First Impressions from Faces:

Ideal Partner Preferences Dominated

by Attractiveness-Related Concerns

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To my own ideal partner, Amir,

and to my mother.

Abstract

When people first encounter a potential partner, they derive a wealth of objective and subjective impressions simply from their faces (e.g., age, gender, attractiveness, trustworthiness). Facial first impressions are consequential, for instance, impacting on decisions to approach a potential partner. Hence, it is relevant to have a solid theoretical understanding of how first impressions relate to ideal partner preferences, particularly as romantic relationship researchers primarily use verbal measures. The current research revealed that individuals can perceive traits and factors related to their ideal partner preferences in highly variable everyday face images, and these factors overlapped largely (although not completely) with those identified by face perception researchers. Partner preferences for face images were dominated by attractiveness-related concerns in both sexes. Further, a minimum-exposure paradigm revealed that, even in some non-romantic contexts, attractiveness is particularly salient in face images. Yet, these findings could not be attributed to an attractiveness halo effect, given that attractiveness did not dominate all non-romantic first impressions of face images (e.g., evaluations of faces in terms of occupations). There are multiple potential reasons why individuals might prioritise facial attractiveness (e.g., from an evolutionary perspective, attractiveness is a cue to fertility and resistance to environmental and genetic stressors). Of note, though, a verbal measure of partner preferences revealed that individuals prioritised warmth-trustworthiness, suggesting that face images and verbal measures may capture different elements of preferences. Therefore, these findings attest the relevance of using face images to complement verbal measures of partner preferences.

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Author's Declaration

This thesis was written by myself and represents my original work, with supervision from Professor Andy Young. This thesis has not been submitted for any other award at this or any other institution.

Portions of the ratings data in Chapter 2 were collected by Clare Sutherland as part of her MRes and, also, by Isobel Santos for her PhD. I reanalysed this data and collected additional ratings data, as outlined in the thesis.

Portions of the data from Chapters 2 and 4 were presented at the Society for Personality and Social Psychology meeting in San Diego, 2016, the British Society for the Psychology of Individual Differences meeting in York, 2015, and the Social Minds meeting in York, 2014 as follows:

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Chapter 1. Introduction

1.1. Overview

Romance and romantic partner preferences are culturally significant, largely pervading diverse forms of storytelling, such as classic fairy tales, plays, television series, and films. Partner preferences are consequential from the perspective of an individual – impacting on relationship satisfaction (Fletcher, Simpson, & Thomas, 2000b; Fletcher, Simpson, Thomas, & Giles, 1999) and predicting divorce (Eastwick & Neff, 2012) – and from business and evolutionary perspectives. For instance, the revenue from dating services in the United States is estimated to be valued at over $2 billion (Marketdata Enterprises Inc., 2012).

Romantic relationship researchers have examined the ideals that individuals hold concerning the traits and qualities that they seek in a partner, referring to these as mate preferences, ideal standards, and ideal partner preferences. In this thesis, the term *ideal partner preferences* refers to romantic preferences without taking into account whether a relationship has or has not been established. Further, the term *ideal partner model* is used throughout this thesis and, when this is referring to Fletcher et al.'s (1999) verbal model (outlined in the subsequent section), the term *ideal partner verbal model* is used. When the ideal partner model refers to the use of face images to represent the ideal partner factors and traits (see Themes Examined), the term *ideal partner face model* is used. Finally, throughout this thesis, many of the studies reported involved asking participants to rate face images in terms of their ideal partner preferences, these face ratings are referred to as *partner preference ratings*.

Even though there is much literature on first impressions impressions from real life situations or from brief naturalistic videos ("thin slice" judgements: Ambady, Bernieri, & Richeson, 2000; Ambady & Rosenthal, 1992; Naumann, Vazire, Rentfrow, & Gosling, 2009; Wall, Taylor, Dixon, Conchie, & Ellis, 2013), this thesis examined only first impressions from facial photographs. The rationale is that impressions from photographs are consequential in real life situations. In addition, online interactions often involve facial

photographs with little other information. These points are discussed in more detail within the Facial First Impressions.

This chapter, firstly, briefly outlines why it is important to understand ideal partner preferences, including what the consequences of these preferences. Secondly, facial first impressions are briefly reviewed, including the consequences of these impressions and the accuracy of facial first impressions. This section includes a brief discussion of a recent and ecological method of face sampling: The "ambient face images" approach. Thirdly, the correspondence between differing measures of partner preferences is reviewed, including an overview of four key perspectives accounting for low correspondence between measures. Finally, the themes examined in this thesis are outlined.

1.2. Ideal Partner Preferences

Individuals have ideals with regards to almost all facets of their life. For instance, the ideal friend is expected to be supportive, the ideal home is expected to be safe, and the ideal Internet connection is expected to be reliable. Interdependence theory (Thibaut & Kelley, 1959) posits that individuals contrast their expectations with their actual experiences. When individuals' lived experiences fall short of their ideals, they might feel unsatisfied and motivated to alter their situation, for example, by confronting an unsupportive friend, by changing the locks in their homes, or by complaining about the Internet. Ideals are functional and consequential, provoking individuals to evaluate and, if need be, regulate their situation. Ideals in relation to romantic partner preferences may serve a similar regulatory function (see Ideal Standards Model).

In the romantic relationship domain, when individuals consider their ideal partner preferences, they typically focus on three core types of questions: Do I want someone who is kind and supportive? Do I want someone who is successful with a nice house? And, do I want someone who is sexy with a nice body? In a series of questionnaire-based studies, Fletcher et al. (1999) provided empirical support for a tripartite structure to ideal partner preferences: Warmth-trustworthiness (consisting of items such as kind and supportive), vitality-attractiveness (consisting of items such as sexy and nice body), and status-resources (consisting of items such as successful and nice house). Specifically, Fletcher et

al. asked participants to list the qualities that they associated with an ideal partner (Study 1), they then asked another group of participants (Study 2) to rate these 49 qualities regarding the importance they have in describing their ideal partner in a long-term relationship, and, finally, an exploratory factor analysis revealed a tripartite structure.

The ideal partner factors are consistent with previous research on partner preferences. For example, Fletcher et al.'s (1999) warmth-trustworthiness factor overlaps with Simpson and Gangestad's (1992) personal/parenting romantic partner factor (consisting of items such as qualities of a good parent, responsibility and kindness) and with the preferred romantic partner traits identified by both Hill (1945) and Christensen (1947), such as dependable character, emotional stability and maturity. The status-resources factor embodies Hill's (1945) and Christensen's (1947) preferred romantic partner trait: Good financial prospect. The vitality-attractiveness factor overlaps with Hill's (1945) and Christensen's (1947) preferred romantic partner trait: Good looks. Further, the status-resources and vitality-attractiveness factors combined encompass Simpson and Gangestad's (1992) attractiveness/social visibility romantic partner factor (consisting of items such as physical attractiveness, financial resources, and social status). Of note, Gangestad and Simpson (2000) found a low correlation between indicators of attractiveness and social visibility, suggesting that these may be distinct elements rather than constituents of the same factor, underscoring the possibility of a three-factor structure to partner preferences.

Fletcher et al.'s (1999) approach was novel, being the first to design a questionnaire measuring partner preferences based on items generated by participants' descriptions. The ideal partner verbal factors are well established and the Ideal Partner Scale has become the standard measure for testing individual differences in ideal partner preferences (Campbell, Simpson, Kashy, & Fletcher, 2001; Fletcher, Kerr, Li, & Valentine, 2014; Fletcher, Simpson, & Thomas, 2000a; Fletcher et al., 2000b, 1999). Of note, face images are comparable to the natural and heterogeneous contexts in which people evaluate potential partners in real life, relative to verbal measures. Yet, research has not explored the validity of ideal partner factor structure in relation to face images; this point is discussed in the Themes Examined. The ideal partner verbal factors were a precursor to the ideal standards model (Campbell et al., 2001; Fletcher et al., 2000a), which specifies the impact of ideal partner preferences on relationship regulation and reproductive success.

1.2.1. Ideal Standards Model

Based on evolutionary psychology (e.g., Gangestad & Simpson, 2000; Simpson & Gangestad, 1992), the Ideal Standards Model (Campbell et al., 2001; Fletcher et al., 2000a) posits that individuals make comparisons between their current relationships and their ideal standards in established relationships, once they have invested resources in their relationships (Van Lange et al., 1997). Hence, ideal partner preferences are used to explain, regulate, and evaluate relationships. Fletcher et al. (2000) suggest that individuals are most likely to compare their relationship and romantic partner to their ideal standards during important turning points such as when deciding whether to marry. A central tenet of the ideal standards model is that each ideal partner factor can lead to reproductive success (Campbell et al., 2001; Fletcher et al., 2000a). For example, some individuals may prioritise indicators of status in a partner, which may lead to reproductive gains since the partner has sufficient resources to cater for any children resulting from their union.

1.2.2. Predictive Validity on Relationship Outcomes

A relevant assumption in the romantic relationships literature is that ideal partner preferences have an impact on partner choice and relationship outcomes. Only one study has examined the predictive validity of partner preferences on actual relationship formation. Campbell, Chin, and Stanton (2016) investigated the ideal partner preferences of 426 single individuals and followed these individuals over five months, resulting in 38 couples (including the new partners that agreed to take part in the study). Findings revealed a positive correlation between stated ideal partner preferences when single and the self-reported traits of the new partner.

Much research has examined the predictive validity of ideal partner preferences on relationship outcomes, such as relationship satisfaction. Complementarity theories posit that differences in needs and characteristics can impact on relationship outcomes (Strodtbeck & Winch, 1959; Winch, Ktsanses, & Ktsanes, 1954; Winch, Ktsanses, & Ktsanses, 1955). Similarly, when people perceive a close match between their romantic partner and their ideal partner preferences (ideal-perception consistency), relationship satisfaction increases (Fletcher et al., 2000b, 1999). Eastwick and Neff (2012) conducted a

3.5 year longitudinal study of newlywed couples, revealing that the congruence between the pattern of ideals and perceived traits present in the partner negatively predicted divorce with a greater effect size, relative to many standard divorce risk factors (e.g., income, employment status, and stress). Further, in a 12-month longitudinal study investigating the consistency between ideal partner preferences and partner and relationship perceptions in 100 participants, Fletcher et al. (2000b) found that greater ideal-perception consistency resulted in individuals evaluating both their relationships and their partners more positively. Positive relationship perceptions predicted lower rates of relationship separation and, additionally, greater ideal-perception consistency predicted a lower risk of relationship separation, which was mediated by positive relationship perceptions (Fletcher et al., 2000b).

Other studies have replicated Fletcher et al.'s (2000b) findings. For example, in a nine month longitudinal study, Zentner (2005) found that ideal-perception consistency predicted higher relationship quality. Similarly, ideal-perception consistency predicted higher relationship quality for both individuals in the relationship (Campbell et al., 2001). Moreover, Overall, Fletcher, and Simpson (2006) found that ideal-perception consistency was negatively related to efforts made to modify the partner, specifically, regarding the factor in which the ideal-perception consistency was high. Of note, Schmitt (2014) indicates that evolutionary approaches do not directly relate to relationship evaluations given that reproductive success is the essential outcome, rather than relationship quality.

The research presented in this thesis focuses exclusively on first impressions of potential partners, as such, relationship outcomes were not examined. The evolutionary and social role perspectives are briefly outlined as follows as these provide divergent accounts for partner preferences.

1.2.3. Evolutionary Perspective

In his book, *The Descent of Man, and Selection in Relation to Sex* (1871), Darwin discussed the relation between sexual selection and human evolution. Evolutionary theories posit that partner preferences are adaptations to biological and social cues (Zebrowitz McArthur & Baron, 1983). Individuals preferring partners who display cues

reflecting their mate value (e.g., genetic quality or social status) would be at an advantage and would be more likely to produce healthy progeny, relative to individuals who either could not perceive these cues or who had no preference for these cues. From this perspective, partner preferences involve strategies to maximise genetic continuity both within and across generations (see Andersson, 1994, for a review of sexual selection). For example, preference for traits related to parasite-resistance may be beneficial as individuals are less likely to acquire a contagious partner (direct benefit) and genetic resistance to parasites is more likely to be passed on to progeny (indirect benefit; Gibson, 1990).

Given that women are obliged to invest more resources in their offspring (via gestation) relative to men (obliged contribution: Sperm), Trivers' (1972) parental investment theory posits that, to heighten reproductive success, women seeking a long-term relationship will be choosier when selecting a partner, prioritising traits related to the capacity (e.g., status) and motivation (e.g., warmth) to support offspring more than men. Insofar as men have larger variance regarding acquiring status, status-related traits will be less salient for men, relative to women. Nevertheless, Western societies typically now have good levels of gender equality in the workplace and home. Hence, sex differentiated preferences may be less relevant in these contexts (see Eagly & Wood, 1999; Eastwick, Luchies, Finkel, & Hunt, 2014; Zentner & Mitura, 2012).

Men's reproductive success is linked to acquiring a fertile partner and, as youth is associated with fertility for women to a greater degree than for men (Williams, 1975), evolutionary researchers hypothesise that men prioritise traits related to fertility, youth, and physical attractiveness more than women (Buss & Schmitt, 1993; Buss, 1989). Research has revealed an association between attractiveness and facial neotony (i.e., babyfaced features, including large eyes, full lips, small chins, and small noses; Jones, 1995; Jones & Hill, 1993; Puts, 2010). For example, Furnham and Reeves (2006) found that neotenous facial features were related to ratings of attractiveness, youthfulness, and healthiness in female face images. Still, research reveals that both sexes experience reduced fertility at approximately 40 years of age (Eijkemans et al., 2014; Leridon, 2004; Matorras, Matorras, Exposito, Martinez, & Crisol, 2011) suggesting that attractiveness-related traits not be relevant cues signalling fertility for women any more than they are for men.

Buss and Schmitt (1993) and Buss (1989) posit that sex differentiated mental adaptations underpin differing partner preferences for men and women, which evolved to maximise reproductive success. Sex differentiated partner preferences have been found in 37 cultures (Buss, 1989), which Buss suggests provides support for the universality of sex differentiated preferences. Research has revealed sex differentiated preferences for attractiveness and earning potential in meta-analyses on stated partner preferences (effect sizes: $d = .50 – .70$; Feingold, 1990, 1992a). In addition, sex differentiated preferences are present when either a long-term or a short-term relationship is considered (Buunk, Dijkstra, Fetchenhauer, & Kenrick, 2002; Kenrick & Keefe, 1992; Li & Kenrick, 2006; Shackelford, Schmitt, & Buss, 2005), with stronger sex differentiated preferences in the former (Kenrick, Groth, Trost, & Sadalla, 1993; Li & Kenrick, 2006). Moreover, in a reanalysis of Buss' (1989) data, studies have revealed that sex differentiated preferences diminish in countries with low risk of pathogens (Gangestad, Haselton, & Buss, 2006) and in countries with high levels of gender parity (Eagly & Wood, 1999; Zentner & Mitura, Study 2, 2012). Indeed, Zentner and Mitura (Study 1, 2012) replicated these findings in a different sample of 3,177 participants from 10 countries, providing support that socialisation impacts on preferences.

1.2.4. Social Role Perspective

The role of environmental factors on partner preferences is accounted for by social role theorists (Eagly & Wood, 1999; Eastwick et al., 2014). Social role perspectives posit that men generally have greater access to higher status positions relative to women and, as such, men are more likely to develop dominant behaviours to accommodate to these roles and to maximise potential for success in these positions (Eagly, Eastwick, & Johannesen-Schmidt, 2009; Eagly & Wood, 1999). Hence, social role perspectives posit that societal gender roles can result in sex differentiated accommodations (Eagly & Wood, 1999) with implications for partner preferences, as people choose a partner that will maximise their personal benefits (Hare, Thibaut, & Kelley, 1960). For example, in low gender parity countries, women and men may optimise their outcomes by respectively preferring partners with successful careers and partners with domestic skills. Indeed, participants who were asked to imagine themselves being a homemaker placed more importance on an older partner with status and less emphasis on domestic skills in a potential partner (Eagly et al.,

2009). Of note, a recent community-based twin study found that women's partner preferences for age and income had almost no genetic component, instead being primarily influenced by family environment (Zietsch, Verweij, Heath, & Martin, 2011).

As Western values progress towards gender equality, research has documented changes in sex differentiated preferences over time (Boxer, Noonan, & Whelan, 2013; Buss, 2001) For instance, the age difference in partners entering their first marriage is decreasing (U. S. Census Bureau, 2006) and women with higher socioeconomic status have a greater likelihood of marrying and increased fertility (England & Bearak, 2012; Macunovich, 2011; Sweeney & Cancian, 2004). Furthermore, Eastwick et al. (2014) conducted a meta-analysis of 95 studies to further examine the sex differentiated partner preferences relating to attractiveness and status factors. Eastwick et al. (2014) found that, for men and women, both attractiveness and, to a lesser extent, earning prospects were related to romantic evaluations. Eastwick et al. (2014) reported small and non-significant sex differences in the relationship between both attractiveness and romantic evaluations and between earning prospects and romantic evaluations.

1.2.5. Interim Summary

The Ideal Standards Model (Campbell et al., 2001; Fletcher et al., 2000a), firstly, suggests that individuals compare their ideal partner preferences with the traits they perceive in their partner (e.g., Janice would like a partner who is warm and trustworthy and she, also, perceives her partner to be high in these traits). Low consistency between ideal partner preferences and the perceived traits in a partner motivate individuals to regulate their relationships. Secondly, the Ideal Standards Model suggests that individuals prioritising any of the ideal partner factors would result in reproductive gains (Campbell et al., 2001; Fletcher et al., 2000a). The research presented in this thesis examined which ideal partner traits and factors are prioritised in first impressions of face images of potential partners (see Themes Examined).

Evolutionary and social role perspectives provide differing accounts of why individuals prioritise certain traits in their partner preferences. Specifically, these perspectives focus largely on sex differentiated partner preferences for attractiveness and status. These two

perspectives diverge as evolutionary theories posit that cultural factors have a non-causal role in influencing evolved characteristics, such as partner preferences, whereas social role theories propose that environmental factors do have a causal role (Eagly et al., 2009; Eagly & Wood, 1999; Zentner & Mitura, 2012). Whilst it seems reasonable to conclude that our ancestral past has left an imprint on partner preferences, research revealing the non-uniformity of sex differentiated partner preferences across cultures (Eastwick et al., 2014; Zentner & Mitura, 2012) attests to the interaction between culture and evolution in moulding partner preferences.

Given the literature on sex differentiated partner preferences, where possible, the data analyses presented in this thesis is separated by participant sex within the Appendices. Nevertheless, the literature on sex differentiated preferences has mostly focused on verbal measures of heterosexual partner preferences. Hence, Chapter 8, Future Directions outlines possible methods of testing heterosexual, non-heterosexual, and polyamorous sex differentiated partner preferences using face images. The subsequent section reviews facial first impressions, given that face images are used to capture partner preferences in the research presented within this thesis.

1.3. Facial First Impressions

Social impressions from face images have been examined extensively since Galton (1879), with findings revealing consensus in trait inferences. In this thesis the term facial first impressions refers to *fast and consequential social inferences from visual facial cues* derived from Quadflieg and Macrae's (2011) definition of person perception. Face perception researchers have explored the facial cues involved in these inferences. For instance, Secord and other researchers asked participants to rate face images on facial cues (e.g., distance between the eyes) or on traits (e.g., intelligence; Secord, Dukes, & Bevan, 1954; Secord, 1958). Findings revealed equivalent consensus regarding ratings on facial cues and on traits. Further, certain traits and cues were related, for example, older face images with thin lips were deemed to be intelligent. Other research identified that global facial traits impact on other social evaluations (for a recent review, see Zebrowitz, 2011). For example, the global facial trait attractiveness is related to competence and intelligence (Eagly, Ashmore, Makhijani, & Longo, 1991) and the global facial trait babyfacedness is

related to physical weakness, submissiveness, honesty, kindness, and warmth (Berry & Zebrowitz McArthur, 1986; Montepare & Zebrowitz, 1998; Zebrowitz McArthur & Apatow, 1984; Zebrowitz & Montepare, 1992).

