makeup artists. This may result in women wearing makeup being the norm for them, reducing its intimidatory effects. Another intriguing possibility is the aestheticians may have been much more likely to actually have been wearing make-up while completing the study. It may be that make-up is a more intimidating signal for women who aren't also wearing it at the time. The current data can't support or refute this possibility, but it would be an interesting one for future studies to address.

Findings from Chapter 2 and Chapter 4 concur that low and medium mate value women are most affected/intimidated/impressed by makeup. Their perception of women wearing makeup as more attractive/dominant may be exploited by higher mate value women as an effective downward competitive strategy for maintaining their superiority. Such a strategy would be less likely to function well as a within-stratum strategy, because high mate value, highly competitive women appear not to be as susceptible to the appearance-enhancing effect of makeup.

Conspicuous Consumption

The fourth modern context explored was how women might spend money on highly visible, luxury items to compete with other women in various social situations. I was interested to know whether women are influenced by other women's spending and the perceived social cost of not spending. Conspicuous consumption might be a mate-retention strategy, used at a stage in their life when women had aged beyond being able to self-promote through appearance

alone. Displaying luxury items confirms a women's high status and signals her partner's devotion to her, to other women (Wang & Griskevicius, 2014). This sends the message that mate-poaching would be a fruitless endeavour.

I theorised that conspicuous consumption may also be a strategy for inducing rivals to expend their resources to "keep up", thereby reducing resources available to their offspring or future off-spring. When presented with a social situation involving women of approximately the same age and socio-economic level, who were not necessarily friends, women who were more intrasexually competitive were more likely to want to spend money on renovating their kitchen, buying a new outfit, and buying makeup in anticipation of the event. The family-only comparison event incited less intrasexual competition (as evidenced by wanting to spend less on a kitchen), especially for mothers between 35 and 45 years of age (the prime target group of these vignettes). It also induced less spending than the other events.

Spending on all three items (new kitchen, new dress, and makeup) also increased with mate value. In this sample, mate value and intrasexual competitiveness were not correlated, so this finding suggested a unique effect of mate value on conspicuous consumption. High mate value women would be expected to secure high mate value partners (who typically come with ample resources), making greater spending less of a cost to them. High mate value women may also feel additional pressure to maintain their superior social standing within their mate value stratum through their actions and display of status. This would result in greater spending when faced with a scenario in which they anticipated social comparison to take place.

The effects of age confirmed that conspicuous consumption was functioning in different ways across the female life span. Overall, increased age was associated with lower mate value, as anticipated. Female mate value is largely dependent on physical attractiveness signal reproductive fitness, which naturally decreases with age (Mathes, Brennan, Haugen,& Price, 1985). However, when the women were grouped based on their life-stage we found that within each life stage different relationships existed with mate value. In the early adulthood (18 years to 34 years) group mate value did not change with age, likely because physical attractiveness does not decrease substantially while women remain fecund. In the mid-adulthood group (35 to 45 years), we did see a decline in mate value with age, suggesting that the physical attractiveness of women declines between 35 and 45 years of age. Many women at 35 are still actively producing viable offspring, while fecundity is markedly reduced at 45 years. Once women passed 45 years of age, there was stabilisation of mate value with no further reductions with age.

At different life-stages women were expected to have different mating/competitive motivations, requiring different strategies. In the early adulthood-group more women were single and less than a third of them had children. Single women would likely be involved in mate attraction and relationship establishment (and any intrasexual competitive strategies associated with promoting these goals), followed by mate-guarding (as many other women of their age would still be single). In the middle age-group, where most women have partnered, mate attraction ought to be less of a focus. Two-thirds of the women had young children, with high demands of care, and so access to adequate resources is particularly important. Shared emotional and practical parental responsibility would make mate retention important too. After the age of 45 years when women have aged beyond advertising their reproductive value it may be that they start basing their self-perceived mate value on other attributes like accomplishments and life-experiences, so fields of competition change, and intrasexual competitiveness becomes focused on mate/resource retention rather than mate attraction and finding other measures of personal value than how they look.

In the second part of the study we confirmed that giving to charity was an act of conspicuous consumption and women were induced to spend more when their peers spent more, as well as when there was an audience of other women watching them. Spending also increased with intrasexual competitiveness and the perception of being judged by how much you spent. Taken together, this suggests that public giving to charity is an intrasexual competitiveness strategy which signals high status and coerces rivals into spending to maintain social standards.

Continuing to demonstrate the importance of mate value that became apparent in all of the previous three studies, the number of raffle tickets purchased by the participants increased with increased mate value. This mirrors the findings in the earlier study where likeliness to spend on a kitchen, outfit, and makeup all also increased with mate value. Mate value was associated with greater wealth (at all ages). Participants rated their household income compared to friends, their wealth compared to peers, and their discretionary income all as being higher as their mate value increased. Interestingly though, number of tickets bought did not increase with increased wealth (wealthier women were not found to purchase more tickets). This supports the interpretation that mate value itself directly affects spending as high mate value women signal and maintain their high status by conspicuously spending, setting a standard for rivals to try and meet.

Also, consistent with the findings from the earlier study, spending decreased with increased age. Older women were less affected by what others at their table were spending, as they spent much less in the scenario where all the others at their table spent a high amount than did the younger women (who spent the highest in this scenario). The number of tickets purchased by older women was also less affected by the presence of partners or the presence of an audience. In terms of perceived judgement from the other women, low mate value, older women, perceived the most judgement from their peers when the other women at their table could see what they were spending. However, as can be seen from above, this did not induce them to buy more tickets.

6. 2 General remarks

At the beginning of this program of research, I measured mate value using both the MVI (Kirsner, Figueredo, & Jacobs, 2003) and MVS (Edlund & Sagarin, 2014), and found that the MVS tended to exhibit more robust predictive relationships effects with the other variables I was investigating. The fact that the MVI was unweighted by opposite-sex mate preferences and simply aggregated self-perceived scores on traits that we know are not equivalently valued (and certainly not equivalently valued by the two sexes) made me concerned that it may not be capturing mate value accurately (Williams & Sulikowski, 2020). The MVS is a global measure which asks participants to rate their self-perceived value as a potential partner. People have evolved to know where they stand compared to same-sex rivals by implicitly rating their own strengths and weaknesses on important mate-selection criteria. In the last two studies, I only used the MVS as my measure of mate value to decrease the length of the printed and online survey. Correlations with age and self-rated attractiveness in the expected directions suggest that this was indeed measuring mate value as I was interested in defining it for the purposes of my research.

Across the four studies I was able to identify that upward competition, same-strata competition, and downward competition all take place, as well as global competition, not targeted at any particular rivals. What I observed was that mate value and intrasexual competitiveness are not strongly correlated, if at all, and represent two independent characteristics affecting resource acquisition and reproductive success. But the combination of both results in women needing to adopt different strategies – high mate value, low competitiveness women compete passively and would require few strategies other than broadly displaying their superiority via self-promotion. High mate value highly competitive women, have the means and the motivation, using their resources and attractiveness to set standards

which consolidate their position, and pressure others to keep up with it. These women would most often be competing downwards. Low mate value, low competitive women may be resigned to their position in the hierarchy, and may lack the resources to effectively compete. Rather than being induced to spend their resources for whatever social rewards that might provide, they abstain from competing and presumably invest their resources directly into raising their offspring. Low mate value, highly competitive women might be expected to be unsuccessful, perhaps even viewed with scorn, were they to heavily engage in self-promotion. Making alliances with powerful, higher status same-sex allies could be a more effective strategy. In this case spending to maintain social standards may be viewed as a necessary cost of competing, although some access to resources would be needed to facilitate this. Future research on identifying the extent to which particular strategies are used within each mate value x intrasexual competitiveness combination would potentially be illuminating. It would be especially interesting to know whether intrasexual competitive drive is an intrinsic trait of an individual, or a plastic response to environmental cues. For example, do the resources available to a low mate value woman, dictate how competitive she is? If that woman's social network would be more likely to provide tangible utilitarian support if she were more active in it, would that induce her to be more competitive, investing a greater proportion of her limited resources to maintain socio-economic standards acceptable to the broader group?

I also identified that competitor manipulation may be a more widely used strategy than suggested by Fisher and Cox (2011). It is not limited to telling someone their dress looks lovely when it clearly doesn't or hinting that the man they are after has some severe flaws, both of which represent very conscious choices. I propose that women have also evolved implicit competitor manipulation strategies, which send messages of their superiority to other women. They do this by wearing makeup, posting filtered photos of themselves on social media, but refusing to acknowledge photos posted by rivals, by cutting more hair off women of the same attractiveness as themselves, or by showing off their $5000 on a handbag. The effect of these messages is that rivals adjust their actual or perceived mate value downwards as a result of the unfavourable social comparison.

Through the course of my research, I have had many informal conversations with women about why they wear makeup. Most readily acknowledge that their (male) partners don't notice, or even state a preference for the woman to look "natural". Yet these women report that they wear makeup "for themselves", because they believe it makes them look/feel better. When probed to think whether they would wear makeup in situations they wouldn't be seen, they

acknowledge that they likely wouldn't. Not one woman offered that she wore makeup to show other women how dominant she was – yet this appears to be one of its functions, of which women are largely unaware. Similarly, when I spoke with women about the photos they posted of themselves on social media, many acknowledged (without any embarrassment) that they posted these so that their friends could see how "hot" they looked. But most then couldn't articulate an answer to the "what were you hoping to achieve when they saw how attractive you looked?" question that followed. While I did not complete any qualitative studies for my PhD, I had many conversations about intrasexual competitiveness and without fail women identified with the idea and could provide many examples of when they had been the recipient of another woman's intrasexual competitiveness, be it at high school, in mothers' groups, or in the Country Women's Association baking competition. What was interesting for me was that women seemed to take these attacks personally, rather than seeing them as a strategy a rival was using to promote their own reproductive goals. It is for this reason that competitor manipulation is so successful – many women are susceptible to adjusting their self-perceived value downwards based on other women's words and actions.

6.3 Strengths and limitations

The first strength of this thesis is the range of modern-day contexts which I was able to explore. These are some of the contexts in which women of today are competing with tools such as sophisticated makeup (with the YouTube tutorials to show you how to do it) and social media (on which to post your photos once you've successfully finished your makeup, and the filtered the photo on top of that!) which have not been available throughout much of evolutionary history. This research informs a greater understanding of the current playing field for intrasexually competitive interactions.

The ability to acquire responses from almost 300 professional hairdressers to compare responses with data from the general population has not been done before and the high ecological validity of analysing participants actual Instagram feeds from the three months prior to the completion of the online survey provides valuable evidence of its use as a vector for intrasexual competition. The ability to replicate results of hypothetical studies with real-world data (on Instagram) and with real-world professionals (in the hairdressers' study) shows that the hypothetical studies were valuable tools for assessing real-world intrasexually competitive behaviour.

Layered over this was the consistent measurement of mate value and intrasexual competitiveness in each study, allowing me to explore how individual differences in characteristics of the participant interacted with the modern-day context.