Researchers have used objective data-driven approaches to model social impressions of faces, exploring the facial cues used in trait evaluations (Oosterhof & Todorov, 2008; Said & Todorov, 2011; Todorov, Dotsch, Wigboldus, & Said, 2011; Todorov & Oosterhof, 2011). Blanz and Vetter (1999, 2003) developed a statistical model whereby 3D scans derived from real faces can be manipulated within a multidimensional face space. This methodology enables researchers to create countless distinct face images whilst being able to control for trait evaluations and facial cues. Hence, the facial cues implicit in a specific trait evaluation can be visually represented. Such computational models of facial social impressions have been widely validated (Oosterhof & Todorov, 2008; Todorov, Dotsch, Porter, Oosterhof, & Falvello, 2013; Walker & Vetter, 2009). This thesis presents a historical overview of semantic evaluations and dimensional models and, also, research that examined a widely used face evaluation model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) in relation to the ideal partner model using face images (see Themes Examined and Chapter 3). The face perception model is briefly reviewed as follows.

1.3.1. Historical Overview of Semantic Evaluations and Dimensional Models

Researchers posit that various key universal dimensions underlie person perception and have evolved to maximise survival. For instance, Asch (1946) asked participants to make social evaluations of an individual characterised by a list of trait adjectives (e.g. practical, industrious, and intelligent), with the addition of either the trait “warmth” or “cold”. Findings revealed that the traits “warmth” or “cold” are central traits, instrumental in shaping social evaluations. In addition, studies using paradigms involving small interactive groups have revealed social (warmth) and task (competence) dimensions (Bales, 1950), with a third dimension (volume of interaction; Bales, 2000) that may be specific to live person perception settings.

Osgood (1964) investigated cross-cultural linguistic dimensions in a study involving 15 countries, in which each country developed their own linguistic scales to avoid translation biases. Findings revealed a tripartite structure: Evaluation (relating to the adjective pair "good-bad"), potency (relating to the adjective pair "strong-weak"), and activity (relating to the adjective pair "active-passive"). Osgood's tripartite structure overlaps largely with Fletcher et al.'s (1999) three ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and, also, with the face perception factors (trustworthiness/valence, dominance, and youthful-attractiveness; Oosterhof & Todorov, 2008; Sutherland et al., 2013; see Face Perception Model).

Furthermore, research by Rosenberg, Nelson, and Vivekananthan (1968) involved participants grouping 64 traits in terms of how likely traits within the same group were descriptive of the same individual (i.e., if Mary is kind, she is also likely to be considerate if these traits are grouped together). Multidimensional scaling and further analyses revealed a social good–bad dimension (including the traits warm, sociable, and good-natured, amongst others) – which accounts for Asch's (1946) findings concerning warmth and cold – and an intellectual good–bad dimension (including the traits determined, skilful, and industrious, amongst others and their antagonistic traits). Other researchers (e.g., Fiske, 1980) have revealed a bidimensional structure (sociability and responsibility) underlying person perception when presenting photographs of individuals to participants.

Hence, research from independent groups converge that person perception is largely characterised by dimensions that can be represented by warmth and competence. Indeed, Fiske, Cuddy, and Glick (2007) posit that warmth and competence are universal dimensions involved in person perception, accounting for 82% of the variance in person perception (Wojciszke, Bazinska, & Jaworski, 1998). For instance, 75% of over 1000 reported memories by participants and, even, social evaluations of familiar people fit within a morality (including the traits generous, honest, and understanding; these traits are additionally included in the warmth dimension) or a competence dimension (Wojciszke et al., 1998; Wojciszke, 1994). Fiske et al. suggest that identifying whether another individual has harmful (versus friendly) intentions is a primary concern encapsulated by the warmth dimension, followed by the identification of whether said individual has the abilities to cause harm (versus good), which is represented by the competence dimension. Fiske et al.

posit that warmth is a more salient dimension, relative to competence, and impact on affective and behavioural responses to a greater extent due to evolutionary pressures. Indeed, identifying whether an individual bears harmful intentions is of greater relevance relative to whether said individual can inflict harm (Fiske et al., 2007) and, hence, impacts on approach versus avoidance behaviours (Cacioppo, Gardner, & Berntson, 1997; Peeters, 2002).

1.3.2. Face Perception Model

Oosterhof and Todorov's (2008) model of face perception was derived by, initially, asking people for their spontaneous evaluations of 66 standardised face images. These spontaneous impressions were then categorised and reduced to 14 traits with the addition of dominance, based on models of interpersonal trait impressions (Wiggins, 1979). Oosterhof and Todorov, subsequently, obtained new face ratings on the 15 traits and a principal components analysis reduced the 13 most reliable trait evaluations into a bidimensional model: Trustworthiness/valence and dominance. These two dimensions remained even when excluding the dominance ratings. Of note, the face images Oosterhof and Todorov used did not vary substantially on age.

A potential limitation of data-driven approaches is that these are reliant on the face images with which the model was derived. Therefore, if the images do not vary enough on a certain dimension, this dimension will not be represented in the model. Indeed, Sutherland et al. (2013) revealed an additional youthful-attractiveness factor when using a database of highly variable face images obtained from the Internet, uncontrolled in terms of age amongst other elements.

Face evaluation models have evolutionary implications regarding both the appraisal of threat and partner preferences, with the objective of maximising survival and securing off-spring (Oosterhof & Todorov, 2008; Sutherland et al., 2013; Watkins, Jones, & DeBruine, 2010; Watkins, Fraccaro, et al., 2010). For instance, Sutherland et al. (2013) suggest that the youthful-attractiveness factor is related to sexual selection. Further, the trustworthiness/valence and dominance dimensions are respectively related to perceptions

concerning the intention and the capability for an individual to harm others (Oosterhof & Todorov, 2008).

Face stimuli representing low to high trustworthiness/valence seemingly progress along an angry to smiling continuum. Individuals appraise smiling faces, relative to angry faces, as trustworthy, unlikely to harbour harmful intentions, and approachable (Caulfield, Ewing, Burton, Avard, & Rhodes, 2014; Todorov, 2008; Zebrowitz, Kikuchi, & Fellous, 2010). In contrast, face images representing low to high dominance become increasingly mature and masculinised (Oosterhof & Todorov, 2008; Todorov & Oosterhof, 2011). Individuals perceive that mature, masculinised, individuals have the capacity to inflict harm (Fink, Neave, & Seydel, 2007; Oosterhof & Todorov, 2008). Puts (2010) suggests that masculinised traits evolved from within-sex competition pressures to enhance the appearance of dominance with the objective of monopolising women.

Oosterhof and Todorov's (2008) bidimensional model of face perception is supported by independent research. Research examining social judgements using face images has revealed a bidimensional model that is largely similar to Oosterhof and Todorov's model in terms of their underlying traits (Boothroyd, Jones, Michael Burt, & Perrett, 2004; Walker & Vetter, 2009). In addition, social and personality research have revealed that warmth and competence are key universal factors (e.g., research examining the perception of cultural groups; Cuddy, Fiske, & Glick, 2008; Leary, 1958; Vigil, 2009; Wiggins, 1979; Wojciszke, 1994; see Historical Overview of Semantic Evaluations and Dimensional Models), traits which are similar to Oosterhof and Todorov's model. Finally, the three dimensional model of face perception seems to overlap largely with Fletcher et al.'s (1999) ideal partner verbal factors (see Themes Examined and see Chapter 3).

1.3.3. Consequences of Facial Impressions

Facial impressions are both pervasive and consequential, with effects demonstrated in varied contexts, ranging from laboratory strategic games (Rezlescu, Duchaine, Olivola, & Chater, 2012; Tingley, 2014) to real-world contexts, including partner preferences (Olivola, Eastwick, et al., 2014), voting behaviour (Antonakis & Dalgas, 2009; Ballew & Todorov, 2007; Lawson, Lenz, Baker, & Myers, 2010; Lenz & Lawson, 2011; Little,

Burriss, Jones, & Roberts, 2007; Olivola & Todorov, 2010a; Todorov, Mandisodza, Goren, & Hall, 2005), and sentencing judgements (Blair, Judd, & Chapleau, 2004; Eberhardt, Davies, Purdie-Vaughns, & Johnson, 2006; Zebrowitz & McDonald, 1991).

Trait evaluations of face images are consequential in the romantic domain. For example, Olivola et al. (2014), revealed that, in a popular online dating website, photographs perceived as being smart and serious negatively predicted dating success for women and photographs perceived as being fun and outgoing positively predicted dating success for men. These effects remained after controlling for both attractiveness and the verbal data included in the online profiles. Further, Little, Burt, and Perrett (2006) have revealed that, when individuals perceive face images as depicting traits they prioritise in an ideal partner, these images are evaluated as being more attractive. Therefore, these findings suggest that the predictive validity of social impressions from faces of potential partners may be related to multiple traits, rather than only attractiveness.

Much research on the consequences of facial social impressions is correlational, using observational data to predict real life decisions. Nonetheless, other research has used experimental paradigms with manipulated face images, revealing causal links between facial impressions and real life outcomes. For instance, regarding the legal domain, research has revealed that facial social evaluations relate to legal decisions, when linking photographs with case evidence (Berry & Zebrowitz McArthur, 1988; Dumas & Testé, 2006; Porter, ten Brinke, & Gustaw, 2010).

Four factors have been shown to impact on whether a specific trait evaluation is consequential: Context, target ethnicity and gender, perceiver attributes, and the information available. Firstly, context impacts on whether a specific trait evaluation is consequential. For example, facial competence is a highly relevant trait within politics (Todorov et al., 2005). Facial competence is often the best predictor of electoral outcomes and this effect remains after controlling for other facial trait evaluations (Olivola & Todorov, 2010a), yet, facial dominance predicts military achievement (Loehr & O'Hara, 2013; Mazur, Mazur, & Keating, 1984; Mueller & Mazur, 1996, 1997). Secondly, facial trait evaluation is consequential as a function of the target ethnicity and gender. For instance, babyfacedness is negatively related to professional achievement in Caucasian

male CEOs, although, it is positively related to achievement in black male CEOs (Livingston & Pearce, 2009). Further, Chen, Jing, Lee, and Bai (2016) revealed that perceived male facial competence (i.e., skills and abilities) was more strongly related to past electoral success for US candidates relative to Taiwanese candidates, whereas perceived male facial social competence (i.e., interpersonal skills) was more strongly related to past electoral success for Taiwanese candidates relative to US candidates. Of note, male facial competence (but not female facial competence) predicted Finnish electoral outcomes (Poutvaara, Jordahl, & Berggren, 2009), yet, both male and female facial competence predicted US electoral outcomes (Olivola & Todorov, 2010a).

Thirdly and fourthly, facial trait evaluations are consequential as a function of the perceivers' attributes and the information available. For instance, facial competence impacts on voting decisions exclusively in individuals with both little political information and much television exposure (Lenz & Lawson, 2011). Further, within a strategic choice game paradigm, research has revealed that facial trustworthiness has a reduced impact on choices when individuals have access to information regarding their opponent's previous strategic decisions (Chang, Doll, van 't Wout, Frank, & Sanfey, 2010; Rezlescu et al., 2012). Of note, individuals still use facial social impressions to some degree, even when pertinent information is available (Olivola, Sussman, Tsetsos, Kang, & Todorov, 2012; Olivola & Todorov, 2010b).

Facial first impressions are likely to gain even wider real life implications, given the rise in social media and online interactions both in romantic and non-romantic contexts. For example, 38% of British adults are currently looking for a relationship and 50% of these use or have used online dating (YouGov, 2013). Further, on average, Facebook has over one billion daily active users (Facebook Inc., 2015a) with a revenue of almost $18 billion in 2015 alone (Facebook Inc., 2016). Of note, other social media tools focus primarily on enabling users to share photographs or videos, such as Instagram with 300 million users. Such interactions are typically characterised by few profile photographs with sparse additional written information. Hence, facial first impressions in these contexts may be particularly consequential regarding both interpersonal and economic prospects, since the most salient information available may often be a photograph.

1.3.4. Accuracy of Facial Impressions

Despite social attributions being consequential (e.g., Antonakis & Dalgas, 2009; Lawson et al., 2010; Lenz & Lawson, 2011; Olivola & Todorov, 2010a; Olivola, Eastwick, et al., 2014; Rezlescu et al., 2012; Tingley, 2014), there is mixed evidence regarding their accuracy (for recent reviews see Rule et al., 2013; Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015).

Research examining the accuracy of facial evaluations of the Big Five personality factors (extraversion, agreeableness, openness to experience/intellect, conscientiousness and neuroticism) has typically involved participants rating highly controlled face images of targets and comparing these ratings to targets' self-reports (Kramer & Ward, 2010, 2011; Little & Perrett, 2007; Penton-Voak, Pound, Little, & Perrett, 2006; Rule et al., 2013). Findings revealed that certain personality impressions from faces are evaluated with over-chance accuracy, particularly, extraversion, agreeableness, and neuroticism (A. L. Jones, Kramer, & Ward, 2012; Kramer & Ward, 2010, 2011; Little & Perrett, 2007; Penton-Voak et al., 2006; Rule et al., 2013). As Penton-Voak et al. (2006, p. 607) mention, there might be a "kernel of truth" in personality evaluations from controlled face images.

Concerning social group membership, various studies have revealed accurate facial impressions of political orientation (e.g., Carpinella & Johnson, 2013; Jahoda, 1954; Olivola et al., 2012; Olivola & Todorov, 2010a; Rule & Ambady, 2010; Samochowiec, Wanke, & Fiedler, 2010). For instance, individuals were 56% accurate when identifying political orientation (Republican versus Democrat) from pairs of face images (Olivola et al., 2012). Yet, these studies typically have not controlled facial cues (e.g., sex, ethnicity, and age), which can impact on social impressions from faces. For example, Republican candidates tend to be Caucasian, male, and older, relative to Democrat candidates (Olivola et al., 2012; Olivola, Tingley, Bonica, & Todorov, 2014). Olivola, Tingley, et al. (2014) reanalysed their facial impressions of political orientation data, revealing almost 51% accuracy when controlling for gender, ethnicity, and age. Hence, these findings suggest that demographic data can be used to gauge political orientation based on political stereotypes, with implications for accuracy of facial impressions on other domains (Todorov et al., 2015).

Further, Olivola, Tingley, et al. (2014) used simple heuristics to evaluate face images of candidate political orientation based only on sex, ethnicity, and age, (with the heuristics choosing randomly when there were no differences between these three categories), comparing the heuristics to human judges evaluating the same face images on political orientation. Findings revealed that the heuristics were superior to the human judges, suggesting that individuals rely on facial cues beyond sex, ethnicity, and age in evaluating political orientation, which can have a detrimental impact on these judgements. Likewise, Olivola and Todorov (2010b) revealed that individuals were less accurate when making evaluations (e.g., sexual orientation judgements) based on face images rather than when they simply relied on knowledge of base-rates (e.g., heterosexual orientation is more common relative to other sexual orientations) with no facial information and this was particularly the case for evaluations with unequal base-rates. As such, facial cues can negatively impact on the accuracy of evaluations, relative to other alternative sources of information. Indeed, Todorov et al., (2015, p. 15.15) suggest "…people may be better off ignoring subtle facial cues."

Yet, are people confident in their skills to infer social inferences from face images? Little research has examined how accurately individuals judge their performance when making face evaluation task (meta-accuracy: Estimated versus actual accuracy). Findings reveal low meta-accuracy for face evaluations (Ames, Kammrath, Suppes, & Bolger, 2010; Hassin & Trope, 2000; Olivola, Eubanks, & Lovelace, 2014; Olivola, Tingley, et al., 2014). Indeed, Olivola, Eubanks, et al. (2014) revealed poor meta-accuracy when asking participants to identify specific types of leaders (e.g., business CEOs, military generals) from face images. Participants were poor at identifying which specific trials they had been correct in identifying the leaders and, moreover, even those participants who were highly confident in their skills were not more accurate in their face evaluations. As such, individuals rely too much on facial cues when making evaluations and individuals are no more accurate in these evaluations even when they feel confident in their evaluations.

Much research assumes that trait inferences from a particular face image corresponds with the portrayed individual's apparent traits. Yet, within-person variation can be equal to between-person variation (Burton, Jenkins, & Schweinberger, 2011; Jenkins, White, van Montfort, & Burton, 2011; Todorov & Porter, 2014). For instance, Jenkins et al. (2011)

asked British participants to rate the attractiveness of 400 face images of Dutch celebrities (20 images of each 20 celebrities) who were unfamiliar to the participants. Findings revealed greater within-person variability, relative to between-person variability, for attractiveness evaluations. Therefore, different images of one individual can result in differing evaluations on traits, such as attractiveness.

The fact that image variability impacts on trait evaluations has implications on the accuracy of these evaluations. Individuals may post online photographs that they strategically select of themselves to portray a certain image, impacting on research using publically available images. For example, much research examining evaluations of sexual orientation from face images used photographs from online dating websites (e.g., Rule, Ambady, & Hallett, 2009). Research examining the accuracy of criminality evaluations have asked participants to evaluate mug shots of arrested individuals relative to university student photographs (Valla, Ceci, & Williams, 2011). As such, the context of these images can bias any trait evaluations made, nevertheless, information regarding context and whether images were strategically selected can still be valuable. For instance, research reveals that Facebook user profile information contains accurate trait information, even though this data was specifically chosen and made publically available by the users with the objective of representing their identity (Back et al., 2010; Vazire & Gosling, 2004).

In cases of accurate facial evaluations, questions remain regarding whether these can be attributed to biological or social factors. For instance, attractive children are more popular than their less attractive peers (Dion, 1972) and attractive individuals may obtain different socialisation throughout their lives, compared to less attractive people (Penton-Voak, 2011). As such, an attractive individual may have more positive social experiences throughout life, perhaps resulting in decreased facial aggressiveness and heightened facial trustworthiness. For example, with regards to facial competence, facially competent CEOs are employed by more profitable companies, yet, this association is dispelled when controlling for company profit before the CEO was hired (Graham, Harvey, & Puri, 2015).

To summarise, there is mixed evidence relating to the accuracy of facial impressions. Accuracy in certain personality evaluations (e.g., extraversion) is over chance levels. Yet, other research on the accuracy of facial evaluations has unclear findings with limitations,

such as image selection, impacting on accuracy. Nevertheless, considering that individuals can make trait evaluations from face images rapidly – in as little as 33 ms (Todorov, Pakrashi, & Oosterhof, 2009) – and these evaluations are consequential (e.g., Antonakis & Dalgas, 2009; Lawson et al., 2010; Lenz & Lawson, 2011; Olivola & Todorov, 2010a; Olivola, Eastwick, et al., 2014; Rezlescu et al., 2012; Tingley, 2014), facial impressions are relevant to examine, independent of their accuracy. The work presented in this thesis investigated first impressions of face images using highly variable, ambient, images. The ambient image approach is briefly reviewed as follows.

1.3.5. The Ambient Face Images Approach

Researchers have suggested that face perception research would benefit from using highly variable face images (Burton et al., 2011; Jenkins et al., 2011). Face perception studies largely use only one, or few, images of each individual, relying mainly on standardised photographs (e.g., controlled lighting, posture, amongst other features). Nevertheless, unconstrained cues within images may impact on within-person facial impressions (Burton et al., 2011; Jenkins et al., 2011). Jenkins et al. (2011) mention that naturalistic, highly variable photographs – termed "ambient images" – are unconstrained in terms of the variability, resulting in variation concerning posture, lighting, background, age, expression, and facial hair, amongst other factors. Ambient images are comparable to real life photographs, such as the images uploaded onto Facebook or Instagram.

Image variability is relevant for both identity recognition and first impressions of face images. Jenkins et al. (2011) and Todorov and Porter (2014) found that within-person variation in first impressions of face images can be equal to, or even greater than, between-person variation. Indeed, Burton, Kramer, Ritchie, and Jenkins (2015) revealed that the process of learning a new face involves learning the face in variable conditions (e.g., different posture and lighting). For instance, Jenkins et al. (studies 1 and 2) asked participants to sort 40 face images representing two Dutch celebrities into groups based on identity. UK participants, who were unfamiliar with the celebrities, sorted the images into a median of 7.5 identities. In contrast, Dutch participants, who were familiar with the celebrities, sorted the face images into a median of 2 identities. These findings underscore the relevance of using ambient images in research on first impressions of unfamiliar faces

to gain a cohesive understanding of person perception, as Jenkins et al. (p. 321) outline, to examine "how we tell people apart, but also how we tell people together."