Another of the strengths of this thesis lies in the large sample sizes and age ranges I was able to accrue for all the studies. Many female intrasexual competitiveness studies have few participants, and the participant age range is generally young, given that participants are often recruited from colleges and universities. I found strong evidence for changes in mate value with age, as well as changes in intrasexual competitiveness tactics, so having sufficient women across the age range and at different stages of life allowed me to identify these differences. Women who were mothers were also found to have different strategies, so studies with mean ages for women in their early twenties are unlikely to capture these differences. I was also able to ensure that there were approximately even men and women in the data sets allowing for exploration in sex differences. I believe that many of the results of prior studies, especially with respect to the attractiveness enhancing effects of makeup are confounded by not analysing the data set split by sex.

In terms of limitations, in Chapter 2 one of the effects we were interested in measuring was that of ovulation and how this interacted with the effect of wearing makeup. The stimulus photos used had been collected by Dr Danielle Wagstaff for another study (D. Wagstaff, 2016), where participants provided consent for their use in future studies. Stimulus photos of the same women were taken during their non-fertile phase and the fertile phase. Methods of measuring ovulation have been found to differ in accuracy, with counting methods being highly dependent on the accurate awareness of the participant. In order to maximise validity the photos were taken within-subjects. The fertile period for women in the stimulus photos was measured using both the counting-back method and the measurement of the hormones oestradiol and progesterone in saliva samples, as suggested by Eisenbruch *et al*. (2015). However, predicted findings of increased physical attractiveness during ovulation were not evident. Overall attractiveness ratings did follow the predicted pattern, increasing with ovulation, and there was a sex-based differential enhancement effect of makeup and ovulation was. Given this lack of clarity around the effect of ovulation on the one hand, and the interesting effects of makeup and intrasexual competitiveness on the other, I elected not to pursue to this direction in the subsequent studies but to focus on psychological rather than physiological aspects of intrasexual competitiveness. However, I acknowledge the existence of physiological effects and believe that how they interact

with mate value, intrasexual competitiveness and context, would be a valuable area of future research.

The ability to digitally apply makeup allowed us to apply identical makeup to the fertile and non-fertile photos of the same face. This limited the risk that different applications of (real) makeup on different days might confound the results (in Chapter 2). However, the amount of makeup and style of makeup has been found to have an effect on perceptions (Aguinaldo & Peissig, 2019; Tagai, Ohtaka, & Nittono, 2016; D. L. Wagstaff, 2018). The makeup applied in this study represented everyday makeup, hence the results might be expected to be different if more or less makeup was applied. In addition, each woman may differ in what they would consider everyday makeup. The faces in Study 1were presented to a panel to be assessed for their general consensus on the "everydayness of the application" and a makeup validation study was done on Study 4, but we know that makeup application is changing and in younger women tends to be more complex, including the ubiquitous use of contouring, using shading to visually change the shape of the face. Like fashion, what was considered 'everyday" when the projects started in 2016 and when they finished in 2022 may have changed. The extra control that digital make-up provides, might also compromise ecological validity. It looks very real on the photographs, but there may subtle differences between digital make-up and real make-up that we just aren't aware of that influence perceptions and judgements.

A third possible limitation that should be noted is the effect of the Covid-19 pandemic on social media usage. While we did collect data on the frequency and time spent on Instagram, the Covid pandemic occurred in the middle of data collection which took place from 2016 to 2022. Lockdowns and working from home affected many people's engagement with social media – in most cases increasing time spent on social media (Aggarwal, Singh, Chopra, & Kumar, 2022), confounding comparisons of time spent on social media for participants collected before and after March 2020 . For this reason, we elected not to use frequency and duration of time spent on social media in any of our analyses. But future studies comparing the time spent on social media with the frequency of posting would give an idea about whether women and men differed in their ratio of stalking only or posting too, and how this was impacted by mate value and intrasexual competitiveness.

The western orientation of this research must be acknowledged. Virtually all the stimulus faces were Caucasian female faces, with only a few Asian faces as they were accrued through Australian Universities. In the conspicuous consumption study, the vignettes presented were

typically middle-class western scenarios: a family Christmas event, a dinner for the mothers of the children's soccer team and a Parents and Citizens Association of a school, as well as buying tickets for a raffle at a charity event. In many cases, participants were accrued through a paid participant bank, and to ensure comprehension of the tasks, the countries were restricted to English-speaking countries: the UK, the USA, Australia and Canada, highly likely resulting is a western bias in respondents as well as stimulus materials. While some aspects of intrasexual competition appear to be cross-cultural such as the experience of jealousy (Valentova, Fernandez, Pereira, & Varella, 2022), rural women in Nicaragua maintained higher body weight ideals, and greater body appreciation, than Western women (Thornborrow, Evans, Tovee, & Boothroyd, 2022) suggesting cultural differences in important self-promotion criteria prevalent in intrasexual competition.

6.5 Future Research Directions

During the course of this research I discovered that competitor manipulation was a far more complex and prevalent intrasexual competitiveness strategy for women than previously reported (Fisher 7 Cox, 2011). Continuing to look at ways in which women unconsciously manipulate rivals, instead of just explicit (conscious) manipulation is a valuable area of future research. Informal conversations that I had with women from all different backgrounds while working on my PhD led me to believe that a qualitative analysis of women's lived experiences of female intrasexual competitiveness would provide a wealth of information which could be analysed in terms of getting a better understanding of how all four identified strategies are being used, but particularly allow for the identification of examples of implicit competitor manipulation. Work into the connection between eating disorders and female intrasexual competitiveness (Abed et al., 2012) could be explored from the aspect of the ultimate competitor manipulation being to manipulate a rival out of the reproductive market completely, and given that women are not expected to do this intentionally, the strategy is most likely unconscious, albeit with devasting consequences.

Also, the findings of how intrasexual competitiveness and mate value interact to affect the competitive strategies used by women resulted in significant differences being identified between how high mate value-highly competitive women act, versus high mate value-less competitive, low mate value-highly competitive or low mate value-less competitive women, further exploration of this would be enlightening. In addition, how this plays out in different ways across the lifespan of a women requires further investigation because as women age, their fields of competition appear to change. Studies involving a particular life stage should accrue

enough subjects from that particular stage, not just measure young women's hypothetical responses to scenarios they may encounter once they enter a different life stage.

Through these studies, makeup has been found to make women seem more intimidating and dominant to rivals – conferring some advantage on the wearer. The efficacy of this underpins billion-dollar beauty and social media industries. Over the last ten years (but gathering momentum in the last five years) there has been a falsification of beauty – fake eyelashes are ubiquitous, women (even in their early twenties) spend thousands on injectable lip-fillers and cosmetic tattooing. The exaggeration of cosmetic adornment may function as a super-normal stimulus (Etcoff et al., 2011; Nottebohm, 1972). The impacts of this on perceptions of attractiveness have previously been discussed (Borau & Bonnefon, 2020; Etcoff et al., 2011). Future studies into the different impact this has on female intrasexual responses is another area of potential investigation.

6.6 Final Comments

Human beings evolved mechanisms to solve problems associated with mate choice, mate attraction and retention, and intrasexual competition. Given that the sexes had different problems to solve, some of the evolved strategies tend to be sex specific. Women have complicated and sophisticated ways of indirectly competing with rivals whilst also trying to maintain the social alliances which are beneficial to themselves and their offspring, all the while being aware of adjusting their strategies based on the interaction of their mate value and intrasexual competitiveness.

None of the studies presented here primed a mate acquisition motive, there was no mention of looking good for a partner, no suggestion of the presence of an attractive/successful man or competition over a man. In all the studies, the Scale for Intrasexual Competition was last set of questions on the survey so as not to prime participants. Yet in each of the four studies, intrasexual competitiveness was found to impact how women responded in that context. Female intrasexual competition is present whenever women who are not related are together. Women are aware of the judgement of other women and the social cost of not meeting the standards set by other women. Much intrasexual competition seems to be to maintain status and manipulate how one is viewed by rivals. Resource acquisition and social dominance may be more compelling long-term motivations than competing for mates *per se*. The latter no doubt occurs, but may only be the dominant driver of women's intrasexual competition motivations for a short period in a woman's life.

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Published Journal Articles and Articles in Preparation for Publication

Williams, M. and D. Sulikowski (2020). "Implicit and explicit compromises in long-term partner choice." *Personality and Individual Differences* 166: 110226.

See Appendix C1

Sulikowski, D; Apps, B; Tran, A; Wilson, EA, Williams, M (2023). “Off with her hair!”. Manuscript in preparation.

See Appendix C2

Conference Presentation

Williams, M & Sulikowski, D (2022). “Instagratification: The use of social media as an intrasexual competitiveness strategy in women”. *3rd Annual Conference of the Australasian Society for Human Behaviour and Evolution (ASHBE)*, 25th November 2022, Sydney Australia.

Appendix A – Common Scales

A1. Mate Value Inventory (MVI-11 Short form) (Kirsner et al, 2003):

How well do you feel that these attributes apply to you currently, on a scale from **-3 (extremely low on this trait) to 3 (extremely high on this trait)?**

1. Ambitious
2. Attractive face
3. Desire children
4. Faithful/value fidelity
5. Generous
6. Good body
7. Have a good sense of humour
8. Healthy
9. Independent
10. Intelligent
11. Kind and understanding
12. Loyal
13. Now have financial resources
14. Responsible
15. Sexually adventurous
16. Social status
17. Stable personality

A2. Mate Value Scale (Edlund & Sagarin, 2014):

1. Overall, how would you rate your level of desirability as a partner on the following scale?

   1 = extremely undesirable to 7 = extremely desirable

2. Overall, how would the opposite sex rate your desirability as a partner on the following scale?

   1 = extremely undesirable to 7 = extremely desirable

3. Overall, how do you believe you compare to other people in desirability as a partner on the following scale?

   1 = very much lower than average to 7 = very much higher than average

4. Overall, how good of a catch are you?

   1 = very bad catch to 7 = very good catch

A3. Scale for Intrasexual Competition (Buunk & Fisher, 2009)

Response scale for all items:

1	2	3	4	5	6	7
Not at all applicable					Completely applicable	

Version for women

Please indicate how much the following statements apply to you. Circle the number that corresponds to the answer of your choice.

1. I can't stand it when I meet another woman who is more attractive than I am.
2. When I go out, I can't stand it when men pay more attention to a friend of mine than to me.
3. I tend to look for negative characteristics in attractive women.
4. When I'm at a party, I enjoy it when men pay more attention to me than to other women.
5. I wouldn't hire a very attractive woman as a colleague.
6. I just don’t like very ambitious women.
7. I tend to look for negative characteristics in women who are very successful.
8. I wouldn't hire a highly competent woman as a colleague.
9. I like to be funnier and more quick-witted than other women.
10. I want to be just a little better than other women.
11. I always want to beat other women.
12. I don’t like seeing other women with a nicer house or a nicer car than mine.

Version for men

Please indicate how much the following statements apply to you. Circle the number that corresponds to the answer of your choice.

1. I can't stand it when I meet another man who is more attractive than I am.
2. When I go out, I can't stand it when women pay more attention to a friend of mine than to me.
3. I tend to look for negative characteristics in attractive men.
4. When I'm at a party, I enjoy it when women pay more attention to me than to other men.
5. I wouldn't hire a very attractive man as a colleague.
6. I just don’t like very ambitious men.
7. I tend to look for negative characteristics in men who are very successful.
8. I wouldn't hire a highly competent man as a colleague.
9. I like to be funnier and more quick-witted than other men.
10. I want to be just a little better than other men.
11. I always want to beat other men.
12. I don’t like seeing other men with a nicer house or a nicer car than mine.