Ambient images provide perceivers with more facial cues, relative to standardised images, resulting in a naturalistic exploration of facial impressions. For instance, Oosterhof and Todorov (2008) identified the trustworthiness/valence and dominance face perception factors using standardised face images, yet, when using ambient face images, Sutherland et al. (2013) revealed an additional youthful-attractiveness factor. The large within-person variability on attractiveness (Jenkins et al., 2011) and other traits (Todorov & Porter, 2014) has implications for the extensive face perception research that use only one or few images of the same individual. As such, these findings may relate to the photographs selected rather than the individual identity in a given photograph.

The research presented in the thesis includes trait judgements of face images, yet, this research accepts that these evaluations relate mainly to the face images used rather than trait judgements of the individuals portrayed in the images. As per Jenkins et al. (2011), the term "ambient images" is used to refer to highly variable facial photographs although, given that the research presented in this thesis focuses exclusively on first impressions, the ambient images referred to in this research only portray each individual once (see Themes Examined and Chapter 2). The research presented in this thesis uses an ambient image database, obtained from Santos and Young (2005, 2008, 2011), to examine facial attractiveness in partner preferences, which is briefly outlined subsequently.

1.3.6. Facial Attractiveness

Notwithstanding individual and cross-cultural differences in perceptions of attractiveness, inter and intra-cultural agreement on attractiveness is robust and widely documented (e.g., Cunningham, Roberts, Barbee, Druen, & Wu, 1995; see Langlois et al., 2000, for a meta-analytical review). This cross-cultural agreement on attractiveness indicates common (or similar) criteria underlying attractiveness judgements and suggests that these criteria are largely (although not completely) independent of cultural and person-specific influences. Various factors have a strong impact on facial attractiveness and, as such, are theorised to be cues regarding genetic quality: Symmetry, averageness, skin health and colour,

secondary sexual characteristics, personality attributes, and female hormonal status (see Rhodes, 2006, for a meta-analysis; for reviews see Fink & Penton-Voak, 2002; Penton-Voak, 2011), amongst numerous others; these are very briefly outlined as follows.

Perceptions of skin facial health and homogenous skin colour are related to facial attractiveness (B. C. Jones, Little, Burt, & Perrett, 2004; Roberts et al., 2005). Regarding colour, a diet rich in carotenoids (derived from fruit and vegetables) adds a yellow hue to the skin, which may be an "honest" signal of health (Lefevre, Ewbank, Calder, von dem Hagen, & Perrett, 2013; Stephen, Law Smith, Stirrat, & Perrett, 2009). Further, attractiveness is related to facial symmetry when using non-manipulated face images (Grammer & Thornhill, 1994; B. C. Jones, Little, Burt, et al., 2004; B. C. Jones et al., 2001; B. C. Jones, Little, Feinberg, et al., 2004; Penton-Voak et al., 2001; Scheib, Gangestad, & Thornhill, 1999) and computerised symmetry manipulations of face images (Mealey, Bridgstock, & Townsend, 1999; Penton-Voak et al., 2001; Perrett et al., 1999; Rhodes, Proffitt, Grady, & Sumich, 1998). Body symmetry is an indicator of better resistance to genetic and environmental stressors throughout ontogeny (see Møller, 1999, for a review) and symmetry is related to higher fertility and improved survival in individuals (Jasienska, Lipson, Ellison, Thune, & Ziomkiewicz, 2006; Manning, Scutt, Whitehouse, & Leinster, 1997).

Concerning facial averageness, this is related to attractiveness in both non-manipulated and manipulated face images, (Light, Hollander, & Kayra-Stuart, 1981; Rhodes & Tremewan, 1996). Averageness might be attractive as, firstly, faces with large deviations from the average often are homozygous for adverse, harmful, alleles (Thornhill & Gangestad, 1993). Secondly, average faces are correlated with genetic diversity, resulting in a person having uncommon proteins that provide better pathogen resistance (Mitchell & Grant, 1984; Thornhill & Gangestad, 1993).

With regards to secondary sexual characteristics, across cultures, facial femininity in women is associated with attractiveness both when using non-manipulated face images (Cunningham, 1986; Grammer & Thornhill, 1994; D. Jones & Hill, 1993) and manipulated facial composites (Perrett et al., 1998). The link between facial masculinity and attractiveness is less clear, with some studies finding a positive association between

attractiveness and masculinised dominant faces (e.g., when using manipulated images; DeBruine et al., 2006; Little & Mannion, 2006) and studies finding a positive association between attractiveness and feminised, submissive, faces (Berry & Zebrowitz McArthur, 1985; Cunningham, Barbee, & Pike, 1990; Little et al., 2009; Perrett et al., 1998). For example, Perrett et al. (1998a) asked Japanese and UK Caucasian participants to rate the attractiveness of own-race face images that varied on sexual dimorphism. Findings revealed that women preferred male faces that were feminised, average, and masculinised, whereas men preferred female faces that were either feminised or average. Of note, male secondary sexual characteristics are "honest" handicaps that advertise health (Folstad & Karter, 1992; Kanda, Tsuchida, & Tamaki, 1996; Yesilova et al., 2000; Zahavi, 1975; although see Scott et al., 2014) and have shown to be negatively related to health (Rhodes, Chan, Zebrowitz, & Simmons, 2003; Scott, Clark, Boothroyd, & Penton-Voak, 2013; Thornhill & Gangestad, 2006; although see Scott et al., 2013).

Female hormonal status has an impact on preferences for facial masculinity. For instance, women display greater preference for facial masculinity (Gildersleeve et al., 2013; Johnston, Hagel, Franklin, Fink, & Grammer, 2001; B. C. Jones et al., 2005; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999; see DeBruine et al., 2010 for a review), masculine voices (Feinberg et al., 2006; Puts, 2005, 2006), masculine bodies (Little, Jones, & Burriss, 2007), odour (Havliček, Roberts, & Flegr, 2005), and dominance (Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004) close to ovulation (time of maximum fertility) relative to during other menstrual phases, with reduced preferences for facial masculinity in postmenopausal or prepubescent women (e.g. Little et al., 2009; Vukovic et al., 2009). Gangestad, Garver-Apgar, Simpson, and Cousins (2007) found that, close to ovulation, women preferred masculinised traits for short-term partners whereas women's preferences for long-term partners remained stable over the ovulatory cycle. For example, Jane may prioritise trustworthiness in a long-term partner, however, close to ovulation Jane may additionally prefer attractiveness in a short-term partner. This effect was more pronounced in women when their partners were asymmetrical (Gangestad, Thornhill, & Garver-Apgar, 2005) or unattractive as short-term partners (Haselton & Gangestad, 2006; Pillsworth & Haselton, 2006).

A controversial account for these findings is that, during peak fertility, women may prioritise male masculinity due to its link with heritable disease resistance, whilst prioritising parental investment (e.g., a partner providing resources) via a long-term relationship during other menstrual phases when progesterone is increased in preparation for pregnancy (Gangestad & Thornhill, 2008). Nevertheless, DNA data has revealed extra-pair paternity rates of 1-2% (Larmuseau et al., 2013; Simmons, Firman, Rhodes, & Peters, 2004; although see Anderson, 2006), suggesting that few women may engage in extra-pair relationships, perhaps as this can jeopardise a long-term relationship. Alternative explanations abound, including that the cycle shift changes in preferences may be vestigial (Thornhill & Gangestad, 2008).

The research presented in this thesis focuses on trait evaluations of ambient face images, with particular emphasis on facial attractiveness, see Themes Examined. As such, the relation between facial attractiveness and other personality attributions is briefly discussed as follows.

1.3.6.1. Personality Attributions

The "what is beautiful is good" stereotype (Dion, Berscheid, & Walster, 1972) is supported by research revealing that attractive individuals are perceived to have desirable characteristics and they are perceived to live more fulfilling lives, relative to unattractive individuals. Across cultures, individuals prioritise personality characteristics in their partner preferences (Buss & Barnes, 1986; Buss, 1989; Zentner & Mitura, 2012). Hence, facial personality attributions may impact on facial attractiveness. For example, Perrett et al. (1998) revealed that masculinised faces are perceived as more dominant, older, less warm, less trustworthy, and less cooperative. Male facial masculinisation is, also, related to measures of physical strength (Fink et al., 2007). In addition, Boothroyd, Jones, Burt, DeBruine, and Perrett (2008) revealed that men with feminine characteristics are more likely to prefer long-term faithful relationships and less likely to prefer short-term relationships, relative to men with masculine characteristics.

Therefore, women seeking a long-term relationship with a trustworthy and understanding partner (qualities useful in parenting) may avoid masculinised men, finding them less

attractive. Cunningham et al. (1990) revealed that male facial masculinity and male facial femininity are moderately attractive, suggesting that the optimum attractive male face comprises of a combination of masculine and feminine facial characteristics that advertise different adaptive qualities (e.g., trustworthiness and health). As such, women are perhaps faced with a compromise between obtaining a supportive partner versus a partner with better disease resistance.

1.3.7. Interim Summary

In summary, this section has reviewed cues to social impressions from face images. Face perception researchers have identified a tripartite structure underlying social evaluations: Trustworthiness/valence and dominance (Oosterhof & Todorov, 2008), and youthful-attractiveness (Sutherland et al., 2013). Of note, the face perception factors appear to overlap largely with Fletcher et al.'s (1999) ideal partner verbal factors, which will be outlined in the Themes Examined (see, also, Chapter 3). Further, recently researchers have emphasised the relevance of using highly variable ambient image faces to ensure that perceivers are exposed to the facial cues present in naturalistic environments (Burton et al., 2011; Jenkins et al., 2011). In addition, facial attractiveness has a significant role in both partner preferences and person perception (Fletcher, et al., 1999; Sutherland et al., 2013), which was explored in the research presented in this thesis (see Themes Examined). Finally, the correspondence between measures of partner preferences was investigated within this thesis (see Themes Examined), focusing on measures using face images and verbal measures; a brief review is subsequently presented.

1.4. Correspondence Between Measures of Partner Preferences

Research has revealed that measurement type has an impact on the predictive validity of partner preferences, with often low correspondence between differing paradigms measuring partner preferences. For example, sex differentiated partner preferences have been revealed in research contexts with no physical contact with a potential partner, such as when rating face images or descriptions of potential partners (Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004; Greengross & Miller, 2008; Greitemeyer, 2007; Wenzel & Emerson, 2009), personal advertisements (de Vries, Swenson, & Walsh, 2008;

de Vries, 2010; Feingold, 1990, 1992a; Ha, van den Berg, Engels, & Lichtwarck-Aschoff, 2012; Pawlowski & Koziel, 2002), or online dating (Hitsch, Hortaçsu, & Ariely, 2010; Skopek, Schulz, & Blossfeld, 2010). In contrast, regarding research contexts in which there is physical contact with a potential partner, research has largely revealed no sex differentiated partner preferences (Eastwick & Finkel, 2008a; Eastwick et al., 2014).

Even within a study, different measures of partner preferences can have low correspondence. For example, Eastwick and Neff (2012) conducted a 3.5 year longitudinal study, revealing that greater consistency between ideal partner preferences and partner perceptions predicted reduced risk of divorce. Nevertheless, these findings were only significant when considering the pattern matrix, rather than the level matrix, both of which are methods of measuring the correspondence between partner preferences and perceptions of the partner. Specifically, the pattern matrix is the correspondence between the relative levels of ideal partner preferences with the relative levels of perceived traits in the partner. For example, high pattern matrix correspondence occurs if Peter prioritises intelligence over trustworthiness in an ideal partner and, indeed, Peter perceives his partner to be more intelligent than trustworthy. The level matrix is the correspondence between the level of an ideal partner trait with the level of the perceived trait in the partner. For example, high level matrix correspondence occurs if Peter prioritises intelligence in an ideal partner more than other individuals, and his partner has above average intelligence.

Eastwick and Neff (2012) suggested that, in real life romantic contexts, pattern variance may reveal better predictive validity whereas, in abstract situations in which individuals evaluate a hypothetical romantic partner, level variance may reveal better predictive validity. Research on sex differentiated partner preferences has predominantly focused on level variance (Buss, 1989; Doosje, Rojahn, & Fischer, 1999). The correspondence between measures of partner preferences captured via face images and verbal measures is discussed in the Themes Examined.

Construal-level theory (Liberman, Trope, & Stephan, 2007; Trope, Liberman, & Wakslak, 2007; Trope & Liberman, 2003, 2010), affective forecasting (Wilson & Gilbert, 2003), empathy gaps (Loewenstein, 1996, 2005), the change-of-meaning perspective (Hamilton & Zanna, 1974) and the associative-propositional evaluation model (Gawronski &

Bodenhausen, 2006, 2007, 2011) are just five of the various theoretical perspectives that can account for the divergence in the predictive validity of differing measures of partner preferences.

1.4.1. Construal-Level Perspective

Construal-level theory (Liberman et al., 2007; Trope et al., 2007; Trope & Liberman, 2003) posits that psychologically remote situations (e.g., hypothetical situations, the future, the past) are conceived using high-level and abstract construals, whereas psychologically close situations (e.g., an event occurring in the present time) are conceived using low-level and concrete construals. Given that traits are predominant in abstract schemas (i.e., these schemas suggest that individuals will exhibit behaviour related to a specific trait across different contexts and time periods; Henderson, Fujita, Trope, & Liberman, 2006; Trope & Liberman, 2010), it can be hypothesised that high-level and abstract construals are related to trait-based evaluations (Nussbaum, Trope, & Liberman, 2003; Rim, Uleman, & Trope, 2009).

Ideal partner preferences generally relate to traits (e.g., the Ideal Partner Scale involves participants rating traits in terms of their preferences; Fletcher et al., 1999), hence, these preferences may be suited to contexts relying on high-level and abstract construals, such as when evaluating potential partners in situations with no photograph of a potential partner. In contrast, in situations using low-level and concrete construals, such as when evaluating photographs of potential partners, individuals may evaluate potential partners based on the potential partners' specific contextualised actions or facial cues. Indeed, Asch's (1946) research on person perception indicates that people readjust their evaluations of a given individual based on the contextualised information derived from physical interaction with said individual.

1.4.2. Change-Of-Meaning Perspective

Asch's (1946) perspective is consistent with Hamilton and Zanna's (1974) change-of-meaning hypothesis, which posits that people reinterpret the meaning of a specific individual's traits in accordance with their overall evaluation of that individual. For

example, the trait proud can be interpreted as a negative quality if accompanied by other negative traits (e.g., arrogant, conceited). Alternatively, proud can be interpreted as a positive quality if accompanied by other positive traits (e.g., dignified, self-respecting). Eastwick, Finkel, and Eagly (2011) revealed that individuals expressed more interest in a potential partner's verbal profile when this was manipulated to match their ideal partner preferences (relative to mismatch). However, following physical interaction between individuals and a potential partner, individuals reinterpreted the profile traits of the potential partner and, as such, the matching or mismatching potential partner profile no longer had an impact on individuals' romantic evaluations. The greater information provided by a context with physical interaction results in the reinterpretation of the traits of a potential partner (Eastwick, Finkel, et al., 2011). Hence, the change-of-meaning perspective accounts for the divergence between evaluations of potential partners in contexts with and without facial information regarding a potential partner and, furthermore, it makes salient the need to incorporate measures of ideal partner preferences that take into account traits as "constellation[s]" rather than independent elements (Eastwick et al., 2014, p. 1018).

1.4.3. Affective Forecasting and Empathy Gaps Perspectives

Affective forecasting (Wilson & Gilbert, 2003) and empathy gaps (Loewenstein, 1996, 2005) posit that, at times, individuals can find it problematic to correctly estimate their future emotional reactions. Whereas, in the present time, individuals can obtain information concerning their on-going emotional experience (Robinson & Clore, 2002), when estimating future emotional reactions, individuals base their judgements on semantic information regarding the proposed situation and the emotion. Different information is used when describing current emotional experiences, relative to predicted emotional experiences, and, therefore, people often make forecasting errors and experience other emotional reactions than they had expected.

Research indicates that when individuals make predictions concerning their emotional reactions in a hypothetical context, in which they are imagining physically interacting with someone, individuals make affective forecasting errors and have empathy gaps as individuals' predictions are incongruent with their current experienced emotional

responses (Kawakami, Dunn, Karmali, & Dovidio, 2009; Mallett, Wilson, & Gilbert, 2008). Ideal partner preferences are somewhat comparable to an affective forecast as individuals predict positive emotional reactions in response to experiencing certain traits (e.g., trustworthiness, attractiveness) in a partner (Eastwick & Finkel, 2008a). Hence, given affective forecasting errors and empathy gaps, ideal partner preferences captured via verbal measures may have less predictive validity when applied to contexts with facial information of a potential partner, relative to contexts with no such information. Further, real life romantic contexts can be ambiguous and complex, and people often interpret ambiguous situations in line with their spontaneous affective responses (Gawronski, Geschke, & Banse, 2003; Hugenberg & Bodenhausen, 2003). Hence, in contexts with facial information of a potential partner, individuals may rely on their spontaneous responses.

1.4.4. Associative-Propositional Evaluation Perspective

The associative-propositional evaluation model (Gawronski & Bodenhausen, 2006, 2007, 2011) posits that real life romantic contexts can be ambiguous and complex and people often interpret ambiguous situations in accordance with their spontaneous responses (Gawronski et al., 2003; Hugenberg & Bodenhausen, 2003). Eastwick et al. (2008, 2011) suggest that verbal measures of partner preferences may reflect propositional beliefs regarding the traits that people prefer in a partner based on the interpersonal consequences that they believe these traits will bring, rather than considering the affective reactions these traits will elicit. Partner preferences captured via ambient face stimuli may be more closely related to preferences expressed in real life romantic situations, relative to verbal measures, as these images – like romantic situations – are often characterised by ambiguity.

1.4.5. Interim Summary

Measures of partner preferences can capture different elements of these preferences, impacting on predictive validity. There are various influential perspectives that can account for the divergence in the predictive validity of differing measures of partner preferences. For instance, construal-level theory (Liberman et al., 2007; Trope et al., 2007; Trope & Liberman, 2003) suggests that individuals considering the traits that they

prioritise in an ideal partner, perhaps via a questionnaire, may rely on high-level and abstract construals, whereas individuals judging photographs of potential partners may elicit low-level and concrete construals. Affective forecasting (Wilson & Gilbert, 2003) and empathy gaps (Loewenstein, 1996, 2005) suggest that future emotional reactions can be difficult for individuals to gauge. Eastwick and Finkel (2008) suggest that partner preferences for specific traits may be based on the predicted affective reactions that these traits will elicit, which might involve inaccurate predictions. The correspondence between measures of partner preferences was examined in this thesis (see Themes Examined, Chapters 4 and 5).

1.5. Summary of Previous Research

Fletcher et al. (1999) identified a tripartite structure to ideal partner preferences using word stimuli generated by participants. Yet, research has neglected to identify whether the same three factors are relevant in first impressions of faces of potential partners. Further, the ideal partner verbal factors overlap largely with the face perception factors (Oosterhof & Todorov, 2008; Sutherland et al., 2013), nonetheless, the extent of this overlap remains unclear. Verbal measures of partner preferences have revealed that individuals prioritise traits related to warmth-trustworthiness (Buss, 1989; Fletcher et al., 1999, 2004; Li, Bailey, Kenrick, & Linsenmeier, 2002). Still, research has identified often low predictive validity between differing measures (e.g., Eastwick & Neff, 2012). As such, first impressions of faces of potential partners might not be dominated by warmth-trustworthiness and related traits. It is, additionally, unclear which ideal partner traits are most salient in first impressions of faces and how these relate to the traits that are prioritised in facial preferences of potential partners. The remainder of this chapter outlines a programme of research that attempts to address these gaps in the field.