A4. HEXACO-60 (Self-report form) (Lee & Ashton, 2009)

On the following pages you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement.

Then write your response in the space next to the statement using the following scale:

5 = strongly agree
4 = agree
3 = neutral (neither agree nor disagree)
2 = disagree
1 = strongly disagree

Please answer every statement, even if you are not completely sure of your response.

1. I would be quite bored by a visit to an art gallery.
2. I plan ahead and organize things, to avoid scrambling at the last minute.
3. I rarely hold a grudge, even against people who have badly wronged me.
4. I feel reasonably satisfied with myself overall.
5. I would feel afraid if I had to travel in bad weather conditions.
6. I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
7. I'm interested in learning about the history and politics of other countries.
8. I often push myself very hard when trying to achieve a goal.
9. People sometimes tell me that I am too critical of others.
10. I rarely express my opinions in group meetings.
11. I sometimes can't help worrying about little things.
12. If I knew that I could never get caught, I would be willing to steal a million dollars.
13. I would enjoy creating a work of art, such as a novel, a song, or a painting.
14. When working on something, I don't pay much attention to small details.
15. People sometimes tell me that I'm too stubborn.
16. I prefer jobs that involve active social interaction to those that involve working alone.
17. When I suffer from a painful experience, I need someone to make me feel comfortable.
18. Having a lot of money is not especially important to me.
19. I think that paying attention to radical ideas is a waste of time.

20. I make decisions based on the feeling of the moment rather than on careful thought.
21. People think of me as someone who has a quick temper.
22. On most days, I feel cheerful and optimistic.
23. I feel like crying when I see other people crying.
24. I think that I am entitled to more respect than the average person is.
25. If I had the opportunity, I would like to attend a classical music concert.
26. When working, I sometimes have difficulties due to being disorganized.
27. My attitude toward people who have treated me badly is “forgive and forget”.
28. I feel that I am an unpopular person.
29. When it comes to physical danger, I am very fearful.
30. If I want something from someone, I will laugh at that person's worst jokes.
31. I’ve never really enjoyed looking through an encyclopedia.
32. I do only the minimum amount of work needed to get by.
33. I tend to be lenient in judging other people.
34. In social situations, I’m usually the one who makes the first move.
35. I worry a lot less than most people do.
36. I would never accept a bribe, even if it were very large.
37. People have often told me that I have a good imagination.
38. I always try to be accurate in my work, even at the expense of time.
39. I am usually quite flexible in my opinions when people disagree with me.
40. The first thing that I always do in a new place is to make friends.
41. I can handle difficult situations without needing emotional support from anyone else.
42. I would get a lot of pleasure from owning expensive luxury goods.
43. I like people who have unconventional views.
44. I make a lot of mistakes because I don’t think before I act.
45. Most people tend to get angry more quickly than I do.
46. Most people are more upbeat and dynamic than I generally am.
47. I feel strong emotions when someone close to me is going away for a long time.
48. I want people to know that I am an important person of high status.
49. I don’t think of myself as the artistic or creative type.
50. People often call me a perfectionist.
51. Even when people make a lot of mistakes, I rarely say anything negative.
52. I sometimes feel that I am a worthless person.

53. Even in an emergency I wouldn't feel like panicking.
54. I wouldn't pretend to like someone just to get that person to do favours for me.
55. I find it boring to discuss philosophy.
56. I prefer to do whatever comes to mind, rather than stick to a plan.
57. When people tell me that I'm wrong, my first reaction is to argue with them.
58. When I'm in a group of people, I'm often the one who speaks on behalf of the group.
59. I remain unemotional even in situations where most people get very sentimental.
60. I'd be tempted to use counterfeit money, if I were sure I could get away with it.

Appendix B
Vignettes for Chapter 5 Study 2

Vignette 2.1: Women only, low amount, with an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the other women at your table buy one or two tickets each.

Vignette 2.2 Women only, low amount, without an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that the other women at your table bought one or two tickets each.

Vignette 2.3 Women only, high amount, with an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the other women at your table buy 20 tickets each.

Vignette 2.4 Women only, high amount, without an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that the other women at your table all bought 20 tickets each.

Vignette 2.5 Women only, variable amount - Carol, with an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your

age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, Carol buys 20 tickets, while all the other women buy one or two tickets each.

Vignette 2.6 Women only, variable amount- Carol, without an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that Carol bought twenty tickets, and the other women bought a one or two tickets each.

Vignette 2.7 Women only, variable amount -Beth, with audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the

table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, Beth buys 20 tickets, while all the other women buy one or two tickets each.

Vignette 2.8 Women only, variable amount -Beth, with without an audience

You are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six, with women you socialise with a couple of times a year. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while. Sarah and Rachel are sisters. They are cheerful and chatty. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that Beth bought twenty tickets, and the other women bought a one or two tickets each.

Vignette 2.9 With partners, low amount, with audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each

table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the women at your table buy one or two tickets each.

Vignette 2.10 With partners, low amount, without an audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that the other women at your table bought one or two tickets each.

Vignette 2.11 With partners, high amount, with audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20

tickets for $150 and all of the proceeds go straight to the charity. When the host comes around to your table, all of the women at your table buy 20 tickets each.

Vignette 2.12 With partners, high amount, without an audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that the women at your table all bought 20 tickets each.

Vignette 2.13 With partners, variable amount- Carol, with audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes

around to your table, Carol buys 20 tickets, while all the other women buy one or two tickets each.

Vignette 2.14 With partners, variable amount,- Carol, without audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that Carol bought twenty tickets, and the other women bought a one or two tickets each.

Vignette 2.15 With partners, variable amount- Beth, with audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. When the host comes

around to your table, Beth buys twenty tickets, while all the other women buy one or two tickets each.

Vignette 2.16 With partners, variable amount,- Beth, without audience

You and your partner are attending a fund-raising lunch for your favourite charity. The venue is one of your favourite restaurants and you are looking forward to the delicious food. You are sitting at a table of six couples, with women you socialise with a couple of times a year. Each woman is accompanied by her partner. Carol is about your age, immaculately presented. She exudes success and confidence, and seems to talk a lot. Beth is also of a similar age, she is plain-looking and down-to-earth. Julie is the friend you agreed to come with, she is quiet, well-dressed and professional. You've worked with her for a while and you've met her boyfriend before. Sarah and Rachel are sisters. They are cheerful and chatty, as are their partners. The conversation at the table is easy and covers many topics including jobs, children, holidays, hobbies and books. During the lunch, the host visits each table in turn, inviting all the guests to buy raffle tickets. The tickets cost $10 each or 20 tickets for $150 and all of the proceeds go straight to the charity. While you are chatting with a friend at a different table, you see the host go to your table, asking everyone at your table to buy raffle tickets. On your way back to re-join your table, the host intercepts you and asks if you would like to buy raffle tickets. Just to get some idea, you ask her how many tickets the rest of your table bought. She tells you that Beth bought twenty tickets, and the other women bought a one or two tickets each.

Appendix C1

This study was completed for my Honours dissertation. Additional data were collected during my PhD to build on the findings and the research was published in a paper co-authored by my PhD supervisor.

Williams, M. and D. Sulikowski (2020). "Implicit and explicit compromises in long-term partner choice." *Personality and Individual Differences* 166: 110226.

Appendix C2

Off with her hair!

Danielle Sulikowski, Brittany Apps, Gautami Nair, Audrey Tran and Elizabeth Anne Wilson, Danielle Wagstaff, Melinda Williams

Manuscript in preparation for publication

Introduction

Individuals engage in intrasexual competition to reduce their same sex rivals' mate value, and influence opposite sex individuals' mate choices, to ultimately manipulate conspecific mating outcomes. Female intrasexual competition involves much indirect aggression, where a rival's actual or apparent mate quality is lowered, or participation in the mating market hampered, by derogation, gossip, social exclusion, and intimidation. In the current study we explore an understudied vector for female intrasexual competition – appearance advice (a form of competitor manipulation, Fisher & Cox, 2011) operationalised as the amount of hair a client is advised to cut-off in the context of a hypothetical salon. We investigate the extent to which advice to cut-off more hair is predicted by individual differences in intrasexual competition, mate value, and the client's facial attractiveness.

Female indirect aggression is associated with mating motivations (Young et al., 2017). Indirect aggression tends to manifest as gossiping, derogation, and social exclusion (Buss, 1988; Reynolds *et al*., 2018). It can also involve rival manipulation via dishonest or disingenuous advice (such as telling another woman that her clothing is flattering when it is not, Fisher & Co, 2011). It tends to peak around adolescence and early adulthood, when competition for mates is high (Archer, 2004; Hess & Hagen, 2006; Verona et al 2008.) Female indirect aggression frequently targets aspects of rivals that men prize in prospective long-term partners: attractiveness (Fisher, 2004) and chastity (Campbell, 1995, although there are also arguments that indirect aggression in response to promiscuity may be less about damaging a promiscuous rival's reputation, and more about policing the price of sex to keep it high, see Ayers & Goetz, 2022; Regenerus, 2012; and Vallaincourt, 2013).

Younger women tend to have longer, and healthier hair, and healthier hair correlates with actual bodily health (Hinsz et al., 2000), making it a potentially reliable indicator of a woman's youth and health, and therefore fertility. Women also report wanting longer hair than they have on average, and believe that men would also prefer them to have longer hair than they do (Jacobi & Cash, 1994). Men also rate female faces with (experimentally added) long hair as more youthful, healthy, sexy and feminine (Mesko & Bereczkei, 2004), as well as more intelligent and dominant (Bereczkei & Mesko, 2006). Interestingly, long hair may also contribute to perceptions of promiscuity, when worn out rather than tied back (Matz & Hinsz, 2017). As such, recommending that a client cut off more of her hair, especially when that hair is healthy, could diminish the client's physical attractiveness, and hobble their capacity to manipulate signals of sexual intent.

Women perceive more physically attractive rivals to be fiercer mating competitors (Fink et al., 2014), and in adolescent girls, self-reported attractiveness positively predicts self-reported victimization by peers (Leenars et al., 2008). The tendency of adolescent and young adult women to make upward social comparisons of physical attractiveness (implying that the focal individual is low on physical attractiveness) positively predicts indirect aggression perpetrated against peers (Arnocky et al., 2011). The same study reported that perpetrating indirect aggression was negatively associated with being a recipient of it. Collectively these findings imply that female intrasexual competition, at least to the extent that it manifests as indirect aggression, is asymmetrical with respect to mate quality. Lower mate quality women seem to perpetrate indirect aggression towards higher mate quality rivals, while those targeted tend not to reciprocate. Systematic targeting of higher quality rivals would be expected in the contexts of direct competition for currently available mates and in guarding against mate poaching. In both scenarios there would seem to be the most to gain by targeting rivals who, in the absence of your attempts to lower their apparent mate value, might be perceived by the (potential) mate in question to be a better option than yourself.

Female intrasexual competition, however, is likely more complex than the above synopsis suggests. For example, perpetrating indirect aggression is associated with earlier onset dating and sexual behaviour (White et al., 2010, Gallup et al., 2011, Pellegrini & Long, 2003) and high social status and perceived popularity (Arnocky & Vallaincourt, 2012).

Further Gallup et al. (2011), reported positive, rather than negative relationships between being the perpetrator and victim of female indirect aggression, suggesting that some adolescent and young adult women (those with more sexual partners, Dane et al., 2017) are more likely than others to be involved in (potentially reciprocal) intrasexual competition, as both perpetrator and recipient. Gallup et al. (2011) also reported that being the target of indirect aggression was associated with lower self-perceived attractiveness and greater promiscuity. Collectively these findings paint a picture of relational aggression being utilised by socially popular and attractive women, with lower mate value rivals being targets. The outcome of such interactions seems to be the reproductive suppression of the lower mate value targets, who may retaliate with a combination of their own indirect aggression and by using promiscuity to undercut the market price of sex (Ayers & Goetz, 2022; Regenerus, 2012).

These two accounts of female intrasexual competition need not be mutually exclusive. The relationships between mate value, intrasexual competitiveness, and the perpetration of indirect aggression may well be context dependent. In the context of guarding against the poaching of an existing or potential mate, female intrasexual competition may be targeted up the mate value ladder. In broader contexts, where no specific mating motivation is present or primed, women with high social status (who also tend to be attractive and of high mate quality, Rahal et al., 2021) utilise indirect aggression to police, punish, and compromise the mating behaviour (and therefore the realised mate value) of lower ranked women. Since we did not prime mating motivations in the current studies, these considerations lead to predictions that intrasexual competition would be likely to manifest in the current studies in a downward direction, with more hair being cut off less attractive clients, by higher mate value, more intrasexually competitive participants. This prediction is also consistent with the possibility that long hair can signal sexual intent, and so cutting it shorter could also contribute to attempts to suppress and police the sexual behaviour of lower ranked rivals.

In the first study of this paper, (all female) participants were presented with a series of hypothetical female hair salon clients, who were either high or low on facial attractiveness. A portrait of each client, a close-up image of their hair (commensurately described as being in either good or poor condition), and the client's wishes to cut off "as

little as possible", or "as much as necessary." Variations in the health of the hair, and the clients' wishes served dual purposes. Firstly, they provided participants with an obvious and plausible rationale for what was being studied (potentially lessening the salience of attractiveness variations across clients), and provided us with built-in manipulation checks. Confirming that participants did indeed cut more hair off those clients who wanted it, and when the hair was in poor condition allowed us to verify that our sample as a whole had engaged with these details for each client across the duration of the study. Secondly, these design features allowed us to create conditions that were especially amenable to intrasexual competition manifesting in the advice to cut off more hair. When the hair was in good condition and the client's wishes were to cut off as little as possible, recommendations to cut off more hair were expected to most strongly correlate with participants' intrasexual competitiveness.

To summarise our theoretical position and our predictions: if female intrasexual competition manifests in the context of appearance advice, then we hypothesise that intrasexual competitiveness will positively correlate with the amount of hair participants recommend that clients have cut off. If female intrasexual competition manifests in a downward manner (with respect to mate value) in the absence of immediate cues of direct competition or mate poaching, then we expect mate value to positively predict how much hair participants recommend clients have cut off, and that participants would recommend more hair be cut off from less attractive clients. Lastly, we predict these effects to be strongest when hair was described as being in good (rather than poor) condition, and clients indicated that they wanted as little as possible cut off. These circumstances provide the most potential for sabotage (removing healthy hair which the client does not want cut-off), while offering minimal justification, in terms of necessary hair maintenance, for cutting off almost any hair at all.

Method

Participants

Two-hundred and eight women completed the study. Sixteen were excluded for failing to identify their current or ideal partner as male (*N*=11), for providing textual responses that could not be readily analysed (*N*=2, for example: "I would cut off as much as

she asked me to"), or for suggesting women cut off more than 50cm of hair (*N*=3, such responses were unrealistic since no stimulus photos depicted hair that long, and resulted in statistical outliers, even after data were transformed). The final sample of women (*N*=192) were aged 17-64yrs (*M*=32.7, *SD*=11.7, although 19 declined to provide their age). About one-third were single (*N*=61, not in a relationship; *N*=9, in a short/uncommitted relationship) and the remaining partnered (*N*=22, not living together; *N*=95, living together; five did not provide their relationship status). Participants were recruited from an undergraduate participant pool (*N*=169, for course credit) and from the general public (*N*=23, for no compensation), and all gave informed consent under protocol number H18039, issued by the Charles Sturt University Human Research Ethics Committee.

Materials

Stimuli

Fifty-six neutral expression female faces of apparent reproductive age were drawn from the UCT-HiFi face database. Two-hundred and thirty-six female faces from this database (all those of apparent reproductive age) had previously been rated for subjective femininity (from 1-15) by a sample of male and female raters. Using these ratings as a proxy for attractiveness we selected the 28 most feminine (*M*=10.97, *SD*=0.61) and 28 (*M*=6.18, *SD*=0.52) least feminine faces to use as the attractive and unattractive stimuli in the current study, respectively. We subsequently had these 56 faces rated for attractiveness (from 1-10) by a sample of women (*N*=56, aged 18-56, *M*=31.3, *SD*=10.4 years). The attractive faces (*M*=5.55, *SD*=1.24) were rated significantly more attractive than the unattractive faces (*M*=3.27, *SD*=1.29, $t(55) = 18.99$, $p < .001$, $d = 0.90$).

The images were cropped to show just the head, hair and neck to the collar bone, set against a neutral background (RGB: 220,211,202), and displayed at a resolution of 72dpi, and a size of approximately 10x15cm. Displayed alongside each image was a supposed magnified view of the hair (7cm in diameter). Hair images were not derived from the face images, but were sourced online and depicted hair that was in either good condition or poor condition. Multiple good and poor condition hair images were collated and colour matched to the stimulus images' hair, so that participants did not view the same hair condition

picture multiple times across the study. All stimulus image manipulations were performed in Adobe Photoshop (CS5). Indicative stimuli are shown in Figure 1.

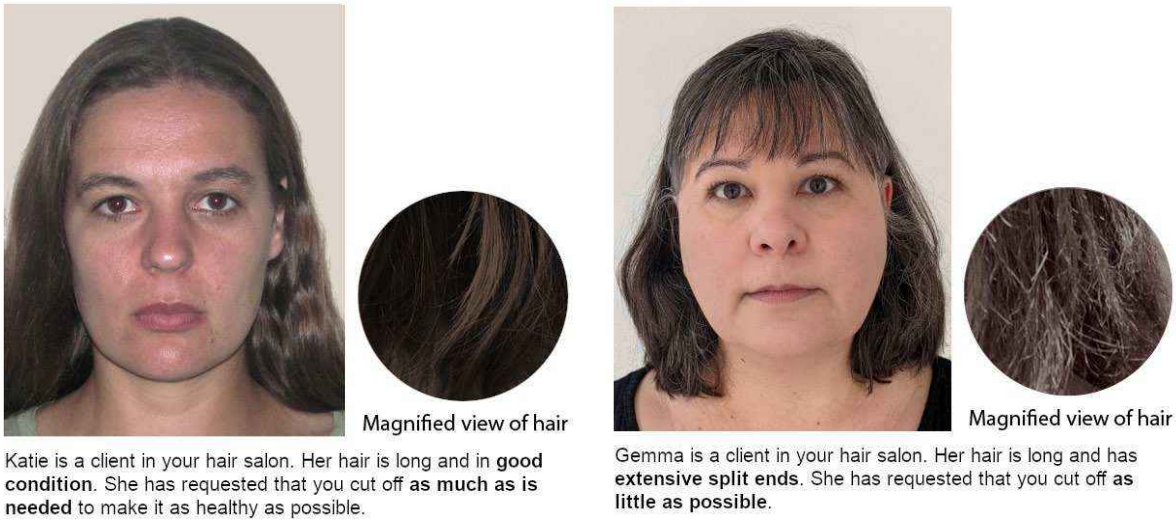

Figure 1. Indicative stimulus photos showing the good hair and the poor hair conditions

Measures

Mate Value Scale (MVS) The MVS (Edlund & Sagarin, 2014) is a four-item measure of global mate value ("Overall, how would you rate your level of desirability as a partner?") and is scored on a 7-point Likert scale. Responses are summed with higher scores indicating higher mate value. Reported internal reliability is high (α=.81 to .92) and was also high in the current sample (α=.91).

Mate Value Inventory (MVI-7, Short Form) The MVI-7 short form (Kirsner et al., 2003) lists 17 attributes sought after in a mate (for example "ambitious", "generous", "good body"). Respondents indicate how well these attributes currently apply to them on a 7-point Likert scale ("extremely low on this trait" to "extremely high on this trait"). Responses are averaged with higher means indicating higher mate value. Reported internal reliability for women is acceptable (α=.61), but was higher in the current sample (α=.87).

Scale for Intrasexual Competitiveness Scale (SIC) The SIC (Buunk & Fisher, 2009) is a 12-item measure of intrasexual competition, with items worded to match the sex of respondents (for example, for women: "I just don't like very ambitious women", "I tend to

look for negative characteristics in attractive women"). Responses are on a 7-point Likert scale ("not at all applicable" to "completely applicable"). Reported internal reliability is high (α=.87-.88) and was similarly high (α=.93) in the current sample.

Procedure

After providing informed consent, participants indicated their age, sex, relationship status (single, not in a relationship; in a short-term/uncommitted relationship; in a long-term relationship but not living together; in a long-term relationship and living together), and the sex of their current, (or ideal) partner. They were then asked to provide advice to female clients in a hair salon as though they were the hairdresser, as to how much hair the client ought to have cut off. Images of each client, alongside a supposed magnified view of their hair, were presented with a blurb indicating the client's name, the condition of the client's hair (poor or good), and how much hair each client wanted cut-off (as little as possible, or as much as necessary to keep it healthy). The same 56 (28 attractive and 28 unattractive) faces were shown to all participants (in random order), but whether any individual face was paired with hair in poor or good condition, and whether it was paired with an instruction to cut off as much hair as needed or as little as possible, was counterbalanced across participants.

Participants were provided with a text entry box for each client and told to indicate their response in centimetres. Where responses were provided with units other than centimetres indicated, they were converted to centimetres for analysis. After providing responses to all 56 faces (presented in random order to each participant), participants completed the SIC, MVS, and MVI. An online debrief statement then provided participants with an explanation of the study's aims and hypotheses.

Data Analysis

The amount of hair each participant recommended to be cut-off each client was averaged across the seven faces of each of the eight conditions (attractive/unattractive x good/poor hair condition x client's wishes). The means for the eight conditions were all positively skewed (0.893 to 2.204). Square-root transformation reduced skew (-0.134 to 0.794) for analysis, while graphs depict back-transformed means and standard errors.