1.6. Themes Examined

1.6.1. Can the Ideal Partner Verbal Factors be Represented by Ambient Face Images?

Relationship researchers predominantly use verbal measures of partner preferences (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger, Göritz, & Burger, 2010; Thush et al., 2008). For instance, the standard measure of partner preferences – the Ideal Partner Scale (Fletcher & Boyes, 2010) – is a verbal measure derived from participants' free-responses regarding the traits that they prioritise in an ideal partner. Nevertheless, face images are more similar to the natural and varied situations in which individuals capture first impressions of potential partners in their daily lives, relative to verbal measures. Chapter 2 explored the potential of using face images to represent traits that individuals prioritise in their ideal partner preferences. Examining first impressions of faces of potential partners is particularly relevant given the rise in social media, in which individuals often decide whether to approach a potential partner based on first impressions of a profile photograph with sparse additional information. For example, the online dating company, Meetic Group, moderates over 15 billion profiles and over 15 billion profile photographs per year and they claim to be at the origin of six million European couples (Meetic Group, 2016b).

1.6.2. The Relation between the Ideal Partner and Face Perception Models

One possibility is that non-romantic first impressions of individuals do not differ from first impressions of potential partners. Fletcher et al.'s (1999) ideal partner verbal factors, including their related traits, are ostensibly similar to the face perception factors and traits (Oosterhof & Todorov, 2008; Sutherland et al., 2013). The two factors that appear to overlap most are as follows: Firstly, the warmth-trustworthiness ideal partner factor (consisting of items such as kind, supportive, understanding, and considerate) and the trustworthiness/valence face perception factor (consisting of items such as confidence, approachability, trustworthiness, degree of smile, and aggressiveness) appear to overlap. Secondly, the vitality-attractiveness ideal partner factor (consisting of items such as adventurousness, outgoing, good lover, and sexy) seems to overlap with the youthful-attractiveness face perception factor (consisting of items such as attractiveness, health, age, and babyfaced). Chapter 3 examined the relationship between the ideal partner model

represented by face images and the face perception model in both a neutral (Study 1) and a romantic context (Study 2), providing a more nuanced account of person perception.

1.6.3. Partner Preferences for Face Images

Relationship researchers have largely used verbal measures of partner preferences (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger, Göritz, & Burger, 2010; Thush et al., 2008). As such, first impressions of faces of potential partners have received substantially less attention, relative to verbal measures of partner preferences. Research using verbal measures has identified that traits related to warmth-trustworthiness, love, dependability, emotional maturity, personality, and kindness, are prioritised in partner preferences (Buss, 1989; Fletcher et al., 2004; Li et al., 2002). Chapter 4 explored partner preferences for face images using ambient face stimuli (Study 1) and face averaging techniques (Study 2). Chapter 5 examined the flexibility of partner preferences for ambient face images, as a function of relationship type.

1.6.4. Correspondence between Measures of Partner Preferences: Face Images and a Verbal Measure

The predictive validity of partner preferences can vary as a function of measurement style, with often low correspondence between differing paradigms. Chapters 4 and 5 explored the correspondence of partner preferences captured via face images and a verbal measure. Verbal measures may reflect traits prioritised in an ideal partner, given the interpersonal consequences that individuals perceive these traits elicit (Eastwick, Eagly, et al., 2011; Eastwick & Finkel, 2008a). In comparison, face perception researchers have revealed that people can evaluate face images spontaneously (Todorov & Uleman, 2002, 2003), quickly, and largely unconsciously (Kahneman, 2003). As such, face images may capture different elements of partner preferences relative to verbal measures.

1.6.5. Potential Partner Preferences for Faces are Dominated by Physical Attractiveness

Partner preferences for face images might be dominated by attractiveness-related concerns for multiple reasons. The "what is beautiful is good" stereotype (Dion et al., 1972) posits that attractive individuals are perceived to have numerous positive qualities (for meta-analytical reviews of attractiveness stereotypes see Eagly et al., 1991; Feingold, 1992b; Langlois et al., 2000). For example, attractive people are perceived to have better job prospects (Chiu & Babcock, 2002; Marlowe, Schneider, & Nelson, 1996) and be better romantic partners with better marriages (Dion et al., 1972), relative to less attractive people. From an evolutionary perspective, Symons (1979) compares attractiveness to that of a "health certificate", signposting fertility and resistance to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999; see Rhodes, 2006, for a review).

Chapter 5 examined whether individuals favour attractiveness-related traits and the vitality-attractiveness ideal partner factor when evaluating face images of potential partners on a specific relationship type (e.g., a loyal relationship). In addition, Chapter 7 explored whether attractiveness-related traits and the vitality-attractiveness ideal partner factor were prioritised in non-romantic evaluations of face images, with the objective of determining whether face ratings were clouded by an attractiveness halo effect.

1.6.6. Evaluating Faces on Ideal Partner Traits after Minimal Time Exposure

It is possible that certain traits are more easily perceived in first impressions of face images following minimal viewing times (e.g., 33 ms). For example, attractiveness may be particularly salient in face images, given the "what is beautiful is good" stereotype (Dion et al., 1972). Chapter 6 used a minimal exposure paradigm to investigate the relative the relative salience of three ideal partner traits in non-romantic first impressions of faces: Trustworthiness, status, and attractiveness. These three traits embody the factors involved in person perception in romantic and non-romantic contexts. For instance, the traits represent Fletcher et al.'s (1999) three ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and, furthermore, represent

two of the face perception factors (trustworthiness/valence and youthful-attractiveness; Oosterhof & Todorov, 2008; Sutherland et al., 2013).

1.7. Summary

Based on verbal stimuli, a tripartite structure to ideal partner preferences has been identified: Warmth-trustworthiness, status-resources, and vitality-attractiveness (Fletcher & Boyes, 2010). Nonetheless, the ideal partner model needs to encompass not only verbal measures but, also, measures using ambient face images. Ambient face images reflect the contexts in which people frequently generate first impressions of potential partners in real life, for instance, via social media websites or by viewing a person in the physical world. The work presented in this thesis includes an examination of models of partner preferences in relation to the face evaluation model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) and, further, the discrepancy between measures of partner preferences using face images and verbal measures was explored, amongst other pertinent issues.

Chapter 2. Can the Ideal Partner Verbal Factors be Represented by Ambient Face Images?

2.1. Abstract

A widely used verbal measure of partner preferences is the Ideal Partner Scale (Fletcher et al., 1999). The use of highly variable ambient face stimuli is a novel approach in the measurement of ideal partner preferences. This research explored the potential of using face stimuli as measures of Fletcher et al.'s (1999) ideal partner verbal factors: Warmth-trustworthiness, vitality-attractiveness, and status-resources. Specifically, this research investigated the underlying factor structure of 12 traits selected to represent Fletcher et al.'s ideal partner verbal factors. At least 10 participants rated each of 12 traits for 1000 face images (Santos & Young, 2005, 2008, 2011). Findings suggest that there is a three-factor structure underlying the 12 traits, which can be seen as overlapping with the ideal partner verbal factors.

Key words: First impressions, ambient face images, and partner preferences.

2.2. Introduction

Physiognomy, "reading" personality characteristics from faces, originated in ancient Greece and remains popular. Indeed, 75% of people indicated in a poll that they felt they could ascertain a notion of another individual's personality simply from looking at their face (Hassin & Trope, 2000). First impressions of faces can have significant interpersonal consequences (see Chapter 1; see Olivola, Funk, & Todorov, 2014; Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015, for recent reviews). For example, facial attractiveness influences various career-related decisions, from securing a post to promotion (Gilmore, Beehr, & Love, 1986; Hochschild & Borch, 2011; Lutz, 2010; see Hosoda, Stone-Romero, & Coats, 2003, for a meta-analysis). Individuals are aware of the relevance of first impressions, which is reflected in the over 51,000 cosmetic surgery procedures undertaken in the UK during 2015 (The Private Clinic, 2016), with a global revenue valued at over $20 billion (Bharat Book Bureau, 2015). Given the significance of first impressions of faces, it is relevant to explore first impressions of potential partners based on face images.

Romantic relationship researchers have identified a tripartite structure underlying ideal partner preferences, using verbal traits generated by participants: Warmth-trustworthiness, status-resources, and vitality-attractiveness (Fletcher et al., 1999). These ideal partner verbal factors are well established and form the basis of a verbal measure of partner preferences – the Ideal Partner Scale – that is currently the standard scale for evaluating individual differences in preferences (Campbell et al., 2001; Fletcher et al., 2014, 2000a, 2000b, 1999). Given that relationship researchers predominantly use verbal measures of partner preferences (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger, Göritz, & Burger, 2010; Thush et al., 2008), first impressions of faces of potential partners is a relatively neglected research area. Yet, face stimuli relative to verbal measures are more similar to the natural and heterogeneous contexts in which people view potential partners for the first time.

This research explored the potential of using face images to represent traits that individuals prioritise in their ideal partner preferences. Participants rated face images on traits selected to represent the ideal partner verbal factors. This research used ambient face stimuli, given that these are unstandardised, highly variable, and, hence, similar to images in real life

environments (e.g., the photographs that people upload onto Facebook or Instagram). As such, ambient images enable research findings to be more easily generalised to real life contexts, relative to controlled stimuli (see Chapter 1 for a brief review of ambient face images).

Ambient images maintain the highly variable factors that are present in natural environments, although, these are not widely used in experimental contexts as they introduce variation between images in terms of light, expression, age, amongst other factors, often termed as "noise". Image variability has an impact on first impressions of faces (Burton et al., 2011; Jenkins et al., 2011; Todorov & Porter, 2014). Jenkins et al., (2011) and Todorov and Porter (2014) found that within-person variation in first impressions of face images can be equal to, or even greater than, between-person variation. Specifically, Jenkins et al., (2011) revealed that attractiveness evaluations differed more as a function of the given photograph rather than the person depicted in the photograph, when using ambient face images taken from the Internet. Todorov and Porter (2014), additionally, revealed that the within-person variability was either equal to or greater than the between-person variability for ambient face images evaluated on competence, creativity, cunning, extraversion, meanness, smartness and trustworthiness. Therefore, the variability inherent to naturalistic photographs can be significant, impacting on facial impressions.

Image variability can be useful in identifying trends in the data that may otherwise be masked if using standardised images (Bruce, 1994; Burton, 2013; Jenkins et al., 2011; Sutherland et al., 2013). For example, Sutherland et al. (2013) identified a youthful-attractiveness factor underlying first impressions of faces when using ambient images, alongside Oosterhof and Todorov's (2008) trustworthiness/valence and dominance dimensions that were obtained using more standardised face images. The current research applies the use of ambient images to a novel context: First impressions of potential partners. Further, this research examines Fletcher et al.'s (1999) ideal partner verbal factor structure as applied to face images (ideal partner face model).

2.2.1. Research Overview

The current research used a database of ambient face images that have been used in previous studies (Santos & Young, 2005, 2008, 2011; Sutherland et al., 2013; Vernon, Sutherland, Young, & Hartley, 2014). The objective of the current research was to explore the potential of using face stimuli as measures of Fletcher et al.'s (1999) ideal partner verbal factors. The study involved participants rating a database of 1000 ambient face images (Santos & Young, 2005, 2008, 2011) on 12 traits representing the warmth-trustworthiness, vitality-attractiveness, and status-resources ideal partner verbal factors. Given that face perception researchers have identified that individuals can evaluate face images on numerous traits (e.g., trustworthiness and warmth; Sutherland et al., 2013), it was expected that face stimuli would be able to represent ideal partner traits. Fletcher et al. found a tripartite structure to ideal partner preferences when using word stimuli. A similar three-factor structure when using face images would indicate that Fletcher et al.'s verbal model of partner preferences may be relevant for face evaluation.

2.3. Method

2.3.1. Participants

114 participants, all university students, were recruited via the University of York website. Participants were between 18 and 31 years old (M = 20.91, SD = 2.88) and 50% of the participants were male. Participants were self-reported native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

2.3.2. Face images

The study used a database of 1000 photographs of face images (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults. Similar to other face databases (e.g., Oosterhof & Todorov, 2008), to avoid other-race effects (Anzures et al., 2013; Feng et al., 2011; Hugenberg & Bodenhausen, 2003; O'Toole, Natu,

& Toole, 2013), face images representing non-Caucasian face images and, also, images representing individuals who appeared to be below 18 years of age were not included. The face images were taken from the Internet and images were deliberately unconstrained in terms of the variability between images, leading to wide variation regarding posture, lighting, background, age, expression, and facial hair, amongst other factors. Indeed, all variables excepting Caucasian adult appearance were unstandardised. Images were 150 pixels in height and were cropped to reveal only the individuals' head and shoulders. See Figure 2.1 for example ambient images.

Figure 2.1. Example ambient images (Santos & Young, 2005, 2008, 2011) not included in the actual study.

2.3.3. Ideal Partner Traits

Participants rated the database of 1000 ambient face images (Santos & Young, 2005, 2008, 2011) on 12 verbal traits representing the warmth-trustworthiness, vitality-attractiveness, and status-resources ideal partner verbal factors. Specifically, four traits were selected to represent each factor. Two of these traits were the factor labels (e.g., warmth and trustworthiness for the warmth-trustworthiness factor). The remaining two traits were selected from Fletcher et al.'s (1999) Ideal Partner Scale, being the two traits that loaded highest on their respective ideal partner verbal factors (e.g., supportive and understanding for the warmth-trustworthiness factor). The selected traits were as follow:

1. Warmth-trustworthiness traits: Warmth, trustworthiness, understanding, and supportive;
2. Status-resources traits: Status, resources, good job, and financially secure;

3. Vitality-attractiveness traits: Vitality, attractiveness, sexy, and adventurousness.

Regarding the vitality-attractiveness factor, four trait ratings (attractiveness, vitality, adventurous and outgoing) were initially collected. However, as the data revealed that adventurous and outgoing were both more strongly related to vitality than to attractiveness, ratings on two further traits selected to represent vitality-attractiveness (good lover and sexy) were collected using the same method. Only the data from four traits were subsequently used: The two traits most strongly related to attractiveness (attractiveness and sexy) and the two traits that were most strongly related to vitality (vitality and adventurous; see Figure 9.1, Appendix A).

2.3.4. Procedure

Following informed consent, in which participants were informed that the study involved first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they could take their time when rating face images, although, they were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Participants subsequently completed six practice trials rating face stimuli randomly selected from the database. Participants then rated the 1000 face images on a single characteristic so that there were no carry-over effects between different traits (e.g., Clifford & Rhodes, 2005; Hamermesh & Abrevaya, 2013; Rhodes, 2006).

At least 10 participants (five male) were randomly assigned to rate one of 10 traits: Understanding, supportive, status, resources, good job, financially secure, vitality, attractiveness, adventurous, and sexy. Ratings were made using a seven-point Likert scale (e.g., for the trait supportive: Not supportive-very supportive). Ratings on trustworthiness (n = 20) and warmth (n = 10) had already been collected by Santos and Young (2005, 2008, 2011) and Sutherland et al. (2013), using the same methodology. Ratings on attractiveness (n = 6) had been collected by Santos and Young (2005, 2008, 2011) using the same methodology, and ratings by an additional four participants on attractiveness were collected in this study (to arrive at n = 10).

The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face image and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 500 face images, participants were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 60 minutes to complete. On completion of the task, participants were debriefed and reimbursed with either psychology course credits or a small payment.

2.4. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23.

2.4.1. Reliability

For each group of raters (i.e., at least 10 different participants rating each trait: Warmth, trustworthiness, understanding, supportive, status, resources, good job, financially secure, vitality, attractiveness, sexy, adventurousness, outgoing, and good lover), inter-rater agreement in trait ratings was high. All Cronbach's alphas were over .72, which is considered sufficiently reliable (Nunnally & Bernstein, 1994). The ratings of each trait were, therefore, considered sufficiently reliable to warrant further analysis of how the traits might relate to each other.

2.4.2. Ideal Partner Face Factor Structure

Following the procedure used by Sutherland et al. (2013), a factor analysis was carried out on the ratings of the 1000 ambient image photographs. A factor analysis was selected to model the structure of ideal partner traits represented by face images. The rationale is that a factor analysis (but not a principal components analysis, PCA) attempts to model the structure between the variables and contains an estimation of error (Fabrigar, Wegener, MacCallum, & Strahan, 1999). As such, for model building and structural investigation a factor analysis is superior to a PCA (Borsboom, 2006; Kline, 1994). An oblique rotation was used to avoid obliging the factors to be orthogonal. The main analysis was run on trait

perceptions at the level of the face images, using the participants' mean trait ratings for each face image. The 12 trait ratings entering the analysis consisted of: Warmth, trustworthiness, understanding, supportive, status, resources, good job, financially secure, vitality, attractiveness, sexy, and adventurousness.

Kaiser-Meyer-Olkin measure of sampling adequacy was .89 and Bartlett's test of Sphericity was $\chi^2(66) = 12875.26$, $\rho < .001$ (see Figure 9.2, Appendix A, for the correlational matrix), which revealed that a factor analysis was suitable. A principal axis factor analysis without rotation was initially conducted to determine the factor structure of traits representing the ideal partner face factors. Concerning factor extraction, four criteria were used to be as objective as possible. The criteria included Kaiser's criterion, the scree test (Fabrigar et al., 1999; Kline, 1994; O'Connor, 2000), a parallel analysis (Horn, 1965; see Figure 9.3, Appendix A), and Velicer's (1976) minimum average partial analysis. The latter two criteria were used as some researchers have mentioned that interpretations of the former two, particularly the scree test, can have low reliability and can be subjective (Fabrigar et al., 1999; O'Connor, 2000). All criteria revealed a three-factor solution.

To examine the factor structure and loadings, a direct oblimin rotation on the principal axis factor analysis was conducted. A direct oblimin rotation was selected to enable an oblique structure between the factors. Regarding the structure matrix, as per Kline's (1994) guidelines, loadings below .30 were not considered (see Table 2.1 for the structure matrix, which reveals correlations between the factors and variables; see also Table 9.1, Appendix A).

Table 2.1. Structure matrix of a principal axis factor analysis with a direct oblimin rotation

Ideal Partner Factor	Trait	Factor 1 52% Variance	Factor 2 19% Variance	Factor 3 15% Variance
Warmth-Trustworthiness	Warmth	**.93**	.25	.19
	Supportive	**.92**	.33	.36
	Trustworthiness	**.88**	.46	.42
	Understanding	**.87**	.41	.30
Status-Resources	Resources	.35	**.92**	.30
	Financially Secure	.28	**.92**	.09
	Status	.40	**.90**	.35
	Good Job	.30	**.81**	.39
Vitality-Attractiveness	Sexy	.21	.31	**.95**
	Attractiveness	.36	.33	**.93**
	Vitality	**.75**	.39	**.78**
	Adventurous	**.63**	.23	**.71**
Scale Reliability α (traits loading over .50)		.93	.93	.91

Note: Substantial loadings (over .50) are in bold.

Overall, factor one represented the warmth-trustworthiness traits, factor two represented the status-resources traits, and factor three represented the vitality-attractiveness traits. The exceptions were that, whilst vitality and adventurous were selected to represent the vitality-attractiveness factor, they also loaded strongly on warmth-trustworthiness. Following an oblique rotation, the variance accounted for by each factor cannot be identified although, before rotation, the three factors combined explained 86% of the variance (see Table 2.1 for the variance accounted for by each factor).

2.4.2.1. Model Robustness

To ascertain the model robustness, different analyses were conducted (see Table 9.2, Appendix A), including a principal components analysis with orthogonal rotation. These analyses all revealed an almost identical three-factor structure. Hence, the three-factor solution represents an underlying structure within the data, rather than being dependent on the data analysis.

Since vitality and adventurous loaded strongly on two factors in a three-factor solution, a principal axis factor analysis with a direct oblimin rotation to extract four factors was conducted to determine whether a four-factor solution would be adequate. The fourth factor accounted for only 1% of the variance and contained only one trait with a loading of over .50 (see Table 9.3, Appendix A). Therefore, it seems reasonable to infer that a three-factor solution best represents the 12 traits selected to depict Fletcher et al.'s (1999) ideal partner verbal factors. For goodness of fit tests to assess which model fits better, see Goodness of Fit, Appendix A.