The MVS and MVI were both included as they measure mate value in different ways. The former provides participants' consciously perceived worth as a partner, the latter garners ratings on a number of traits that are valued by potential partners. The MVS and MVI scores correlated strongly, while neither was related to ISC scores (see Table 1). A single mate-value factor (MVF) was then defined by converting both the MVS and MVI to their respective z-scores, entering the two sets of z-scores into a PCA and extracting the first component scores. Each scale loaded strongly onto this factor (.906) and it accounted for 82% of the total variance.

The MVF and ISC scores (the latter converted to z-scores), were then entered as covariates into a full-factorial 2 (attractiveness of stimulus face: high or low) x2 (condition of hair: poor or good) x2 (client's wishes: as little as possible or as much as needed) repeated-measures ANCOVA. Since age did not correlate with the dependent measure across any of the conditions (see Table 1), and ~10% of the sample declined to provide it, age was not controlled for in the analyses reported below.

Results

Table 1 shows the correlations between the individual difference variables and the dependent variables for Study 1. Contrary to predictions, participant self-reported mate-value did not predict how much hair they recommended that clients cut off. In line with predictions, intrasexual competitiveness did tend to predict how much hair participants recommended that clients have cut-off, as did the client's apparent mate value (operationalised as their facial attractiveness). Also as predicted, the relationship between participant intrasexual competitiveness and advice and was most apparent when clients wished to have the minimum amount of hair cut off as possible. Detailed reports of the statistical model are below.

Table 1 Pearson *r* correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study 1.

Individual difference variables			1.	2.	3.	4.	5.
1. Age			-				
2. MVI (Mate Value Inventory)			.121	-			
3. MVS (Mate Value Scale)			.107	**.640****	-		
4. MVF (Mate Value Factor)			.126	**.906****	**.906****	-	
5. SIC (Scale for Intrasexual Competitiveness)			**-.212****	-.060	.077	.009	-
Dependent variables							
Client Attractiveness	Hair Condition	Client Wishes					
Attractive	Good	Min	-.067	-.082	.004	-.043	.119
		Max	.099	-.042	.048	.003	.026
	Poor	Min	-.031	-.044	.050	.003	.114
		Max	-.018	-.056	.066	.006	.043
Unattractive	Good	Min	-.064	-.049	-.005	-.030	**.146***
		Max	.108	-.047	.039	-.004	.061
	Poor	Min	-.045	-.020	.098	.043	.140#
		Max	-.035	-.043	.075	.018	.075

Note. *p<.05, **p<.01, #p<.1

As expected, we observed significant main effects of hair condition (F(1,188) = 524.3, p < .001, η_ρ^2 = .736) and client wishes (F(1,188) = 298.6, p < .001, η_ρ^2 = .614) as participants advised more hair to be cut-off when it was in poor condition, and when the client indicated that they were happy for as much to be cut-off as was needed. We also observed a significant interaction between these variables, (F(1,188) = 4.592, p = .033, η_ρ^2 = .024), as the effect of client wishes was larger when hair was in poor condition (p < .001, η_ρ^2 = .729) than when it was in good condition (p < .001, η_ρ^2 = .696), as participants recommended cutting off the most hair when it was in poor condition, and the client was happy for as much to be cut-off as needed).

The main effect of client attractiveness approached significance only (F(1,188) = 3.556, p = .061, η_ρ^2 = .019), but we did observe a significant interaction between client attractiveness and participant intrasexual competitiveness (F(1,188) = 4.882, p = .028, η_ρ^2 = .025). When we estimated the main effect of client attractiveness at high levels (one standard deviation above the mean) of intrasexual competitiveness, we observed that highly competitive participants recommended cutting more hair off less attractive clients than they recommended cutting off more attractive clients (F(1,188) = 8.387, p = .004, η_ρ^2 =

.043). At low levels (one standard deviation below the mean) of intrasexual competitiveness, less competitive participants' advice was unaffected by clients' attractiveness ($F(1,188) = .054$, $p = .816$, $\eta_\rho^2 < .001$, see Figure 2).

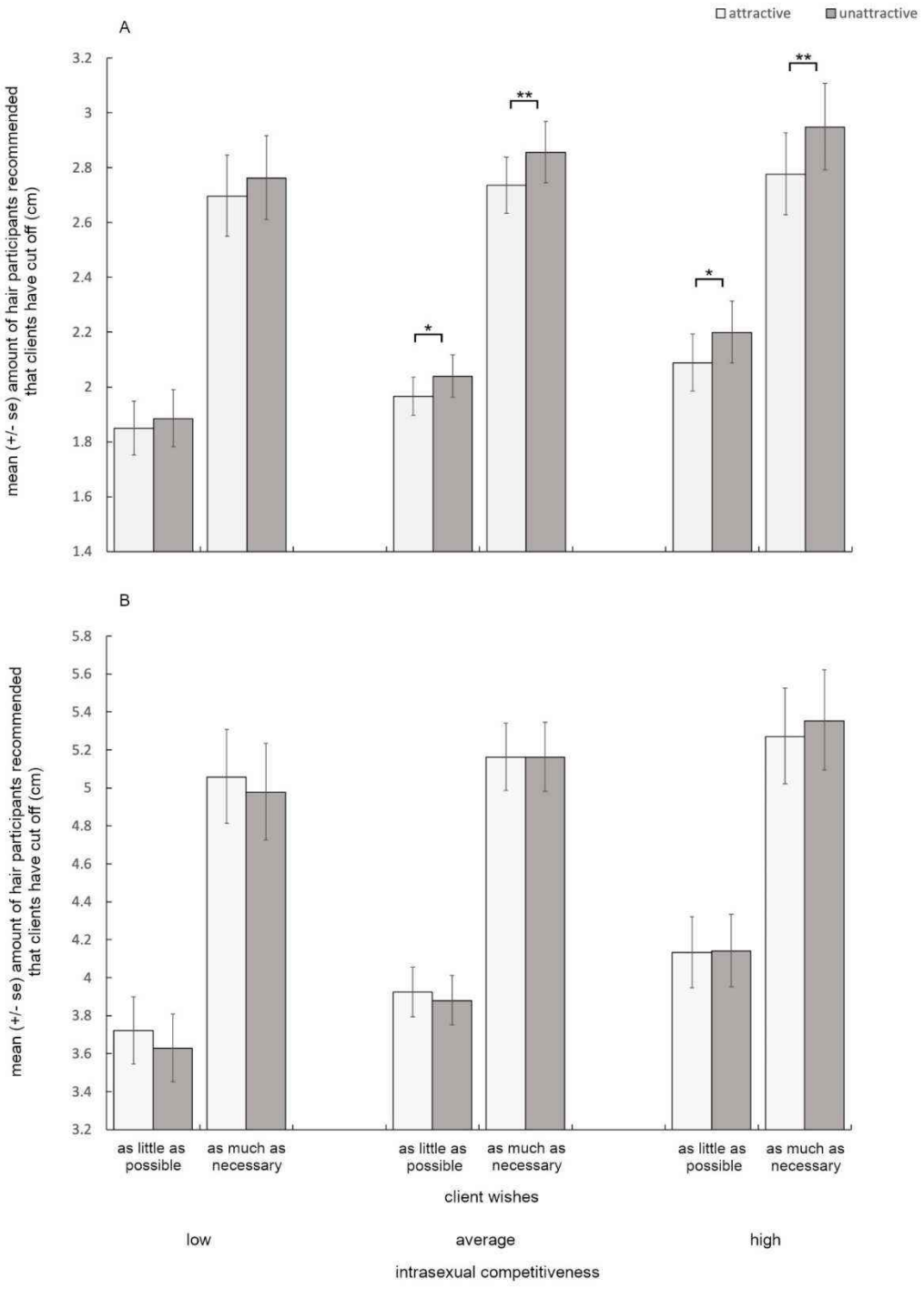

Figure 2. Effect of client attractiveness and intrasexual competitiveness on amount of hair cut off (A) attractive clients and (B) less attractive clients.

We also observed a significant interaction between hair condition and client attractiveness ($F(1,188) = 8.794$, $p = .003$, $\eta_\rho^2 = .045$). When hair was in poor condition, client attractiveness did not impact how much hair was cut-off ($p = .561$, $\eta_\rho^2 = .002$). When hair was in good condition, participants recommended cutting significantly more hair off less attractive clients, compared to more attractive clients ($p = .001$, $\eta_\rho^2 = .057$).

The above interactions were further qualified by more complex four-way (hair condition, client attractiveness, intrasexual competitiveness, and mate value, $F(1,188) = 4.781$, $p = .030$, $\eta_\rho^2 = .025$) and five-way (hair condition, client attractiveness, client wishes, intrasexual competitiveness, and mate value, $F(1,188) = 4.781$, $p = .030$, $\eta_\rho^2 = .025$) interactions.

To unpack the four-way interaction, we first estimated relevant three-way interactions at high and low levels (one standard deviation above and below the mean) of each covariate, respectively. The three-way interaction between hair condition, client attractiveness, and intrasexual competition was not significant at either high ($F(1,188) = 2.611$, $p = .108$, $\eta_\rho^2 = .014$) or low ($F(1,188) = 1.919$, $p = .168$, $\eta_\rho^2 = .010$) levels of mate value. However, the three-way interaction between hair condition, client attractiveness and mate value was moderated by intrasexual competition. At low levels of intrasexual competition, this interaction was not significant ($F(1,188) = 0.700$, $p = .404$, $\eta_\rho^2 = .004$), but at high levels of intrasexual competition, this interaction was significant ($F(1,188) = 4.892$, $p = .028$, $\eta_\rho^2 = .025$). The pattern of this interaction was such that at high levels of mate value, the hair condition by client attractiveness interaction was not significant ($F(1,188) = 0.006$, $p = .941$, $\eta_\rho^2 < .001$) and participants cut more hair from unattractive clients ($F(1,188) = 5.299$, $p = .022$, $\eta_\rho^2 < .027$), regardless of hair quality. At low levels of mate value, the hair condition by client attractiveness interaction was significant ($F(1,188) = 8.684$, $p = .004$, $\eta_\rho^2 < .044$), as low mate value, highly competitive participants only cut more hair off the less attractive clients when the hair was in good condition ($p < .001$, $\eta_\rho^2 = .058$), not when it was in poor condition ($p = .587$, $\eta_\rho^2 = .002$).

We adopted an analogous approach to unpack the five-way interaction (systematically investigating the relevant four-way interactions at high and low values of the respective covariates), but we were unable to identify any clear patterns of moderation. We

therefore concluded that the five-way interaction resulted from a multitude of incremental lower-order interactions and simple effects which cumulatively reached significance, but none of which were individually large enough to account for the five-way interaction, rendering it uninterpretable.

Discussion

In study 1, we investigated the extent to which participants' mate-value and intrasexual competitiveness predicted the amount of hair they would recommend that attractive and unattractive salon clients should have cut off. We observed that highly intrasexually competitive participants cut more hair off less attractive clients, while less competitive participants were not impacted by client attractiveness. This suggests that appearance advice may act as a vector for intrasexual competition, and that such competition (in this scenario at least) tends to be projected downward to less attractive competitors.

The absence of any simple effects or low-level interactions involving mate value, suggests that women across the mate-value spectrum engage in this type of downward-projected intrasexual competition. The significant effects of mate value that were observed were limited to moderating the impacts of hair condition. When participants were high in intrasexual competitiveness and high in mate value they cut more hair off less attractive clients, regardless of the condition of the hair. When participants were high in intrasexual competitiveness and low in mate value, they only cut more hair from less attractive clients, when the hair was in good condition, not when it was in poor condition. High mate value, therefore, appeared to broaden the range of potential targets of intrasexual competition, but only for women who were also high in intrasexual competitive intent.

The effects of hair condition and client wishes that we observed were in line with predictions. Recommendations to cut off more hair most clearly align with competitive tactics when the hair is in good condition and when the client wants as little hair cut off as possible. When hair is in poor condition, it is more ambiguous whether recommendations to cut more off would help or hinder the clients' attractiveness (and ultimately the health of their hair, too). Also, when clients express a wish to have as little hair as possible cut off, recommendations to cut off more hair are potentially more damaging to clients' self-

perceived attractiveness, than the same recommendation given when the client is happy for ast5 much hair as needed to be cut off. It is therefore consistent with an intrasexual competition account of the data that the only condition in which the simple bivariate correlation between intrasexual competitive intent and how much hair was recommended to be cut-off was significant was for unattractive clients with hair in good condition, who wanted as little hair as possible cut off.

Study 2

In Study 1, we only included faces that were relatively high or relatively low on attractiveness. We observed that more intrasexually competitive participants cut more hair off the less attractive clients. However, since we didn't include clients of average attractiveness (and therefore average implied mate value), we also don't have a clear understanding of whether participants were tending to target women of absolutely low mate value, or just any women who were of lower perceived mate value than themselves – both scenarios would have produced the effects seen in Study 1. The majority of participants would likely have perceived the unattractive client group as low in mate value in absolute terms, as well as lower in mate value than themselves. With a dearth of clients of average levels of attractiveness, we also don't know how participants (most of which we presume are also around average levels of attractiveness) would advise clients they perceive to be their mate value equals. We targeted these research questions in the design of Study 2, by including clients of low, average, and high facial attractiveness.

Method

Participants

Two-hundred and seventy-nine women completed the study. Twenty-one were excluded for not indicating a preference for male partners. The final sample of women (*N*=258) were aged 18-67yrs (*M*=34.8, *SD*=10.5, although 2 declined to provide their age). About one-quarter were single (*N*=62, not in a relationship; *N*=10, in a short/uncommitted relationship) and the remaining partnered (*N*=30, not living together; *N*=156, living together; five did not provide their relationship status). Participants were recruited from an undergraduate participant pool (*N*=228, for course credit) and from the general public

(*N*=30, for no compensation), and all gave informed consent under protocol number H18039, issued by the Charles Sturt University Human Research Ethics Committee.

Materials

Stimuli

Forty-eight neutral expression female faces of apparent reproductive age were drawn from the UCT-HiFi face database. Based on prior femininity ratings, we selected 16 faces high in femininity (*M*=11.03, *SD*=0.66), low in femininity (*M*=6.11, *SD*=0.60), and average in femininity (*M*=8.70, *SD*=0.72). We subsequently had these 48 faces rated for attractiveness (from 1-10) by a sample of women (*N*=52, aged 19-58, *M*=34.0, *SD*=10.1 years). A one-way repeated-measures ANOVA applied to the mean attractiveness scores revealed a significant main effect of attractiveness category ($F(2,104) = 243.6$, $p < .001$, $\eta_\rho^2 < .824$), with differences in perceived attractiveness corresponding to the different categories as intended. The highly attractive faces were rated as most attractive (*M*=5.12, *SE*=0.18), followed by the mid-level attractive faces (*M*=4.17, *SD*=0.17) and the unattractive faces (*M*=3.42, *SD*=0.16, all pairwise comparisons were significant, $p < .001$).

Stimuli were cropped and presented as potential hairdressing clients, as described for study 1. Differently to study 1, we preceded the stimuli with a picture of a life-size credit card and a ruler to help give participants an accurate impression of the dependant variable units (cm).

Measures

The Mate Value Scale (MVS, Edlund & Sagarin, 2014), Mate Value Inventory (MVI-7, Short Form, Kirsner et al., 2003), and the Scale for Intrasexual Competitiveness Scale (SIC, Buunk & Fisher, 2009) were used as described for study 1. Study 2 internal reliabilities for the three measures were high, α=.90, α=.81, and α=.90, respectively.

Procedure

The procedure was very similar to that described for Study 1. After providing informed consent, participants provided the same demographics information as in Study 1, and were then asked to provide advice to female clients in a hair salon as though they were the hairdresser, as to how much hair the client ought to have cut off. As in Study 1, the

same 48 faces (16 each of highly attractive, unattractive, and mid-level attractive clients) were shown to all participants (in random order), but whether any individual face was paired with hair in poor or good condition, and whether it was paired with an instruction to cut off as much hair as needed or as little as possible, was counterbalanced across participants.

Unlike in study 1 (where participants were provided with a text entry box and told to indicate their response in centimetres), in study 2 responses were on an 11-point Likert scale, with each point labelled from "1cm (or less)", "2cm"…, to "10cm", and "more than 10cm". After providing responses to all 48 client faces, participants were again shown each of the 48 faces one at a time (in a random order, and without accompanying information about hair condition), and this time asked to rate the attractiveness of each face "compared to your own face". Participants responded on a 21-point slider scale, with anchors at -10 ("Much less attractive than me"), 0 ("As attractive as I am"), and 10 ("Much more attractive than me"). Participants then completed the SIC, MVS, and MVI, and were debriefed via an online debrief statement.

Results

The amount of hair each participant recommended to be cut-off each client was averaged across the four faces of each of the 12 conditions (three levels of attractiveness x good/poor hair condition x client's wishes). As we adopted a Likert scale response format, these 12 means were approximately normally distributed and no transformations were applied. As in study 1, the MVS and MVI were combined into a single mate value factor, MVF (see Table 2). Each scale loaded strongly onto this factor (0.873) and it accounted for 76% of the total variance. As in Study 1, the MVF and SIC scores (the latter converted to z-scores), were then entered as covariates into a full-factorial 3 (client attractiveness: low, medium or high) x2 (condition of hair: poor or good) x2 (client's wishes: as little as possible or as much as needed) repeated-measures ANCOVA. In this analysis we controlled for age in the final model as it positively correlated with the dependent measure across all conditions (see Table 2), and accounted for significant variance ($F(1,253) = 6.250$, $p = .003$, $\eta_p^2 = .024$). The two participants who declined to provide their age were assigned the mean age of 35 for these analyses. For the repeated measures effects in this model, we adopted

multivariate comparison procedures (Wilks' λ) due to multiple violations of the assumption for sphericity.

Table 2 Pearson *r* correlations between all individual difference variables and between the individual difference variables and the dependent variables for Study 2.

Individual difference variables			1.	2.	3.	4.	5.
1. Age			-				
2. MVI (Mate Value Inventory)			**.209****	-			
3. MVS (Mate Value Scale)			.078	**.525****	-		
4. MVF (Mate Value Factor)			**.164****	**.873****	**.873****	-	
5. SIC (Scale for Intrasexual Competitiveness)			-.001	**-.167***	.054	-.065	-
Dependent variables							
Client Attractiveness	Hair Condition	Client Wishes					
Highly Attractive	Good	Min	**-.159***	-.079	.005	-.043	.111$^{\#}$
		Max	-.109$^{\#}$	-.026	.006	-.011	.090
	Poor	Min	**-.128***	-.023	-.017	-.023	.084
		Max	-.098	.044	-.012	.018	-.024
Mid-level Attractive	Good	Min	**-.167****	-.051	.021	-.017	**.148***
		Max	**-.154***	-.034	.021	-.007	.078
	Poor	Min	**-.154***	-.052	-.035	-.049	.092
		Max	-.119$^{\#}$	.007	-.016	-.005	-.016
Unattractive	Good	Min	-.116$^{\#}$	-.048	.006	-.024	.113$^{\#}$
		Max	**-.126***	.006	.017	.014	.047
	Poor	Min	**-.156***	-.032	-.017	-.028	.082
		Max	**-.140***	.028	.034	.036	-.021
Note. *p<.05, **p<.01, $^{\#}p$<.1							

We observed significant main effects of hair condition (λ = .252, F(1,253) = 752.7, p < .001, η_ρ^2 = .748) and client wishes (λ = .345, F(1,253) = 480.5, p < .001, η_ρ^2 = .655), as participants cut off more hair when it was in poor condition, and when clients indicated they were happy for as much as necessary to be removed. As in study 1, we also observed a significant interaction between these variables, (λ = .737, F(1,253) = 90.44, p < .001, η_ρ^2 = .263). The effect of client wishes was larger when hair was in poor condition (p < .001, η_ρ^2 = .607) than when it was in good condition (p < .001, η_ρ^2 = .570), since participants recommended cutting off the most hair when it was in poor condition, and the client was happy for as much to be cut-off as needed.

We also observed a significant main effect of client attractiveness (λ = .975, F(2,252) = 3.296, p = .039, η_ρ^2 = .025), qualified by a significant interaction between client

attractiveness and hair condition (λ = .897, F(2,252) = 14.40, p < .001, η_ρ^2 = .103). For hair in both good and poor condition, the simple effects of attractiveness were significant (good: λ = .897, F(2,252) = 14.46, p < .001, η_ρ^2 = .103; poor: λ = .962, F(2,252) = 4.984, p = .008, η_ρ^2 = .038). When hair was in good condition, participants recommended cutting the most hair off the clients of average attractiveness, and the least hair off the most attractive clients (all pairwise comparisons across levels of client attractiveness were significant, all p < .011, see Figure 3A). When hair was in poor condition, the effects of client attractiveness were reversed with the least hair cut off the clients of average attractiveness, compared to both the least attractive (p = .002) and most attractive (p = .039) clients, with similar amounts of hair cut off the least and most attractive clients (p = .250, see Figure 3B).

We also observed a significant three-way interaction between hair condition, client wishes, and intrasexual competitiveness (λ = .984, F(1,253) = 4.184, p = .042, η_ρ^2 = .016). To test our prediction that participant intrasexual competitiveness would most strongly predict the amount of hair cut off when the hair was in good condition and the client wanted the least amount cut off as possible, we examined the main effect of the intrasexual competitiveness covariate across four follow-up ANCOVA models (each with attractiveness of the client as the repeated-measure). As predicted only when the client's hair was in good condition and the client wanted the minimum amount of hair cut-off, did participant intrasexual competitiveness significantly predict how much hair was cut off (F(1,253) = 4.785, p = .030, η_ρ^2 = .019). At the other three combinations of client wishes by hair condition, the main effect of intrasexual competitiveness was not significant (all F(1,253) < 2.594, all p > .109, all η_ρ^2 < .010).