2.4.2.2. Face Averages

To view a visual representation of high and low levels of each factor, 18 averaged images representing each factor, separated by face sex, were created. The stimuli were created as follows:

1. An ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults was used.
2. Factor scores representing each ideal partner face factor were computed for all 1000 photographs using the regression method. Based on the regression scores, the stimuli were ordered from high to low on each ideal partner face factor. Only the highest and lowest 50 stimuli representing each factor were selected, separated by face image sex.
3. 179 fiducial points were manually positioned on each image using PsychoMorph (Tiddeman, Burt, & Perrett, 2001) to mark the outlines and positions of internal and external features of each face. Two experimenters verified this delineation.
4. Averaged images for each of the groups of 50 stimuli representing high and low ratings of each factor were created using PsychoMorph (Tiddeman et al., 2001).
5. The resulting images were 300 pixels in height and were cropped to reveal only the individuals' head and shoulders (see Figure 2.2; see Figure 9.6, Appendix A, for multiple facial averages representing high and low levels of each factor, separated by face sex).

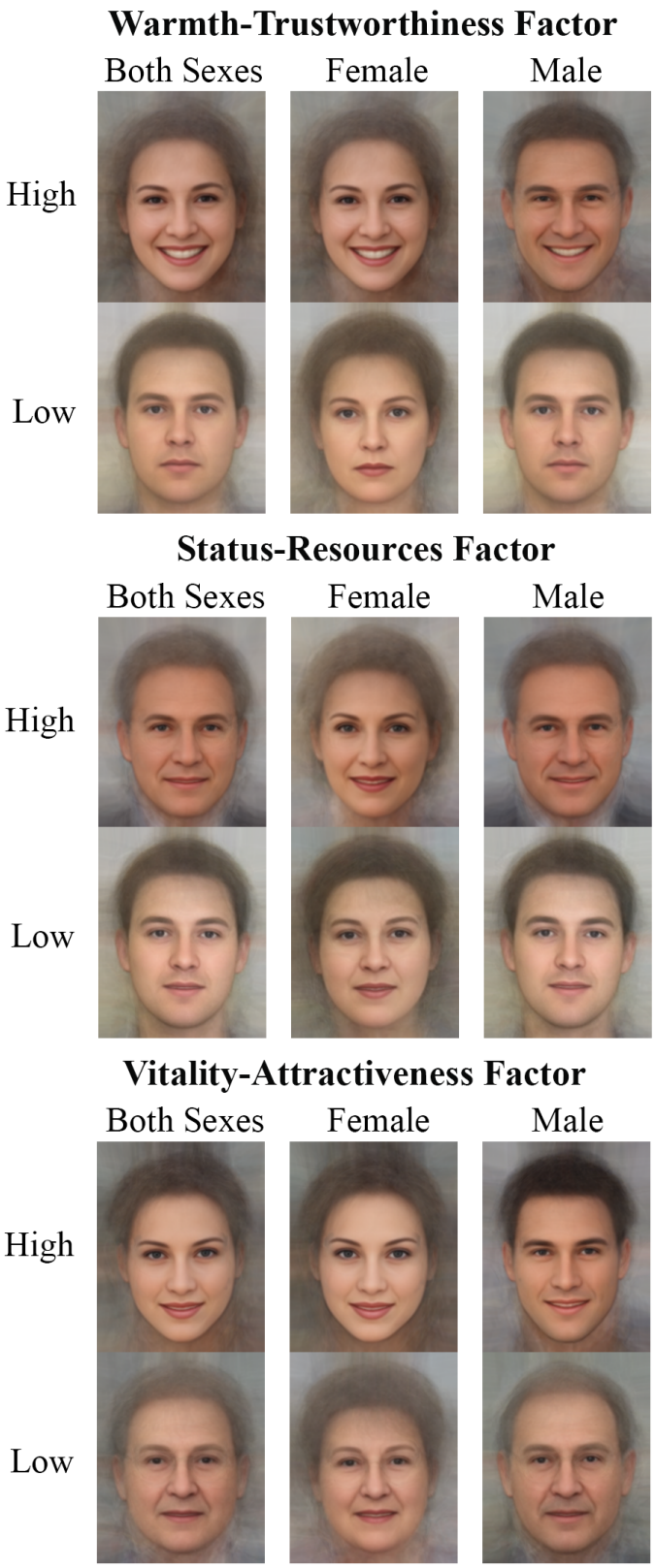


Figure 2.2. Averaged face images (each made from 50 ambient images) representing high and low levels of warmth-trustworthiness (top), status-resources (middle), and vitality-attractiveness (bottom) using male and female images combined (left), female images only (middle), and male images only (right).

Averaged face images representing high levels of factor one (warmth-trustworthiness) depict smiling individuals, whereas the images representing low levels contained more neutral expressions, which is consistent with research (Hess, Adams Jr, & Kleck, 2004; Said, Sebe, & Todorov, 2009). With regards to factor two (status-resources), images representing high levels were slightly more mature, relative to the other averaged images, and the male face averaged image contained an outline of a shirt collar. These cues are consistent with Sutherland et al.'s (2013) high dominance averaged images. Concerning factor three (vitality-attractiveness), high levels of this factor depict relatively young and beautiful face images, with low levels of this factor depicting mature individuals. Of note, images representing each factor are distinct.

2.5. Discussion

The study aimed to identify the potential of using ambient face images (Santos & Young, 2005, 2008, 2011) to represent Fletcher et al.'s (1999) ideal partner verbal factors. There was a three-factor structure underlying 12 traits selected to represent the ideal partner verbal factors when using face images, which overlapped with Fletcher et al.'s verbal factors. Factor one largely represented the warmth-trustworthiness traits (warmth, trustworthiness, supportive, understanding, vitality, and adventurous), factor two represented the status-resources traits (status, resources, good job, and financially secure), and factor three represented the vitality-attractiveness traits (vitality, attractiveness, adventurous, and sexy). Hence, a tentative conclusion is that Fletcher et al.'s ideal partner verbal factors can be represented by ambient face stimuli.

Two traits selected to represent vitality-attractiveness (vitality and adventurous) loaded strongly on factors one (warmth-trustworthiness) and three (vitality-attractiveness). It can, therefore, be inferred that in face images, vitality and adventurous relate strongly to warmth-trustworthiness and vitality-attractiveness, rather than loading predominantly on the vitality-attractiveness factor as per verbal measures of partner preferences (Fletcher et al., 1999). This might reflect the fact that participants were asked to make trait ratings based on their first impressions of the face images, with no mention of romantic partner preferences. Therefore, it is possible that, in a romantic context, the traits vitality and adventurous relate more strongly to vitality-attractiveness, whereas in a non-romantic face

evaluation context, as in this study, the traits vitality and adventurous relate to both warmth-trustworthiness and vitality-attractiveness.

From a broader perspective, there seems to be a marked similarity between Fletcher et al.'s (1999) ideal partner verbal factors and the factors identified by face evaluation research (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Specifically, Oosterhof and Todorov (2008) identified a trustworthiness/valence and a dominance dimension underlying first impressions and these dimensions, including the traits representing them, are respectively similar to Fletcher et al.'s warmth-trustworthiness and status-resources verbal factors. Sutherland et al. (2013) identified the youthful-attractiveness factor, which is similar to Fletcher et al.'s vitality-attractiveness verbal factor. As such, further research can examine the relationship between the ideal partner face model and the face evaluation model (see Chapter 3).

First impressions of faces are often an essential element involved in whether individuals decide to pursue a romantic contact. Indeed, facial first impressions may be particularly salient in online dating contexts where there is often little information available regarding a potential partner, beyond a profile photograph. The online dating website eHarmony boasts almost 2.5 million members in the UK alone (eHarmony, 2015), further emphasising the need for research on partner preferences in contexts in which ambient face images and little other information is present. The present findings reveal that people can potentially see traits in ambient face images that might be used to evaluate an ideal partner. Still, are these various ideal partner traits and factors equally relevant for individuals expressing interest in a partner? For example, do individuals prioritise trustworthiness or attractiveness traits when evaluating face images of potential partners based on their first impressions? These questions are explored in Chapters 3 and 4.

2.6. Conclusion

This research examined the potential of using ambient face stimuli (Santos & Young, 2005, 2008, 2011) as measures of Fletcher et al.'s (1999) three ideal partner verbal factors, with 12 traits selected to represent these verbal factors. Findings revealed a three-factor structure using face images, which largely overlaps with Fletcher et al.'s ideal partner

verbal factors. Therefore, it can be inferred that Fletcher et al.'s tripartite structure is relevant to ambient face stimuli. Face stimuli, relative to verbal measures, are more similar to the natural contexts when people view potential partners for the first time and, indeed, first impressions of faces may be a key determinant of whether individuals pursue others for a romantic relationship. Research exploring whether the ideal partner face model and the face evaluation model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) are related and, further, research examining which ideal partner traits and factors are prioritised in romantic first impressions of face images pose natural next steps.

Chapter 3. Ideal Partner and Face Perception Models: Related but Separate Underlying Structures

3.1. Abstract

Research on first impressions of face images has revealed a tripartite structure (Oosterhof & Todorov, 2008; Sutherland et al., 2013) that overlaps with Fletcher et al.'s (1999) three-factor model of ideal partner verbal preferences. This research examined the relationship between these two models in both a neutral and a romantic context. Study 1 used face ratings on traits selected to represent Fletcher et al.'s ideal partner verbal factors but which also did not overlap with the traits that Sutherland et al. (2013) selected to represent the face evaluation factors. Findings revealed strong correlations between (1) the warmth-trustworthiness ideal partner factor as applied to face images (face factor) and the trustworthiness/valence face perception factor, (2) the vitality-attractiveness ideal partner face factor and the youthful-attractiveness face perception factor, and (3) the status-resources ideal partner face factor and the dominance face perception factor. Study 2 examined whether the ideal partner face model and the face perception model differed when accounting for variance in partner preference face ratings. Despite the large correspondence between the two models, findings revealed that these models differed significantly, reflecting the contexts in which each model was derived: person perception versus impressions of potential partners.

Key words: First impressions, face perception, and partner preferences.

3.2. Introduction

The global fashion industry is estimated to be valued at $1,200 billion annually (OTEXA, D&B Hoovers, & ITMF, 2015), with Louis Vuitton ranked number 10 on Forbes' list of the most valuable luxury brands (2013) and valued at over $28 billion (BrandZ & Millward Brown, 2015). A cornerstone of fashion is the belief that first impressions matter (Rath, Bay, Gill, & Petrizzi, 2014). The emphasis people place on first impressions is perhaps not overstated given that individuals can infer traits from faces after only 33 ms (Todorov et al., 2009) and these judgements have implications in major social contexts such as sentence rulings and electoral outcomes (Olivola & Todorov, 2010a).

Face perception research has identified a tripartite structure underlying first impressions. Oosterhof and Todorov (2008) used standardised face images to identify trustworthiness/valence and dominance factors, which are instrumental in identifying whether individuals ought to approach versus avoid another person face. The trustworthiness/valence factor is related to the question: Is this person *intending* to harm me? The dominance factor is related to the question: Is this person *capable* of harming me? In addition, Sutherland et al. (2013) identified a youthful-attractiveness factor when using ambient images, which they speculate may be implicated in romantic partner preferences. There are close parallels between the factors identified in face perception and in ideal partner preferences. Fletcher et al. (1999) used verbal traits generated by participants to identify a tripartite structure to partner preferences: Warmth-trustworthiness, status-resources, and vitality-attractiveness. Chapter 2 revealed that traits selected to represent Fletcher et al.'s verbal ideal partner factors can be perceived in ambient face images and these traits, also, have a three-factor structure when represented by face images.

The current research examined whether non-romantic first impressions of people differ from first impressions of potential romantic partners. Study 1 examined the factor structure of traits selected to represent the ideal partner verbal model as applied to face images (ideal partner face model) and the face perception model, using participant ratings of ambient face images. Study 2 explored whether the ideal partner face model and the face perception model differed when accounting for variance in partner preference face ratings. The ideal

partner factors appear ostensibly similar to the face perception factors. Specifically, the warmth-trustworthiness ideal partner verbal factor (represented by the traits: Kind, supportive, understanding, and considerate) seems to overlap largely with the trustworthiness/valence face perception factor (represented by the traits: Confidence, approachability, trustworthiness, degree of smile, and aggressiveness). The vitality-attractiveness ideal partner verbal factor (represented by the traits: Adventurousness, outgoing, good lover, and sexy) seems to overlap with the youthful-attractiveness face perception factor (represented by the traits: Attractiveness, health, age, and babyfaced). The vitality-attractiveness verbal factor represents both physical attractiveness and a person's energy/activity whereas the youthful-attractiveness factor largely embodies age-related traits. Finally, the status-resources ideal partner verbal factor (represented by the traits: Financially secure, nice house or apartment, successful, and good job) seems to overlap somewhat with the dominance face perception factor (represented by the traits: Dominance, masculinity, intelligence, and skin). The latter factors appear to overlap less than the previous factors, as status-resources embodies financial and career elements whereas dominance is largely related to the ability to inflict physical harm.

3.2.1. Research Overview

This research explored the relationship between the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Study 1 investigated the correspondence between these two models, using traits selected to represent the ideal partner model which did not overlap with any of the traits chosen to represent the face perception model. Given the ostensible similarity between certain ideal partner and face perception factors, including the traits that represent these, high correspondence was expected between the warmth-trustworthiness and the trustworthiness/valence factors and between the vitality-attractiveness and the youthful-attractiveness factors. In addition, significant correspondence was expected between the status-resources and the dominance factors, although this was expected to be lower than the correspondence between the former factors.

Study 2 examined whether the two models differed significantly when accounting for variance in partner preference face ratings. Despite the apparent overlap between the models, it was unclear whether these actually overlap and, if so, the degree of overlap. In the case that the models were to completely overlap, the ideal partner model when using only face stimuli would be redundant as it is only applicable to romantic contexts (Campbell et al., 2001; Fletcher et al., 2000a, 2000b, 1999), whereas the face perception model has broader implications regarding first impressions in the social environment (Caulfield et al., 2014; Todorov, Baron, & Oosterhof, 2008; Todorov et al., 2005; Todorov, 2008; Watkins, Jones, et al., 2010).

In contrast, if the models were not to overlap entirely, the models would each provide unique information regarding the subtle differences between perception regarding first impressions of unfamiliar faces and first romantic impressions of unfamiliar potential partners. Fletcher et al.'s (1999) ideal partner verbal model was derived from participants' free descriptions of their ideal partner and this tripartite factor structure has been validated in research on partner preferences (Campbell et al., 2001; Fletcher et al., 2014, 2000a, 2000b, 1999). Hence, it was expected that the ideal partner face model would account for unique variance in partner preference face ratings beyond that accounted for by the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013).

Study 2, further, examined the relationship between the face perception model and partner preference face ratings. Fletcher et al. (1999) used a verbal measure of partner preferences, which revealed that warmth-trustworthiness was prioritised by participants and vitality-attractiveness was a near second, with the status-resources factor ranking a relatively distant third. Eastwick, Luchies, Finkel, and Hunt (2014) conducted a meta-analysis on partner preferences for attractiveness (k = 97) and earning prospects (k = 56), which revealed that attractiveness predicted romantic preferences with a moderate to strong effect size (r = ~.40) and earning prospects predicted romantic preferences with a small effect size (r = ~.10), with no sex differences present in either effect. Hence, regarding face images, it was expected that both sexes would prioritise the vitality-attractiveness and youthful-attractiveness factors relative to status-resources and dominance, although it was

unclear whether vitality-attractiveness and youthful-attractiveness would be prioritised over warmth-trustworthiness and trustworthiness/valence.

3.3. Study 1

3.3.1. Method

3.3.1.1. Participants

40 participants, all university students, were recruited via the University of York website. Participants were between 18 and 39 years old (*M* = 21.15, *SD* = 4.07) and 50% of the participants were male. Participants were self-reported native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

3.3.1.2. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).

3.3.1.3. Ideal Partner Traits

Participants rated ambient face images (Santos & Young, 2005, 2008, 2011) on verbal traits representing the warmth-trustworthiness and status-resources ideal partner verbal factors. Specifically, four traits were selected to represent each ideal partner verbal factor. The study reported in Chapter 2 involved collecting ratings of ambient face stimuli on traits representing each ideal partner verbal factor, although three of these traits overlapped with traits that Sutherland et al. (2013) used to represent the face perception factors (warmth, trustworthiness, and attractiveness). In order to achieve a relatively independent comparison between the models, the overlapping traits were replaced in this study.

Moreover, as these three traits are themselves the ideal partner factor labels for the warmth-trustworthiness and vitality-attractiveness factors, to maintain consistency, only traits that were not factor labels for the ideal partner model were included.

The 12 traits were selected from Fletcher et al.'s (1999) Ideal Partner Scale, being those that loaded highest on their respective ideal partner verbal factors:

1. Warmth-trustworthiness factor: Understanding, supportive, considerate, and kind;
2. Status-resources factor: Good job, financially secure, nice house or apartment, and successful;
3. Vitality-attractiveness factor: Sexy, adventurousness, good lover, and outgoing.

Ratings on four verbal traits (considerate, kind, nice house or apartment, and successful) representing the warmth-trustworthiness and status-resources ideal partner verbal factors were collected, given that other non-overlapping trait ratings representing the ideal partner verbal factors were already collected in the study reported in Chapter 2.

3.3.1.4. Face Perception Traits

This study used the same 13 traits that Sutherland et al. (2013) included in their face perception model:

1. Trustworthiness/valence factor: Aggressiveness, approachability, trustworthiness, degree of smile, and confidence;
2. Dominance factor: Dominance, masculinity, intelligence, and skin;
3. Youthful-attractiveness factor: Health, attractiveness, age, and babyfaced.

3.3.1.5. Procedure

Following informed consent, in which participants were informed that the study involved first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they could take their time when rating face images, although, they were encouraged to rely on their first

impressions (Sutherland et al., 2013; Todorov et al., 2005). Participants subsequently completed six practice trials rating face stimuli randomly selected from the database. Participants then rated the 1000 face images on a single characteristic so that there were no carry-over effects between different traits (e.g., Clifford & Rhodes, 2005; Hamermesh & Abrevaya, 2013; Rhodes, 2006). 10 participants (five male) were randomly assigned to rate one of four traits: Considerate, kind, nice house or apartment, and successful. Ratings were made using a seven-point Likert scale (e.g., for the trait understanding: Not understanding-very understanding). Ratings on understanding, supportive, good job, financially secure, sexy, adventurous, good lover, and outgoing were collected in the study reported in Chapter 2, using the same methodology (n = 10 for each trait).

The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 500 face images, participants were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 60 minutes to complete. On completion of the task, participants were debriefed and reimbursed with either psychology course credits or a small payment.

3.3.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23. Three analyses were conducted to examine the following:

1. The factor structure derived from 12 traits representing ideal partner face model. These traits were not overlapping with those traits selected to represent the face perception model.
2. The factor structure derived from 25 traits representing both the ideal partner face model (12 traits) and the face perception model (13 traits) combined.
3. The correlation between the ideal partner face factors and the face perception factors.

3.3.2.1. Reliability

For each group of raters (i.e., 10 different participants rating each trait: Understanding, supportive, considerate, kind, good job, financially secure, nice house or apartment, successful, sexy, adventurousness, outgoing, and good lover), inter-rater agreement in trait ratings was high. All Cronbach's alphas were over .72, which is considered sufficiently reliable (Nunnally & Bernstein, 1994). The ratings of each trait were, therefore, sufficiently reliable to warrant further analysis of how the traits might relate to each other.

3.3.2.2. Ideal Partner Face Factor Structure

Following the procedure used by Sutherland et al. (2013), as described in Chapter 2, a factor analysis was carried out on the ratings of the 1000 ambient image photographs. A factor analysis was selected to model the structure of ideal partner traits represented by face images. The rationale is that a factor analysis (but not a principal components analysis, PCA) attempts to model the structure between the variables and contains an estimation of error, (Fabrigar et al., 1999). As such, for model building and structural investigation a factor analysis is superior to a PCA (Borsboom, 2006; Kline, 1994). An oblique rotation was used to avoid obliging the factors to be orthogonal. The main analysis was run on trait perceptions at the level of the face images, using the participants' mean trait ratings for each face image. The 12 trait ratings entering the analysis consisted of: Understanding, supportive, considerate, kind, good job, financially secure, nice house or apartment, successful, sexy, adventurousness, good lover, and outgoing.