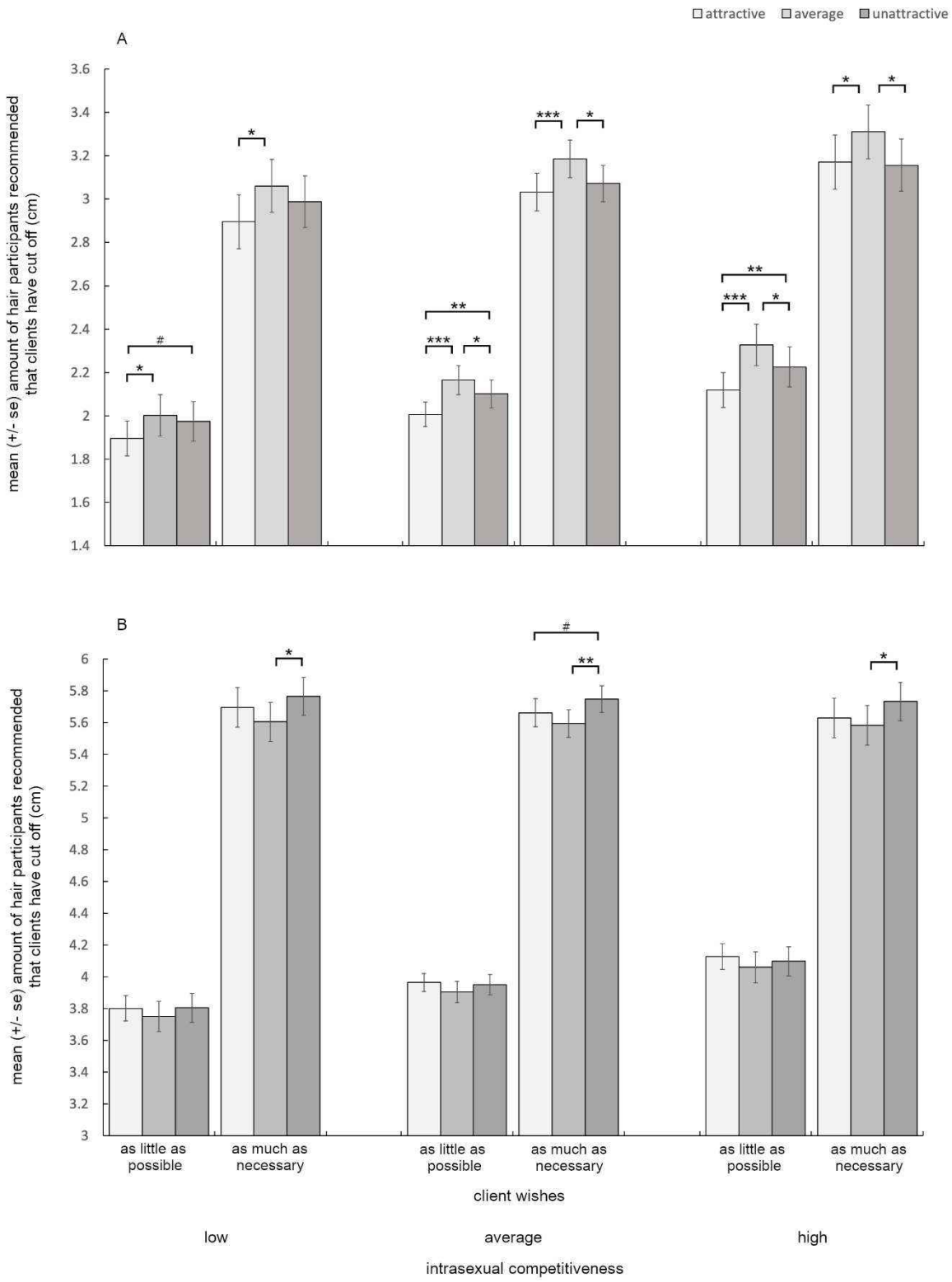

Figure 3. Effect of client attractiveness and intrasexual competitiveness on amount of hair cut off when hair was in (A) good condition and (B) poor condition

The only other significant term in the model, was the four-way interaction between client wishes, client attractiveness, intrasexual competition and mate-value (λ = .971, $F(2,252) = 3.744$, p = .025, η_ρ^2 = .029). As we did in study 1, we probed this interaction by estimating the three-way interactions, at low and high levels of each covariate, respectively. The three-way interaction between client wishes, client attractiveness, and mate value was not significant at either high (λ = .986, $F(2,252) = 1.756$, p = .175, η_ρ^2 = .014) or low (λ = .982, $F(2,252) = 2.270$, p = .105, η_ρ^2 = .018) levels of intrasexual competition. Similarly, the three-way interaction between client wishes, client attractiveness and intrasexual competition was not significant at either high (λ = .994, $F(2,252) = 0.769$, p = .465, η_ρ^2 = .006) or low (λ = .981, $F(2,252) = 2.399$, p = .093, η_ρ^2 = .019) levels of mate value. As with the five-way interaction in study 1, we therefore concluded that this four-way interaction was not reliably interpretable.

The relative attractiveness ratings of the faces were then used to examine how clients' attractiveness, relative to the participant predicted how much hair was cut off. We split the faces (uniquely for each participant) into those the participant perceived as less attractive than themselves (rated less than -1), more attractive than themselves (rated more than 1), as attractive as themselves (rated from -1 to 1). We initially inspected how the amount of hair cut off was distributed over the full factorial model, replacing the three *a priori* attractiveness levels with the three relative attractiveness levels (less attractive than me, as attractive as me, more attractive than me). However, since the allocation of stimulus faces to categories was dependent on how participants rated them, we couldn't guarantee scores in all cells for all participants (if a participant chose not to label any of the faces presented with poor hair condition and flexible client wishes as less attractive than themselves, then they would have no score in that cell). Only 64 participants had data in all cells over the full factorial model. When we averaged over hair condition and client wishes, 189 participants had data in all cells. We therefore modelled the impacts of relative client attractiveness using these 189 participants, and a one-way (relative attractiveness: less attractive than me, as attractive as me, more attractive than me), repeated-measures ANCOVA with MVF and SIC scores as the covariates, controlling for age.

Here, we observed no significant main effect of relative attractiveness (λ = .994, $F(2,183) = 0.559$, p = .573, η_ρ^2 = .006), but we did see a significant interaction between relative attractiveness and intrasexual competition (λ = .961, $F(2,183) = 3.731$, p = .026, η_ρ^2 = .039). At low levels of intrasexual competition (one and a half standard deviations below the mean), participants cut more hair off women they perceived to be as attractive as themselves, compared to women they perceived to be less attractive than themselves (p = .028). At high levels of intrasexual competition (one and a half standard deviations above the mean), this pattern reverses and participants cut less hair off women they perceived to be as attractive as themselves, compared to women they perceived to be less attractive than themselves (p = .023). None of the pairwise comparisons involving women perceived as more attractive than the participant, were significant at either high or low levels on intrasexual competition (all p > .090).

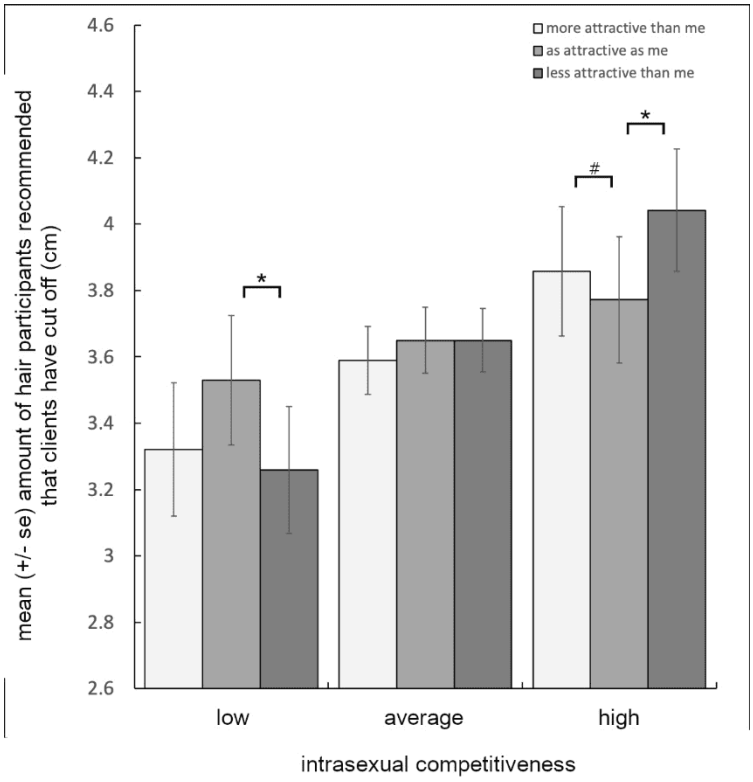

Figure 4. Effect of relative attractiveness and intrasexual competitiveness on amount of hair cut off

In addition to using the relative attractiveness ratings to re-classify stimuli for the above analyses, we also analysed the ratings themselves, to determine the extent to which they were related to participants' intrasexual competitiveness. We subjected the ratings to a one-way repeated-measures ANCOVA, with client attractiveness as the within-subjects variable (3 levels: low, average, high) with mate-value, intrasexual competition, and their interaction as covariates, controlling for age. In this model, both age ($F(1,253) = 17.66$, $p < .001$, $\eta_\rho^2 = .065$) and mate value accounted for significant variance ($F(1,253) = 35.71$, $p < .001$, $\eta_\rho^2 = .124$). Since ratings were provided on a self-referent scale (less attractive than me – more attractive than me) it is unsurprising that younger women and women of higher self-reported mate-value provided lower overall scores. Also unsurprising was the main effect of client attractiveness ($\lambda = .254$, $F(2,252) = 370.2$, $p < .001$, $\eta_\rho^2 = .746$), with participants providing the highest ratings for the highly attractive women and the lowest ratings for the women of low attractiveness (all pairwise simple effects were significant, all $p < .001$, all $\eta_\rho^2 > .599$). More interesting was the significant main effect of intrasexual competitiveness ($F(1,253) = 5.520$, $p = .020$, $\eta_\rho^2 = .021$), as more competitive participants tended to provide lower overall scores. There was also a significant interaction between client attractiveness and intrasexual competitiveness ($\lambda = .967$, $F(2,252) = 4.277$, $p = .015$, $\eta_\rho^2 = .033$). The interaction was best accounted for by the observation that (while simultaneously controlling for mate-value and age) intrasexual competition negatively predicted the relative attractiveness ratings given to the women of low ($\beta = -.185$, $t = 3.233$, $p < .001$) and average ($\beta = -.133$, $t = 2.298$, $p = .022$) attractiveness, but to the women of high attractiveness ($\beta = -.079$, $t = 1.358$, $p = .176$). No other main effects or interactions were significant (all other ps > .317).

To summarise the key results of Study 2, intrasexual competition scores positively predicted how much hair was cut off when clients' hair was in good condition, and the clients wanted the least amount possible cut off. When clients' hair was in good condition, participants cut the most hair off the clients of average attractiveness, and the least hair off the most attractive clients. When the relative attractiveness (relative to each participant's self-perceived own attractiveness) of the clients was considered, participants low on intrasexual competition cut more hair off those clients they rated to be as attractive as themselves, compared to those they rated to be less attractive than themselves. Highly

intrasexually competitive participants reversed this effect, cutting more hair of those clients they rated to be less attractive than themselves, compared to those they rated to be as attractive as themselves. When the relative attractiveness ratings were themselves analysed, it was revealed that intrasexual competitiveness negatively predicted the ratings given to clients of both low and average attractiveness, but did not predict the ratings given to the highly attractive clients.