The Kaiser-Meyer-Olkin measure of sampling adequacy was .94 and Bartlett's test of Sphericity was $\chi^2\ (300)\ =\ 29118.81, p\ <\ .001$, (see Figure 9.7, Appendix B, for the correlational matrix), which revealed that a factor analysis was suitable. A principal axis factor analysis was conducted to determine the factor structure of traits representing the ideal partner face factors that were not overlapping with the traits representing the model of face perception (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Concerning factor extraction, four criteria were used to be as objective as possible. The criteria included Kaiser's criterion, the scree test (Fabrigar et al., 1999; Kline, 1994; O'Connor,

2000), a parallel analysis (Horn, 1965; see Figure 9.8, Appendix B), and Velicer's (1976) minimum average partial analysis. The latter two criteria were used as some researchers have mentioned that interpretations of the former two criteria, particularly the scree test, can have low reliability and can be subjective (Fabrigar et al., 1999; O'Connor, 2000). All criteria revealed a three-factor solution.

To examine the factor structure and loadings, a direct oblimin rotation on the principal axis factor analysis was conducted. A direct oblimin rotation was selected to enable an oblique structure between the factors. Regarding the structure matrix, as per Kline's (1994) guidelines, loadings below .30 were not considered (see Table 3.1 for the structure matrix, which reveals correlations between the factors and variables; for further information see Table 9.5, Appendix B; see Table 9.6, Appendix B, for the results of a principal axis factor analysis separated by participant sex).

Table 3.1. Structure matrix of a principal axis factor analysis with a direct oblimin rotation

Ideal Partner Factor	Trait	Factor 1 52% Variance	Factor 2 18% Variance	Factor 3 14% Variance
Warmth-Trustworthiness	Kind	**.96**	.36	.29
	Supportive	**.91**	.35	.32
	Understanding	**.87**	.42	.25
	Considerate	**.82**	.38	.33
Status-Resources	Financially Secure	.27	**.91**	.05
	Nice House or Apartment	.42	**.88**	.30
	Successful	.49	**.87**	.36
	Good Job	.31	**.82**	.34
Vitality-Attractiveness	Good Lover	.40	.27	**.92**
	Sexy	.28	.32	**.91**
	Adventurous	**.67**	.24	**.73**
	Outgoing	**.81**	.25	**.56**
Scale Reliability α (traits loading over .50)		.93	.92	.87

Note: Substantial loadings (over .50) are in bold.

Overall, factor one represented the warmth-trustworthiness traits (accounting for 50% variance), factor two represented the status-resources traits (accounting for 17% variance), and factor three represented the vitality-attractiveness traits (accounting for 13% variance). The exceptions were that whilst adventurous and outgoing were selected to represent the

vitality-attractiveness factor, they also loaded strongly on warmth-trustworthiness. Following an oblique rotation, the variance accounted for by each factor cannot be identified although, before rotation, the three factors combined explained 84% of the variance (see Table 3.1 for the variance accounted for by each factor). These findings replicate the three-factor structure underlying traits selected to represent the ideal partner face factors but which overlap with the traits representing the face perception model (see Chapter 2).

3.3.2.2.1. Model Robustness

To ascertain the model robustness, different analyses were conducted (see Table 9.7, Appendix B), including a principal components analysis with orthogonal rotation. These analyses all revealed an almost identical three-factor structure. In addition, a principal axis analysis with direct oblimin rotation separated by participant sex revealed a near identical three-factor structure (see Table 9.6, Appendix B). Hence, the three-factor solution represents an underlying structure within the data, rather than being dependent on the data analysis.

Since the traits adventurous and outgoing loaded strongly on two factors in a three-factor solution, a principal axis factor analysis with a direct oblimin rotation to extract four factors was conducted to determine whether a four-factor solution would be more adequate. The fourth factor accounted for only 2% of the variance (see Table 9.8, Appendix B), therefore, it seems reasonable to infer that a three-factor solution best represents the 12 traits selected to depict the ideal partner face factors.

3.3.2.3. Ideal Partner Face Factor and Face Perception Factor Structure Combined

Following the procedure used by Sutherland et al. (2013), as described previously within this chapter, a factor analysis was carried out on the ratings of the 1000 ambient image photographs. A factor analysis was selected to model the structure of ideal partner traits and face perception traits, represented by face images. An oblique rotation was used to

avoid obliging the factors to be orthogonal. The main analysis was run on trait perceptions at the level of the face images, using the participants' mean trait ratings for each face image. The 25 trait ratings entering the analysis consisted of 12 traits selected to represent the ideal partner verbal model (Fletcher et al., 1999) and the 13 traits that Sutherland et al. (2013) included in their face perception model: Understanding, supportive, considerate, kind, good job, financially secure, nice house or apartment, successful, sexy, adventurousness, good lover, outgoing, aggressiveness, approachability, trustworthiness, degree of smile, confidence, dominance, masculinity, intelligence, skin, health, attractiveness, age, and babyfaced.

The Kaiser-Meyer-Olkin measure of sampling adequacy was .94 and Bartlett's test of Sphericity was $\chi^2(300) = 29118.81, p < .001$, which revealed that a factor analysis was suitable (see Figure 9.9, Appendix B, for the correlational matrix). A principal axis factor analysis without rotation was initially conducted to determine the factor structure of all 25 traits. Concerning factor extraction, four criteria were used to be as objective as possible. The criteria included Kaiser's criterion, the scree test (Fabrigar et al., 1999; Kline, 1994; O'Connor, 2000), a parallel analysis (Horn, 1965; see Figure 9.10, Appendix B), and Velicer's (1976) minimum average partial analysis. The latter two criteria were used as some researchers have mentioned that interpretations of the former two, particularly the scree test, can have low reliability and can be subjective (Fabrigar et al., 1999; O'Connor, 2000). All criteria revealed a four-factor solution.

To examine the factor structure and loadings, a direct oblimin rotation on the principal axis factor analysis was conducted. A direct oblimin rotation was selected to enable an oblique structure between the factors. Regarding the structure matrix, as per Kline's (1994) guidelines, loadings below .30 were not considered (see Table 3.2 for the structure matrix, which reveals correlations between the factors and variables; for further information see Table 9.9, Appendix B).

Table 3.2. Structure matrix of a principal axis factor analysis with a direct oblimin rotation for non-overlapping traits from ideal partner face model and face perception model

			Factor 1	Factor 2	Factor 3	Factor 4
Model	Factor	Trait	43% variance	15% variance	15% variance	6% variance
Ideal Partner Face Model	Warmth-Trustworthiness	Kind	**.95**	.37	.25	-.22
		Supportive	**.91**	.35	.28	-.21
		Understanding	**.86**	.43	.21	-.12
		Considerate	**.81**	.41	.27	-.23
Face Perception Model	Trustworthiness/Valence	Approachability	**.92**	.34	.21	-.02
		Trustworthiness	**.88**	.50	.30	-.28
		Degree of Smile	**.93**	.20	.21	-.05
		Aggressiveness	**-.92**	-.27	-.17	.29
		Confidence	**.59**	**.56**	.49	.23
Ideal Partner Face Model	Status-Resources	Financially Secure	.27	**.90**	.00	.34
		Nice House or Apartment	.39	**.88**	.24	.10
		Successful	.45	**.89**	.30	.06
		Good Job	.29	**.80**	.31	.16
Face Perception Model	Dominance	Dominance	-.34	.23	-.29	**.92**
		Masculinity	-.29	.00	-.36	**.84**
		Intelligence	.31	**.74**	.10	.16
		Skin	.14	.33	.11	.24
Ideal Partner Face Model	Vitality-Attractiveness	Adventurous	**.66**	.24	**.71**	-.07
		Outgoing	**.81**	.24	**.52**	-.11
		Good Lover	.36	.27	**.88**	-.19
		Sexy	.21	.32	**.91**	-.23
Face Perception Model	Youthful-Attractiveness	Attractiveness	.38	.47	**.87**	-.09
		Health	.32	.48	**.87**	.07
		Age	.02	.30	**-.74**	.33
		Babyfaced	.18	-.05	.42	-.20
Scale Reliability α (traits loading over .50)			.88	.91	.91	.85

High loadings (over .50) are in bold.

Overall, factor one represented the warmth-trustworthiness and the trustworthiness/valence traits, factor two represented the status-resources traits, factor three represented the vitality-attractiveness and the youthful-attractiveness traits, and factor four represented the dominance traits. The exceptions were the traits confidence, intelligence, and outgoing. Specifically, even though confidence was selected to represent the trustworthiness/valence factor, it also loaded strongly on factor two (status-resources) in addition to factor one (warmth-trustworthiness and trustworthiness/valence). Intelligence was selected to represent the dominance factor, yet, it loaded strongly on factor two (status-resources). Outgoing was selected to represent the vitality-attractiveness factor, though, it also loaded strongly on factor one (warmth-trustworthiness) in addition to factor three (vitality-attractiveness). Following an oblique rotation, the variance accounted for by each factor cannot be identified although, before rotation, the four factors combined explained 79% of the variance (see Table 3.2 for the variance accounted for by each factor).

3.3.2.3.1. Model Robustness

To ascertain the model robustness, different analyses were conducted (see Table 9.10, Appendix B), including a principal components analysis with orthogonal rotation. These analyses all revealed an almost identical four-factor structure. Hence, the four-factor solution represents an underlying structure within the data, rather than being dependent on the data analysis.

Since the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) both contain a tripartite structure, a principal axis factor analysis with a direct oblimin rotation to extract only three factors was conducted to determine whether a three-factor solution would be more adequate (see Table 9.11, Appendix B). Factor one represented the warmth-trustworthiness and the trustworthiness/valence traits (accounting for 43% variance), factor two represented the vitality-attractiveness and the youthful-attractiveness traits (accounting for 15% variance), and factor three represented the status-resources traits (accounting for 15% variance), including the traits intelligence (selected to represent the dominance factor) and confidence (selected to represent the trustworthiness/valence factor). As such, considering both the

robustness of the four-factor solution and that only one of the traits selected to represent dominance loaded on factor three in the three-factor solution, it seems reasonable to infer that four factors best represent the ideal partner face model and the face perception model.

3.3.2.4. Correlations and William's T Tests

The correlation between the ideal partner face factor scores and the face perception factor scores was examined. Firstly, factor scores representing each factor of the ideal partner face model were computed for all 1000 photographs using the regression method. Regression factor scores representing each factor of the face perception model for the same 1000 photographs were computed by Sutherland et al. (2013). The regression factor scores for the ideal partner face model and the face perception model were correlated. Findings revealed strong correlations between (1) the warmth-trustworthiness and trustworthiness/valence factors, (2) the status-resources and dominance factors, and (3) the vitality-attractiveness and youthful-attractiveness factors (see Figure 3.1).

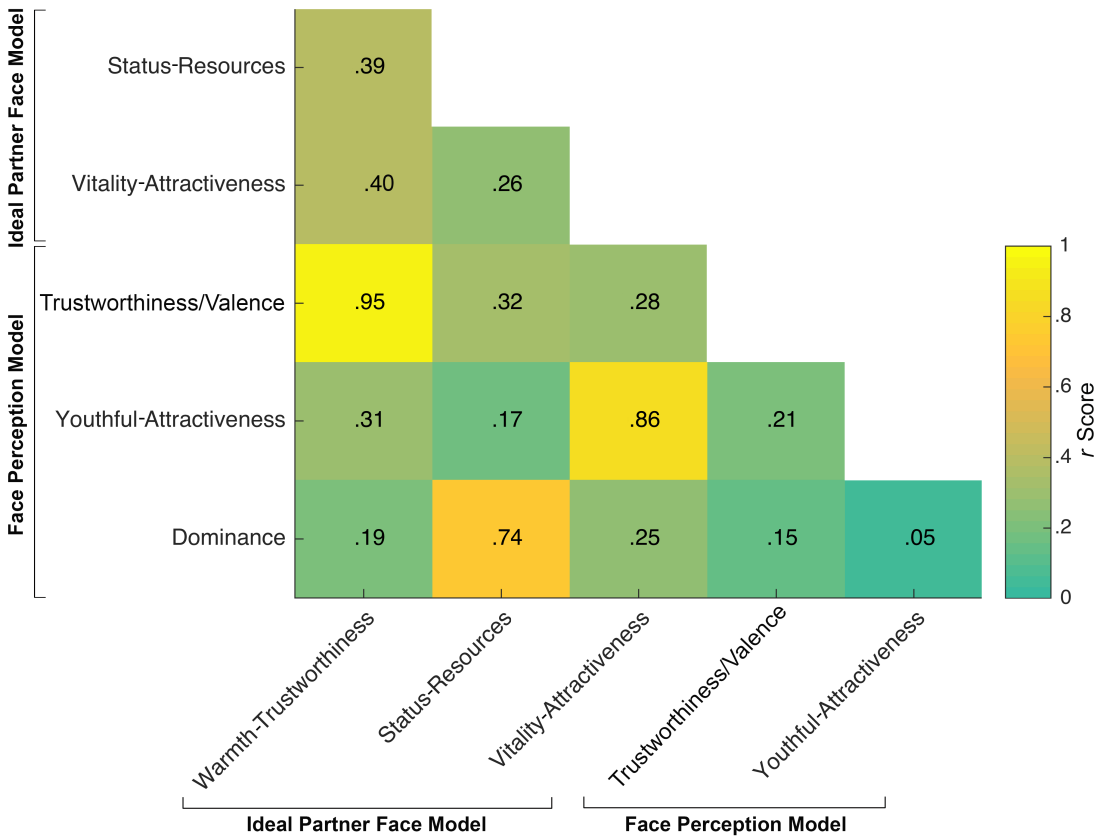


Figure 3.1. Correlations between the factor regression scores for the ideal partner face model and the face perception model. N = 1000. All correlations obtained $p < .01$.

William's t tests were conducted to determine whether there were significant differences between these dependent overlapping correlations (see Table 3.3). The correlations between (1) the warmth-trustworthiness and trustworthiness/valence factors, (2) the status-resources and dominance factors, and (3) the vitality-attractiveness and youthful-attractiveness factors were significantly larger than the remaining correlations represented in Figure 3.1 and in Table 3.3. Specifically, the correlations between the warmth-trustworthiness and the trustworthiness/valence factors were significantly larger than the correlations between warmth-trustworthiness and dominance, warmth-trustworthiness and youthful-attractiveness, trustworthiness/valence and status-resources, or trustworthiness/valence and vitality-attractiveness. Likewise, the correlations between the status-resources and dominance factors and between the vitality-attractiveness and youthful-attractiveness factors were significantly larger than the remaining correlations (e.g., the correlation between status-resources and trustworthiness/valence). These findings are in accordance with the hypotheses.

Table 3.3. Test of significant difference between dependent overlapping correlations

First Pair	Second Pair	William's T
Warmth-Trustworthiness and Trustworthiness/Valence	Warmth-Trustworthiness and Dominance	41.08***
	Warmth-Trustworthiness and Youthful-Attractiveness	37.29***
	Status-Resources and Trustworthiness/Valence	47.05***
	Vitality-Attractiveness and Trustworthiness/Valence	51.43***
Status-Resources and Dominance	Status-Resources and Trustworthiness/Valence	14.55***
	Status-Resources and Youthful-Attractiveness	18.06***
	Warmth-Trustworthiness and Dominance	23.00***
	Vitality-Attractiveness and Dominance	18.02***
Vitality-Attractiveness and Youthful-Attractiveness	Vitality-Attractiveness and Trustworthiness/Valence	25.16***
	Vitality-Attractiveness and Dominance	23.71***
	Warmth-Trustworthiness and Youthful-Attractiveness	29.13***
	Status-Resources and Youthful-Attractiveness	32.15***

$N = 1000$
*** $p < .001$

3.3.3. Discussion

This research examined the correspondence between the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Findings revealed strong correlations between the warmth-trustworthiness and trustworthiness/valence factors and between the vitality-attractiveness and youthful-attractiveness factors. These findings are in accordance with the hypotheses, given the similarity between these ideal partner face factors and the face perception factors and, also, the traits that represent these. In addition, there was a strong relationship between the status-resources and dominance factors, although this was weaker than between the former factors. A weaker relationship between the status-resources and dominance factors was expected and, indeed, emerged as trait descriptions of these factors reveal that status-

resources represents both financial and career prospects whereas dominance is largely related to the ability to inflict physical harm and physical dominance.

A factor analysis on the traits selected to represent the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) revealed a four factor solution with (1) a warmth-trustworthiness and trustworthiness/valence factor, (2) a vitality-attractiveness and youthful-attractiveness factor, (3) a status-resources factor, and (4) a dominance factor. Hence, it can be inferred that there is a large (although not absolute) overlap between the two models.

A potential caveat to these results should be mentioned. Participants rated face images based on their first impressions on traits (e.g., considerate) with no reference to their ideal partner preferences, their romantic preferences, or any association with romance. Indeed, participants were only informed that the study investigated first impressions of faces. Therefore, it is relevant to explore whether the ideal partner face model and the face perception model remain interrelated when partner preferences towards face images are considered, rather than simply ratings of first impressions of face images. This was subsequently explored in Study 2.

3.4. Study 2

Study 1 identified a strong correspondence between the ideal partner face model and face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013), using trait ratings based on participants' first impressions. However, participants in Study 1 were not asked to rate face images based on their romantic partner preferences and there was no mention of romantic relationships, or ideal partner preferences in the information provided to participants prior to their completion of the study. Hence, Study 2 examined whether the relationship between the ideal partner face model and face perception model remained present when participants' partner preferences were considered.

Identifying how partner preferences are related to first impressions of others is a novel approach with clear implications for person perception. Participants rated 500 opposite-sex

ambient face images based on how interesting they found each face in terms of being their ideal partner. The partner preference face ratings were examined in relation to the ideal partner face model and the face perception model. The objective was to identify whether the two models were related. For instance, James may prioritise traits associated with both the warmth-trustworthiness ideal partner face factor and the trustworthiness/valence face perception factor in a romantic partner, yet, it is unclear whether these two factors overlap. It can be speculated that factors which largely overlap (i.e., the warmth-trustworthiness and trustworthiness/valence factors and, also, the vitality-attractiveness and the youthful-attractiveness factors) may have a shared function (e.g., sexual selection motivations; Gangestad & Simpson, 2000; Simpson & Gangestad, 1992).

3.4.1. Method

3.4.1.1. Participants

50 participants, all university students, were recruited via the University of York website. Participants were between 18 and 32 years old (M = 21.12, SD = 3.66) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Data from the same participants were reanalysed in Chapter 4, Study 1.

3.4.1.2. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).

3.4.1.3. Verbal Measure

Analysis of the verbal measure of partner preferences is presented in Chapter 4. Fletcher et al. (1999) developed the Ideal Partner Scale by conducting an exploratory factor analysis on participants' key words used when describing their ideal partner, revealing a tripartite structure to partner preferences. The Ideal Partner Scale is the predominant measure of ideal partner verbal preferences. The questionnaire takes five minutes to complete, typically reveals sex differentiated partner preferences, and has good internal reliability, good test-retest reliability, and good convergent and predictive validity (Campbell et al., 2001; Fletcher et al., 2014, 2000a, 1999, 2004; Overall et al., 2006).

The 34-item scale is divided into three sections, although only the first section – the Partner Scale – is relevant for this research and, hence, it is described as follows. The Partner Scale involves participants rating items in terms of how important they are in describing their ideal partner in a close relationship (very unimportant-very important). Six items portray warmth-trustworthiness (kind, supportive, understanding, considerate, sensitive, and good listener), five items represent status-resources (successful, nice house, financially secure, dresses well, and good job; each item for this factor is accompanied by *or potential to achieve* in parentheses), and six items portray partner vitality-attractiveness (sexy, nice body, attractive appearance, good lover, outgoing, and adventurous). A score for each ideal partner verbal factor is obtained by calculating the mean score of the ratings for the items representing the relevant factor. For example, for the warmth-trustworthiness ideal partner verbal factor, a mean score of the ratings of the items kind, supportive, understanding, considerate, sensitive, and good listener is calculated to obtain an overall warmth-trustworthiness score.