Discussion

In Study 2, we sought to clarify the impacts of client attractiveness on the amount of hair participants recommended that those clients have cut off. Under the circumstances most conducive to intrasexual competition (when participants hair was in good condition, and the clients wanted as little hair as possible cut off – the only combination of conditions under which SIC scores directly predicted how much hair was cut-off), participants recommended cutting the most hair off clients of average (compared to high or low) attractiveness. We also replicated the observation from Study 1, whereby more hair was cut off the least attractive clients, compared to the most attractive clients.

Interactions between client attractiveness and participant intrasexual competitiveness, suggest a reasonably straightforward account of how disingenuous appearance advice manifests as female intrasexual competition. the primary targets are other women of average to low attractiveness. There is an apparent inconsistency, however, in terms of how intrasexual competition moderates this effect. Analyses based on the absolute attractiveness categories of clients, indicate that the impacts of client attractiveness remain consistent across the range of intrasexual competitiveness. The most hair is cut from the clients of average attractiveness, followed next by those of low attractiveness, but this effect increases with participant intrasexual competitiveness. As women report being more competitive, their advice is more strongly impacted by client attractiveness. This interpretation is also consistent with the results of Study 1.

The analyses based on clients' attractiveness relative to the participants, suggests a different pattern. According to these data, highly competitive participants primarily target those they perceive to be less attractive than themselves (rather than those they perceive to be as attractive). This paradox could be resolved by considering that highly competitive

participants generally perceived the clients of average attractiveness to be less attractive than themselves. While this is how highly competitive participants rated the clients of average attractiveness (as less attractive than themselves), they still rated them as more attractive than the clients of low attractiveness and still cut more hair from them. Self-reported mate value and intrasexual competitiveness were largely unrelated in our sample, so it is unlikely that highly competitive participants, generally, were any more attractive themselves than less competitive participants. Instead, we suggest that the lower relative attractiveness ratings that highly competitive participants gave to the clients of average (and low) attractiveness are probably indicative of derogation (Fisher, 2004). Intrasexual competitiveness negatively predicted relative attractiveness ratings, (for average and low attractiveness clients, after controlling for mate value and age), further suggesting that derogation played a role in those ratings.

The above is an important point, because it changes the apparent interpretation of the impacts of relative attractiveness. We don't believe that highly competitive participants are actually shifting the primary focus of their competition to rivals they perceive to be less attractive than themselves. Rather, we think it most likely that highly competitive participants are primarily targeting their mate quality peers, just as less competitive participants are. But highly competitive participants were also more derogatory when rating the attractiveness of these peers, being more likely than other participants to shift their mate quality equals into the 'less attractive than me' category. As such, the results of Studies 1 and 2 together suggest that in the context of advice given to a putative stranger, in the absence of any immediate mating target, or any overt competitive threat, women direct disingenuous appearance advice primarily towards their mate quality equals, and secondarily towards those who rank lower (rather than higher) than themselves.

General Discussion

Indirect aggression is a primary vehicle for female intrasexual competition. Across two studies, we investigated an understudied mode of indirect aggression, rival manipulation via disingenuous or damaging appearance advice. Participants advised hypothetical salon clients how much hair they ought to have cut-off. When the hair was in good condition and clients advised that they wanted as little as possible cut-off, participants' self-reported intrasexual competitiveness positively predicted how much hair

they recommend that clients have cut off. Client attractiveness also impacted how much hair participants recommend they have cut off. When the hair was in good condition and clients advised that they wanted as little as possible cut-off, participants recommended cutting the most hair off clients of average attractiveness, and also tended to cut more hair from clients of low attractiveness, compared to clients of high attractiveness. When clients' relative attractiveness (relative to participants' own attractiveness) was considered, participants who were relatively low on intrasexual competition recommended cutting the most hair off clients they perceived to be as attractive as themselves. Participants who were high on intrasexual competitiveness recommended cutting the most hair off clients they rated as being less attractive than themselves. We attributed this shift to rival derogation impacting the attractiveness ratings, however (see detailed argument above), concluding that across the spectrum of intrasexual competitiveness, women primarily targeted their mate quality peers with advice to cut off more hair. Participants' self-reported mate value played a negligible role in all of these effects. The current findings support appearance advice as a vector for female-female competition.

An unexplored distinction is whether recommendations to cut off excess amounts of hair constituted attempts to reduce rivals' physical attractiveness (since men consider longer hair more to be more attractive, Mesko & Bereczkei, 2004), or to hobble rivals' capacity to signal sexual intent (since long hair worn out, rather than tied back, may be interpreted as a signal of potential sexual availability, Matz & Hinsz, 2017). Either or both of these outcomes may have influenced responses in the current study. It is possible, for example, that advice to cut more hair off clients of low attractiveness (compared to those of high attractiveness) reflect attempts to curtail such women's capacity to signal sexual intent. Since these rivals were already perceived as substantially less attractive than the participants, and both female and male mating preferences actively encourage assortative mating by mate value (Williams & Sulikowski, 2020), it seems unlikely that the majority of participants perceived these less attractive rivals as long-term mating threats, or would have much to gain by further lowering these rivals' attractiveness. However, a lower quality rival may be able to mate upwards by signalling sexual availability for relatively little male investment (Buss & Schmidt, 1993; Gangestad & Simpson, 2000; Regenerus 2012), effectively lowering the market price of sex. Hence, limiting a low-quality rivals' capacity to

signal sexual availability by encouraging her to cut off of more of her hair, could be a competitive tactic targeting promiscuity. Women are known to use intrasexual competitive tactics to police each other's promiscuity, (Ayers & Goetz, 2022; Muggleton, *et al*., 2019; Vallaincourt & Sharma, 2011). Whether or not limiting promiscuity was one of the motive's driving participants' responses in the current study cannot be determined based on our data, but is an interesting possibility for future studies to investigate.

It is unsurprising that the impacts of participant intrasexual competitiveness and client attractiveness on how much hair was cut off, were attenuated when clients' hair was in poor condition. When hair has extensive split ends, it becomes ambiguous whether or not cutting off substantial amounts would constitute rival sabotage. On the one hand it reduces the overall length of the hair, which we argue does constitute rival sabotage when that hair is in good condition. On the other hand, the best way to immediately improve the look of hair with extensive split ends, and to eventually allow that hair to grow back longer and healthier, is to cut all of those split ends off. This makes it difficult to determine whether appearance sabotage would manifest as cutting off more or less hair with extensive split ends. In study 2, there was an apparent reversal of the impacts of client attractiveness when the hair was in poor condition, with the least hair cut off from clients of average attractiveness (compared to when hair was in good condition, and the most was cut off these clients). This tempts us to suspect that cutting off less hair when extensive split ends were present, especially when clients indicated that they were happy for as much as needed to be cut off, may well have constituted rival sabotage. However, the current data are not sufficiently compelling on this point. Another study designed to untangle the competing motives of cutting off another woman's hair to make it shorter, versus cutting it off to make it healthier, would be needed to draw firm conclusions on this point.

Our brief review of prior findings suggested that in the absence of an overt mating threat, female intrasexual competition would more likely to manifest in a downward direction, than in an upward direction. Indeed, we observed that women of low attractiveness were targeted more so than women of high attractiveness in both studies. Study 2, however, revealed that the primary targets of competition in our study were women of average attractiveness, those perceived by participants to be as attractive as themselves. Least targeted were highly attractive women. These are interesting

observations because the primary costs of female indirect aggression are the risk of retaliation and reputational harm (an aggressing female may be perceived as less kind, and therefore less appealing as a prospective mate Fisher *et al.*, 2010,). The hypothetical context presented within the current studies appears especially conducive to risk-free aggression. The client is ostensibly a stranger with no future interactions or opportunities for retaliation implied. Placing the participant in the role of the hairdresser also provides a circumstance in which it would be necessary for some hair to be cut-off, introducing plausible deniability that an act of aggression had taken place at all. That aggression was nevertheless attenuated by client attractiveness, suggests that the associated risks may not be the primary factor driving women to refrain targeting their competitive tactics towards highly attractive rivals.

Assortative mating means that competitors who are too far out of your league are likely targeting mates who are also too far out of your league (Williams & Sulikowski, 2020). As such, highly attractive women may not actually present a mating threat for the majority of other (less attractive women), and so may not be perceived as relevant rivals. Equally, while some appearance sabotage tactics may have devastating potential (such as using bullying to induce or exacerbate eating disorders, Abed, 1998; Lie *et al.*, 2019, most such tactics likely have only a limited capacity to harm rivals' appearance. A very attractive woman with short hair is still, in all likelihood, a very attractive woman. To provide any benefit to the actor, sabotage tactics with limited potential would need to target rivals whose attractiveness does not exceed the actor's by more than the sabotage can potentially overcome. Less hair cut from more attractive clients may therefore reflect a combination of a lack of mating threat presented by these clients (for the majority of participants, at least) coupled with the relatively limited capacity that excessive hair cutting has to sabotage a (highly attractive) rivals' appearance.

The largely null effects of participants' self-reported mate value warrant some consideration. The mate value factor we used explained substantial variance in the self-referential attractiveness score, suggesting that it was a reasonable proxy for participant attractiveness, and therefore mate value. We had initially hypothesised that in the current studies, intrasexual competition would be more likely to be directed down the mate value continuum, than up it. This led us to further predict that higher mate value women would

engage in more competitive behaviour (by cutting more healthy hair off clients who didn't want it cut-off), than lower mate value women. While we did observe more downward than upward competition, the primary targets were those clients which participants perceived to be as attractive as themselves. Such horizontal competition, coupled with the observation that intrasexual competitiveness and mate value were largely unrelated, leads us to a theory of stratified female-female competition. Assortative mating by mate quality means that any individuals' pool of potential mates and rivals is primarily comprised of people of similar mate value to themselves. The majority of mating interactions (whether intersexual attraction or intrasexual competition) likely play out between individuals of similar mate quality. Fisher and Fernandez (2017) have previously mounted precisely these arguments, but they were at the time untested. Stratified female-female competition, defined by primarily horizontal competitive interactions occurring with similar frequency all along the mate value continuum, may account for a substantial proportion of competitive female-female interactions.

Conclusion

In the current study, female intrasexual competition via rival manipulation was investigated. More competitive participants advised hypothetical salon clients to cut off more hair when that hair was healthy and when clients expressed a wish to have as little hair cut off as possible. Participants advised clients they perceived to be as attractive as themselves to cut off the most hair, and also advised unattractive clients to cut of more than they advised highly attractive clients to cut off. Other than targeting women of similar perceived attractiveness, participants own mate-value had limited impact on haircut advice, suggesting that this type of female intrasexual competition manifests consistently along the mate value spectrum. We observed these effects in a context – advice about a haircut – that was ostensibly unrelated to any identifiable, or implied, mating opportunity or mating threat. These observations lead us to concur with Ayers and Goetz (2022), that future research should broaden the contextual scope within which female intrasexual competition is investigated. We suspect that intrasexually competitive motives may influence the full breadth of female-female interactions, whenever opportunities to manipulate the reproductive outcomes of other women present themselves, irrespective of whether or not those interactions involve an identifiable mating threat for any woman involved.

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