3.4.1.4. Procedure

Following informed consent, in which participants were informed that the study involved romantic first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate opposite-sex faces based on the following instructions: "Rate each person on how

interesting you find them in terms of being your ideal partner in a close relationship (e.g., dating, living together, or married)", using a seven-point Likert scale (not interesting-very interesting). Participants were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Following completion of six practice trials rating opposite-sex face stimuli randomly selected from the database, participants rated the 500 opposite-sex face images.

The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until the participant had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 250 face images, they were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 30 minutes to complete. Subsequently, participants completed the Ideal Partner Scale (Fletcher et al., 1999). On completion, participants were debriefed and reimbursed with a small payment.

3.4.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23. Analysis of the verbal measure of partner preferences is presented in Chapter 4. In addition to the reliability tests, there were three stages in the analyses:

1. The relationship between the ideal partner face factors and the face perception factors was examined. Firstly, each face image was given three scores reflecting its relationship to each of the warmth-trustworthiness, status-resources, and vitality-attractiveness ideal partner face factors (derived from Study 1). In addition, each face image was given three scores reflecting its relationship to each of the trustworthiness/valence, dominance, and youthful-attractiveness face perception factors (computed by Sutherland et al., 2013). Each participant's partner preferences for the 500 faces they rated was correlated with the faces' loadings on each factor for the ideal partner face model and, also, for the face perception model, to find out how each factor was linked to the ratings given. Then, these correlations were transformed using

Fisher's z (Fisher, 1915, 1925). The partner preference Fisher's z scores were subjected to a repeated-measures ANOVA between models and factors.

2. The face perception factors in relation to the partner preference face ratings were examined. The individual participant partner preference face ratings were correlated with the factor scores for the face perception model (derived from Sutherland et al., 2013) and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The partner preference Fisher's z scores were subjected to a repeated-measures ANOVA between the face perception factors.
3. To determine which face perception factors and traits accounted for most of the variance in partner preference face ratings, the individual participant partner preference face ratings were correlated with the face perception factor scores and with traits selected to represent these factors.

3.4.2.1. Reliability

For each group of raters (i.e., 25 heterosexual men and 25 heterosexual women), inter-rater agreement in partner preference face ratings was high. All Cronbach's alphas were over .95, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

3.4.2.2. Ideal Partner Face Model and Face Perception Model ANOVA

To determine how the ideal partner face factor structure was related to the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013), firstly, regression factor scores representing each factor of the ideal partner face model were computed for all 1000 photographs using the regression method (derived from Study 1). Regression factor scores representing each factor of the face perception model for the same 1000 photographs were computed by Sutherland et al. (2013). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and the face perception model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the participant partner preference Fisher's z scores were subjected to a repeated-measures 2 x 3 ANOVA between models (ideal partner face model and face perception model) and factors (warmth-

trustworthiness and trustworthiness/valence, status-resources and dominance, and vitality-attractiveness and youthful-attractiveness). See Appendix B for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between models and factors $\left(F(1.16, 56.94) = 80.69, MSE = 0.29, p < .001, \eta_p^2 = .62\right)$ and, furthermore, there was a significant effect for models $\left(F(1.00, 49.00) = 18.00, MSE = 0.03, p < .001, \eta_p^2 = .27\right)$ and for factors $\left(F(1.70, 83.41) = 423.09, MSE = 13.73, p < .001, \eta_p^2 = .90\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that revealed that participants prioritised the vitality-attractiveness and youthful-attractiveness factors relative to the warmth-trustworthiness and the trustworthiness/valence factors and the status-resources and the dominance factors in the ideal partner face model and face perception model (see Figure 3.2).

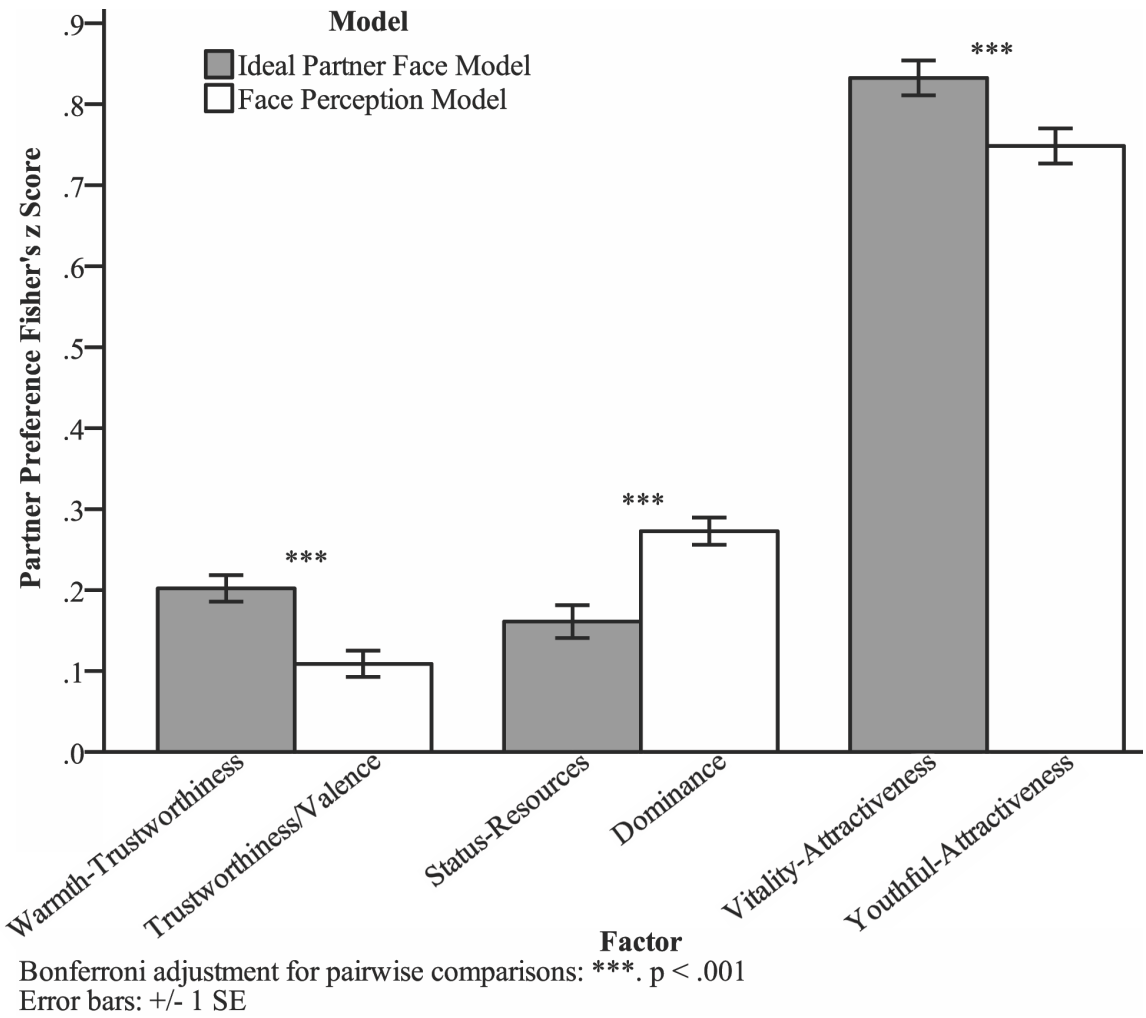


Figure 3.2. Partner preferences for ambient face stimuli as a function of the ideal partner face model and the face perception model. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

Moreover, there were significant differences between each of the factors as a function of model (*p*s < .001; see Figure 3.2). For example, there was a significant difference between the warmth-trustworthiness ideal partner face factor and the trustworthiness/valence face perception factor. Therefore, despite the ideal partner face model and face perception model exhibiting similar patterns in terms of their overall relationship to partner preference face ratings, these models are to some extent distinct, which is in accordance with the hypotheses.

3.4.2.3. Face Perception Model ANOVA

To explore which face perception factors were prioritised in participants' partner preference face ratings there were three steps in the analysis. Firstly, the regression factor scores representing each factor of the face perception model for the 1000 photographs were computed by Sutherland et al. (2013). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the face perception model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant partner preference Fisher's z scores were subjected to a repeated-measures ANOVA between the face perception factors (trustworthiness/valence, dominance, and youthful-attractiveness). See Appendix B for analysis separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant effect for factors $\left(F(1.52, 74.45) = 338.02, MSE = 7.27, p < .001, \eta_p^2 = .87\right)$. Pairwise comparisons using Bonferroni's adjustment revealed significant differences between each factor (*p*s < .001). In addition, participants prioritised the youthful-attractiveness factor in their partner preference face ratings, relative to the trustworthiness/valence and dominance factors. These findings are in accordance with the hypotheses.

3.4.2.4. Face Perception Model Correlations

To determine which face perception factor accounted for most of the variance in partner preference face ratings, firstly, the regression factor scores representing each factor of the face perception model for the 1000 photographs were computed by Sutherland et al. (2013) and, secondly, the individual participant partner preference face ratings were correlated with each of the face perception regression factor scores (see Figure 3.3; see Figure 9.13, Appendix B, for analysis separated by participant sex). Findings revealed that every participant prioritised the youthful-attractiveness factor, indicating that the emphasis on youthful-attractiveness is an overriding concern.

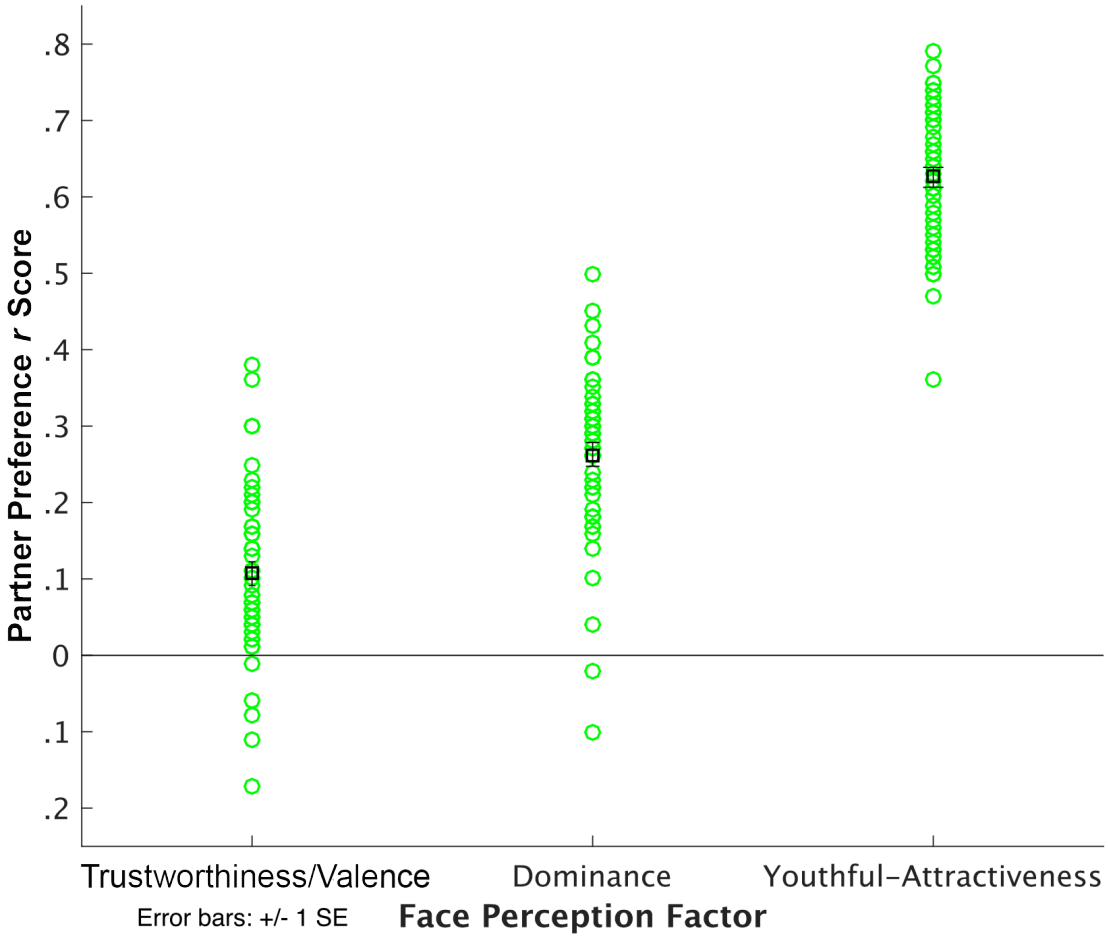


Figure 3.3. Individual participant partner preference face ratings correlated with the face perception factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

3.4.2.5. Face Perception Trait Correlations

To determine which traits accounted for most of the variance in partner preference face ratings, the individual participant partner preference face ratings were correlated with the independent evaluations of the face stimuli on 13 traits selected to represent the face perception factors. This study used the same 13 traits that Sutherland et al.'s (2013) included in their face perception model:

1. Trustworthiness/valence traits: Aggressiveness, approachability, trustworthiness, degree of smile, and confidence;
2. Dominance traits: Dominance, masculinity, intelligence, and skin;

3. Youthful-attractiveness traits: Health, attractiveness, age, and babyfaced.

The correlations for the youthful-attractiveness traits revealed a moderate to strong relationship between these traits and the partner preference face ratings (see Figure 3.4; see Figure 9.14, Appendix B, for analysis separated by participant sex). In contrast, the correlations for the trustworthiness/valence traits and the dominance traits revealed a small relationship between these traits and the partner preference face ratings, with the exception of masculinity and dominance that revealed moderate negative correlations.

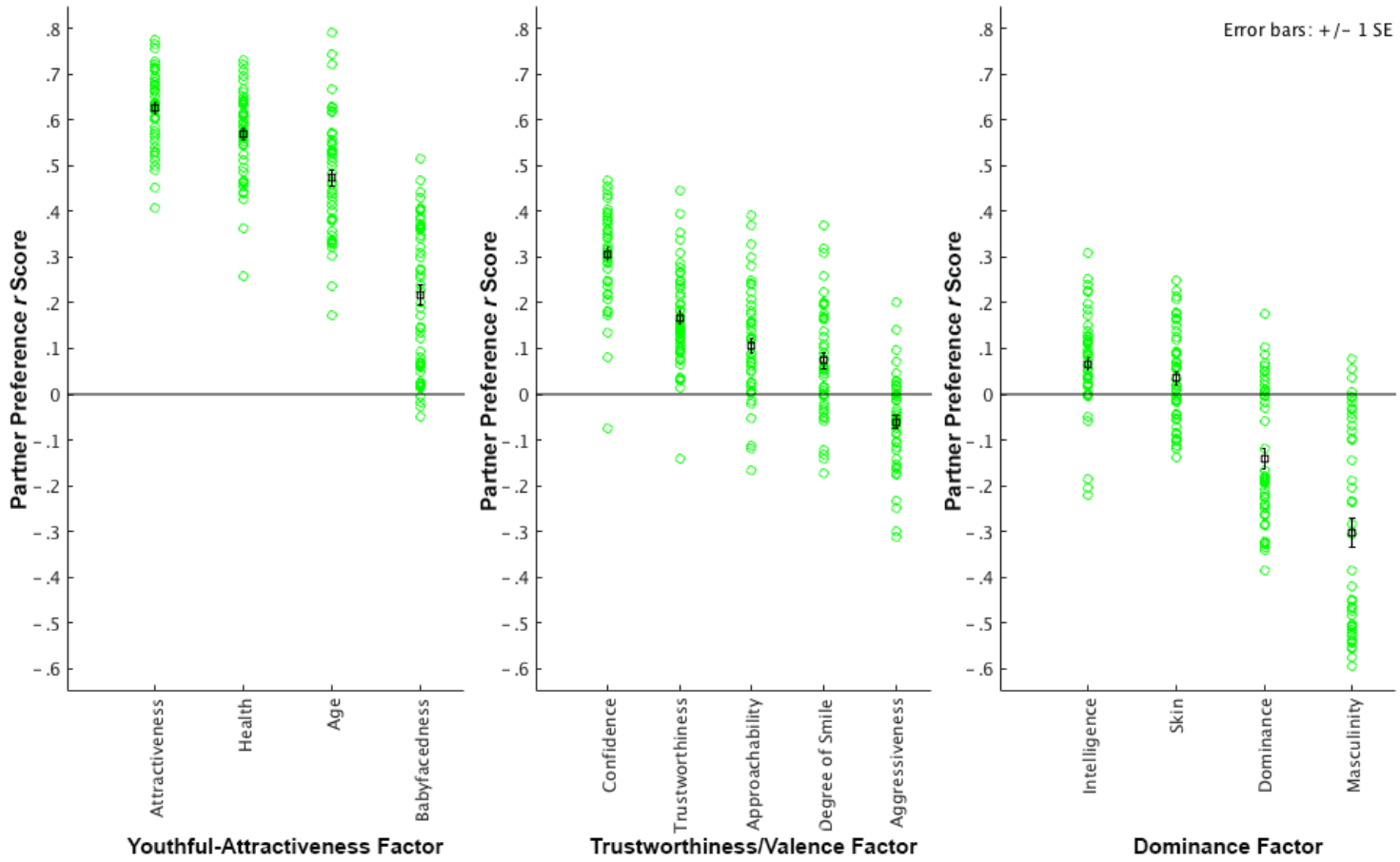


Figure 3.4. Individual participant partner preference face ratings correlated with trait ratings for the youthful-attractiveness (left), trustworthiness/valence (middle), and dominance (right) factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values, similarly, revealed that the youthful-attractiveness traits were prioritised and accounted for up to 62% variance (*M* = 26%, *SD* = 0.14) in partner preferences. The trustworthiness/valence traits and the dominance traits respectively accounted for a mean 4% (*SD* = .04, maximum variance = 22%) and 5% (*SD* = .06, maximum variance = 35%) variance in partner preferences. Hence, youthful-attractiveness concerns were more salient relative to trustworthiness/valence and dominance concerns, when evaluating faces in terms of partner preferences, which is consistent with the predictions.

3.4.3. Discussion

Study 2, examined the relationship between the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Findings revealed that, despite the ostensible similarity between certain ideal partner and face perception factors (e.g., between the vitality-attractiveness and youthful-attractiveness factors), the two models differed significantly when accounting for variance in partner preference face ratings. Hence, the two models provide unique information regarding unfamiliar person perception. The ideal partner model (Fletcher et al., 1999) accounts for first impressions in romantic contexts (Campbell et al., 2001; Fletcher et al., 2000a, 2000b, 1999), whereas the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) accounts for first impressions of people in the social environment as a whole, without necessarily specifying context (Caulfield et al., 2014; Todorov, Baron, et al., 2008; Todorov et al., 2005; Todorov, 2008; Watkins, Jones, et al., 2010). These findings are in accordance with the predictions, given that the ideal partner verbal model has been validated in much research on partner preferences (Campbell et al., 2001; Fletcher et al., 2014, 2000a, 2000b, 1999).

Study 2, further, revealed that every participant, regardless of gender, prioritised the youthful-attractiveness factor when evaluating ambient face images as potential partners. Indeed, traits related to youthful-attractiveness accounted for up to 62% variance in partner preferences. The same pattern of findings was not present for either the trustworthiness/valence or the dominance factors. Hence, youthful-attractiveness was an overriding concern for all participants when rating unfamiliar face images on their partner

preferences. These findings are in accordance with the hypotheses and with a meta-analysis identifying that attractiveness predicts romantic preferences to a greater extent relative to status (Eastwick et al., 2014).

Traits related to attractiveness may be particularly salient to individuals in romantic contexts as attractiveness is linked to numerous positive social consequences. The "what is beautiful is good" stereotype (Dion et al., 1972) has revealed that attractive people are perceived to have better job prospects (Chiu & Babcock, 2002; Marlowe et al., 1996), and be better romantic partners with better marriages (Dion et al., 1972), relative to less attractive people. From an evolutionary perspective, attractiveness-related traits may be prioritised since these may signal that a potential partner is both fertile and resilient to environmental and genetic stressors (Jasienska, Lipson, Ellison, Thune, & Ziomkiewicz, 2006; Lassek & Gaulin, 2008; see Rhodes, 2006, for a review). Another possibility is that individuals only consider potential partners who attain a minimum level of attractiveness and it may be that, until this point, the trustworthiness/valence and dominance factors are not relevant.

3.5. General Discussion

This research explored whether individuals evaluate unfamiliar faces differently in terms of their first impressions in a romantic versus non-romantic context. Specifically, this research examined the relationship between the ideal partner face model and the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013). Both studies used the same face database (Santos & Young, 2005, 2008, 2011) as Sutherland et al. (2013), therefore, the underlying factor structures and correlations between the two models could be examined.

Study 1 involved obtaining face ratings on traits selected to represent the ideal partner face factors but which, also, did not overlap with the traits that Sutherland et al. (2013) selected to represent the face perception factors. A factor analysis on the traits selected to represent the ideal partner face model and the face perception model (Sutherland et al., 2013) revealed a four factor solution with (1) a warmth-trustworthiness and

trustworthiness/valence factor, (2) a vitality-attractiveness and youthful-attractiveness factor, (3) a status-resources factor, and (4) a dominance factor. Hence, the two models do not overlap completely. Nonetheless, there were strong correlations between (1) the warmth-trustworthiness and trustworthiness/valence factors, (2) the vitality-attractiveness and youthful-attractiveness factors, and (3) the status-resources and dominance factors. Of note, the status-resources and dominance factors were less strongly correlated, relative to the former factors. Therefore, despite a large overlap between the two models (primarily regarding the warmth-trustworthiness and trustworthiness/valence and vitality-attractiveness and youthful-attractiveness factors) this overlap is not absolute.

Sutherland et al. (2013) mention that their youthful-attractiveness factor may be implicated in romantic partner preferences. As such, the strong relationship between the vitality-attractiveness and youthful-attractiveness factors is unsurprising, even though the latter places greater emphasis on age. Moreover, Oosterhof and Todorov (2008) indicate that the trustworthiness/valence factor is relevant in perceptions of intention to commit harm. Hence, the trustworthiness/valence factor is somewhat similar to Fletcher et al.'s (1999) warmth-trustworthiness verbal factor, which involves an individual's willingness to support and be considerate towards a romantic partner, that is, the reverse of the intention to commit harm. In contrast, trait descriptors of status-resources emphasise financial and career prospects relevant for supporting offspring (financially secure, nice house or apartment, successful, and good job) whereas the trait descriptors of dominance largely emphasise the ability to inflict physical harm (dominance, masculinity, intelligence, and skin). Hence, there was lower correspondence obtained between status-resources and dominance, relative to the former factors, which is in accordance with the predictions.

Study 2 examined the relationship between the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013) and partner preference face ratings. In addition, this study explored whether the ideal partner face model and the face perception model differed when accounting for variance in partner preference face ratings. Despite the large correspondence between the two models, findings once more revealed that these models differed significantly, reflecting the contexts in which each model was derived. The face perception model is relevant to person perception in the social environment (Caulfield et

al., 2014; Todorov, Baron, et al., 2008; Todorov et al., 2005; Todorov, 2008; Watkins, Jones, et al., 2010) whereas the ideal partner face model is restricted to romantic contexts (Campbell et al., 2001; Fletcher et al., 2000a, 2000b, 1999). For example, if Anne thinks that Tom is trustworthy as a work colleague, based on her initial impression, she might not also think that Tom is likely to be warm and trustworthy as a romantic partner unless, perhaps, a romantic context were salient.

Further, in accordance with the predictions, findings revealed that participants prioritised the vitality-attractiveness and youthful-attractiveness factors relative to the status-resources and dominance factors in partner preference face ratings. Indeed, all participants prioritised the youthful-attractiveness factor and traits related to youthful-attractiveness accounted for up to 62% variance in partner preference face ratings. It was unclear whether participants would prioritise vitality-attractiveness and youthful-attractiveness relative to warmth-trustworthiness and trustworthiness/valence factors as previous research using verbal measures has revealed that warmth-trustworthiness is prioritised in partner preferences, relative to the remaining two ideal partner face factors. Hence, the finding that attractiveness-related concerns dominate partner preferences for face images is novel.

This research tested the relationship between the two models in both a neutral context (Study 1: Participants rated face images based on first impressions of traits) and a romantic context (Study 2: Participants rated face images based on their partner preferences). In both contexts there was some overlap between the models although there was never a total overlap, particularly regarding the status-resources and dominance factors. The fact that the same pattern of findings was revealed in both contexts further validates these results. Oosterhof and Todorov (2008) posit that trustworthiness/valence and dominance attributions are relevant in determining threat, which impact on decisions to approach (versus avoid) another person. First impressions of potential partners might be somewhat comparable, impacting on decisions to approach (versus avoid) a potential partner. For example, Mina might decide not to approach Paul as a potential partner if he appears to be untrustworthy or unattractive. Further, attractiveness-related concerns dominated partner preferences for face images. It is possible that attractiveness acts as a filter, with individuals only considering potential partners who score above a mimum level of

attractiveness and, once this is attained, other factors (e.g., trustworthiness/valence) might then become relevent. Other possibilities include that attractiveness signals fertility and resistance to environmental and genetic stressors (Jasienska, Lipson, Ellison, Thune, & Ziomkiewicz, 2006; Lassek & Gaulin, 2008; see Rhodes, 2006, for a review).

Both studies used a database of highly variable face stimuli, which is comparable to the natural and varied conditions in which people view other people, including potential partners, in their daily lives. Indeed, the face images used in this research are comparable to the photographs that people upload onto social media sites, such as Facebook, or onto online dating sites. Rosenfeld and Thomas (2012) revealed that the Internet has taken precedence over social contacts (e.g., colleagues and friends) in the search for potential potential partners. Over 49 million individuals have tried online dating in the US and dating sites receive an estimated annual revenue of almost $2 billion (Reuters, Herald News, PC World, & Washington Post, 2015). In these sites, individuals typically decide whether to find out more about a potential partner based on little information, generally just a photograph and a short description. Online dating websites are somewhat comparable to the task participants completed in Study 2, in which individuals indicated their romantic interest towards images of potential partners. First impressions of face images may be particularly consequential in online contexts, being perhaps more salient than verbal information.

As such, further research could identify whether including a short verbal description impacts on face ratings. For instance, it would be relevant to identify whether first impressions of face images are more (or less) salient relative to verbal descriptors, when both stimuli are presented at once, as is the case for the online dating community. As professional relations and business extend into the online world, first impressions of others based on minimal information are increasingly common and increasingly relevant. Further, given that relationship researchers have primarily used verbal measures of partner preferences (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger, Göritz, & Burger, 2010; Thush et al., 2008), identifying the correspondence between measures using face images and verbal measures is relevant (see Chapter 4).

Of note, research on first impressions of voices has revealed a bidimensional structure that overlaps largely with the face perception model (Oosterhof & Todorov, 2008). McAleer, Todorov, and Belin (2014) asked 320 participants to rate voice recordings of "hello", each lasting less than 500 ms, and found a valence factor (including traits such as trust and likeability) and a dominance factor underlying trait ratings. Identifying how these factors relate to the ideal partner model is an interesting avenue for future research. Moreover, given that people are rarely exposed to information pertaining to only a single domain in real life, research identifying the relative weight attributed to facial, verbal, and vocal information in first impressions of others is relevant (e.g., for an online dating profile: the relative salience of verbal information and a photograph; for a speed-dating event: the relative salience of facial, verbal, and vocal information). Abend, Pflüger, Koppensteiner, Coquerelle, and Grammer (2014) identified a correlation between men's ratings of female faces and voices and, further, revealed that low facial and body fluctuating asymmetry (which is a signal of resistance to genetic and environmental stressors throughout ontogeny; see Møller, 1999 for a review) was related to facial and vocal attractiveness. Hence, signals of attractiveness may be advertised via information pertaining to the face, body, and voice. Research identifying how first impressions of people are formed based on cross-modal information is in its infancy, requiring further progress.

3.6. Conclusion

First impressions of people are, debatably, one of the driving forces behind many multibillion-dollar industries, such as the cosmetics industry with an estimated total revenue of just under $57 billion and which employed over 56,000 individuals in the US in 2013 (Statista, 2015). Research on first impressions of unfamiliar face images has revealed a tripartite structure (Oosterhof & Todorov, 2008; Sutherland et al., 2013) that ostensibly overlaps with Fletcher et al.'s (1999) tripartite structure to ideal partner verbal preferences. This research examined the relationship between the ideal partner face model and the face perception model and revealed that these models overlapped largely. In accordance with the predictions, there were strong correlations between (1) the warmth-trustworthiness and trustworthiness/valence factors, (2) the vitality-attractiveness and youthful-attractiveness factors, and (3) the status-resources and dominance factors. Despite the large

correspondence between the two models, findings revealed that these models differed significantly, reflecting the contexts in which each model was derived: person perception versus impressions of potential partners.

Chapter 4. Correspondence between Measures of Partner Preferences: Face Images and a Verbal Measure

4.1. Abstract

Despite the widespread use of faces in research on first impressions, the use of highly variable face stimuli offers a novel potential approach in the measurement of partner preferences. The present study is the first to use highly variable stimuli and face averaging techniques for this purpose. This research explored whether individual differences in partner preferences, as measured by the verbal Ideal Partner Scale, correspond with partner preference face ratings. Chapter 3 identified that the youthful-attractiveness face perception factor was prioritised in participants' partner preference face ratings. Within the current chapter, partner preferences for face images will be examined in relation to Fletcher et al.'s (1999) ideal partner verbal model (rather than the face perception model, as per Chapter 3). In Study 1, 50 participants rated 500 opposite-sex face stimuli on their partner preferences and completed a verbal measure of partner preferences. In Study 2, 40 young adult participants rated 30 opposite-sex young adult face images on their partner preferences and completed a verbal measure of partner preferences. Findings revealed that participants prioritised attractiveness-related traits and vitality-attractiveness in face stimuli, whereas, participants prioritised warmth-trustworthiness in the verbal measure. From an evolutionary perspective, it can be inferred that traits related to vitality-attractiveness may be especially salient in a potential partner as these may signal fertility. Findings revealed a dissociation between partner preferences measured using face stimuli and a verbal measure and, as such, it can be inferred that face stimuli and the verbal scale may capture different elements of partner preferences.

Key words: First impressions, attractiveness, and evolutionary theory.

4.2. Introduction

Marilyn Monroe was a 1950s popular sex symbol, she was the first model on the cover of Playboy in 1953, and the licensing rights to her image were sold for up to $30 million in 2011 (Miller, 2014). Today, Marilyn's Facebook page has over 14 million likes with many individuals claiming that Marilyn was the perfect woman of all times (Facebook Inc., 2015c). Nevertheless, individuals do not tend to want the "perfect" romantic partner. Individuals mostly do not seek a romantic partner who is highly attractive, trustworthy, and wealthy. These people are rare (Buss & Barnes, 1986), difficult to attract, and difficult to maintain as a long-term partner. Indeed, obtaining a partner who is moderate on several traits may be more beneficial than the costs involved in seeking a partner who is exceptional in one or more traits (Li & Kenrick, 2006). For example, some researchers suggest that individuals who are fairly attractive have increased probabilities of being resistant to many genetic and environmental stressors (Furnham, Moutafi, & Baguma, 2002; Singh & Young, 1995; Streeter & McBurney, 2003). Therefore, seeking a highly attractive partner may not provide many further gains relative to seeking a moderately attractive partner who also possesses other desirable qualities (e.g., trustworthiness).

There are substantial individual differences in the attributes that men and women prefer in an ideal partner (Buunk et al., 2002; Kenrick et al., 1993; Kenrick & Keefe, 1992; Li & Kenrick, 2006; Shackelford et al., 2005; Zentner, 2005). Fletcher et al. (1999) identified a tripartite structure underlying verbally expressed ideal partner preferences: Warmth-trustworthiness (e.g., a person who is kind and supportive), vitality-attractiveness (e.g., sexy and nice body), and status-resources (e.g., successful and nice house), although these ideal partner verbal factors need not be weighted equally. Research using verbal measures of partner preferences has revealed that traits related to warmth-trustworthiness, love, dependability, emotional maturity, personality, and kindness, are prioritised in partner preferences (Buss, 1989; Fletcher et al., 2004; Li et al., 2002). Fletcher et al., further, found that warmth-trustworthiness was prioritised by most participants and vitality-attractiveness was a near second, with the status-resources factor a relatively distant third.

Romantic relationship researchers have predominantly used verbal measures of partner preferences (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger,

Göritz, & Burger, 2010; Thush et al., 2008), such as Fletcher et al.'s (1999) Ideal Partner Scale. Nevertheless, examining first impressions of potential partners using naturalistic, highly variable, stimuli – such as ambient images of faces – is relevant with substantive implications. For instance, social media have become the standard in promoting interpersonal connections for romantic, social, and professional objectives, with over two billion active social media users globally (Kemp, 2015). A key element of social media involves posting personal photographs and, based on these highly variable images, individuals make consequential decisions, for example, such as deciding whether to approach a potential romantic partner. Measures of partner preferences using ambient face images, are comparable to real life photographs (e.g., the images that people upload onto Facebook or Instagram) and are comparable to the heterogeneous conditions in which people view potential partners in real life. Hence, research findings can be more easily be generalised to real life contexts when using ambient face images, relative to either controlled face stimuli or verbal measures.

The current research examined the correspondence between a verbal measure of partner preferences and first impressions of face images as potential partners. Chapter 3 Study 2 examined partner preferences for opposite-sex ambient face images in relation to Sutherland et al.'s (2013) face perception model. The current chapter examined partner preferences in relation to Fletcher et al.'s (1999) ideal partner verbal factors as applied to face images (ideal partner face model).

Chapter 3 Study 2 revealed that attractiveness-related concerns dominated partner preferences for face images. Indeed, the youthful-attractiveness factor accounted for up to 62% variance in participants' partner preference ratings and was prioritised in every participant tested. Physical attractiveness may be prioritised in partner preferences given that it is associated with numerous social consequences and the "what is beautiful is good" stereotype (Dion et al., 1972) posits that people attribute multiple positive qualities to attractive individuals (see Eagly, Ashmore, Makhijani, & Longo, 1991; Feingold, 1992b; Langlois et al., 2000, for meta-analytical reviews of attractiveness stereotypes). For example, relative to less attractive people, attractive individuals have better career prospects (Chiu & Babcock, 2002; Marlowe et al., 1996), facilitated economic mobility (particularly for women; Elder Jr., 1969; Holmes & Hatch, 1938), pay less bail (Downs &

Lyons, 1991), are perceived to be better romantic partners with better marriages (Dion et al., 1972), date more people (R. E. Riggio & Woll, 1984) and, when dating an attractive individual, people mention being more pleased by their date (Berscheid, Dion, Walster, & Walster, 1971; Walster, Aronson, Abrahams, & Rottman, 1966).

An evolutionary perspective (Gangestad & Simpson, 2000; Simpson & Gangestad, 1992) posits that partner preferences are adaptations to biological and social cues (Zebrowitz McArthur & Baron, 1983). Individuals preferring partners who display cues reflecting their mate value (e.g., genetic quality or social status) would be at an advantage and would be more likely to produce progeny, relative to individuals who either could not perceive these cues or who had no preference for these cues. From this perspective, partner preferences involve strategies to maximise genetic continuity both within and across generations (see Andersson, 1994, for a review of sexual selection). For example, preference for traits related to parasite-resistance may be beneficial as individuals are less likely to acquire a contagious partner (direct benefit) and genetic resistance to parasites is more likely to be passed on to progeny (indirect benefit; Gibson, 1990).

The current research is the first to examine the correspondence between verbal measures of partner preferences and preferences for images of potential partners. It may seem counterintuitive that a given individual might prioritise warmth-trustworthiness in a verbal measure of partner preferences (as per Buss, 1989; Fletcher et al., 2004; Li, Bailey, Kenrick, & Linsenmeier, 2002), yet, this same individual might prioritise vitality-attractiveness when evaluating face images of potential partners (as per Chapter 3 Study 2). Nevertheless, previous research has revealed that measurement type has an impact on the predictive validity of partner preferences, with often low correspondence between differing measures of partner preferences (see Chapter 1 for a brief review). Eastwick, Eagly, Finkel, and Johnson (2011) and Eastwick and Finkel (2008) suggest that verbal measures of partner preferences may reflect propositional beliefs regarding the traits that people prefer in a partner based on the interpersonal consequences that they believe these traits will bring, rather than considering the affective reactions these traits will elicit. For example, Tom says that he would like a partner who is intelligent because he believes that an intelligent partner would be interesting and fun. However, Tom may not have

considered that having an intelligent partner could make him feel inferior and, perhaps, unhappy.

The associative-propositional evaluation model (Gawronski & Bodenhausen, 2006, 2007, 2011) posits that real life romantic contexts can be ambiguous and complex, and people often interpret ambiguous situations in line with their spontaneous responses (Gawronski et al., 2003; Hugenberg & Bodenhausen, 2003). Highly variable face stimuli, like romantic contexts, can be ambiguous and complex. Indeed, face perception researchers have revealed that people evaluate one another on specific traits based on first impressions (Hall, Goren, Chaiken, & Todorov, 2009; Hassin & Trope, 2000; Langlois et al., 2000; Montepare & Zebrowitz, 1998; Olivola & Todorov, 2010b; Todorov, Baron, et al., 2008; Zebrowitz & Montepare, 2005; Zebrowitz, 1997) and these evaluations can be spontaneous (Todorov & Uleman, 2002, 2003), fast, and largely unconscious (Kahneman, 2003). Spontaneous and fast processes are involved in how the brain analyses nonverbal behaviour (Hassin, Uleman, & Bargh, 2005; Lakin, 2006).

In addition, functional magnetic resonance imaging research has revealed that the amygdala automatically evaluates face images based on the approachability-dominance face perception factors and the amygdala, further, modulates the activity of occipital and temporal regions (Engell, Haxby, & Todorov, 2007; Todorov & Engell, 2008). Hence, first impressions from faces may involve implicit, automatic, processes. Partner preferences captured via face stimuli may be more closely related to preferences expressed in real life romantic situations as these are often characterised by ambiguity and spontaneous decisions, relative to verbal measures. Hence, it is possible that there will be low correspondence between measures of partner preferences using face images and verbal measures.

4.2.1. Research Overview

This research explored the relationship between ideal partner preferences measured using face images and a verbal measure. In both studies, participants rated the face images based on their partner preferences and participants, additionally, completed a verbal measure of partner preferences. This research examined partner preferences using 500 opposite-sex

ambient face images (Study 1) and 30 averaged youthful-looking face images (Study 2). The complementary use of ambient images and image averaging techniques to explore first impressions of potential partners is a novel approach, enabling the research to derive conclusions using large variability in images and facilitating confirmation of these findings using images controlled on age and ideal partner face factor.

There were two hypotheses:

1. With regards to partner preferences for face stimuli, based on findings from Chapter 3 Study 2, it was expected that participants would prioritise the vitality-attractiveness ideal partner face factor and related traits (vitality, attractiveness, sexy, and adventurousness) relative to the warmth-trustworthiness and status-resources ideal partner face factors and their related traits (warmth-trustworthiness traits: Warmth, trustworthiness, supportive, and understanding; status-resources traits: Status, resources, good job, and financially secure).
2. Concerning the verbal measure of partner preferences, based on previous research (e.g., Buss, 1989; Fletcher et al., 1999, 2004; Li et al., 2002), it was expected that participants would prioritise warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranking last.

4.3. Study 1

The research objective was to examine the correspondence between measures using face stimuli and verbal measures. Ambient face stimuli, rather than tightly controlled images, are better representative of the varied conditions in which individuals view potential partner in real life and represent a new approach to measuring partner preferences. This study involves a reanalysis of the data collected in Chapter 3, Study 2, in which participants rated opposite-sex ambient face stimuli on their partner preferences and completed a verbal measure of partner preferences.

4.3.1. Method

4.3.1.1. Participants

50 participants, all university students, were recruited via the University of York website. Participants were between 18 and 32 years old (*M* = 21.12, *SD* = 3.66) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. The participant data from Chapter 3 Study 2 is reanalysed in this study.

4.3.1.2. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).

4.3.1.3. Verbal Measure

Fletcher et al.'s (1999) Ideal Partner Scale is a verbal measure, revealing preferences towards warmth-trustworthiness, status-resources, and vitality-attractiveness (see Chapter 3 for more information).

4.3.1.4. Procedure

As described in Chapter 3 Study 2, participants were informed that they would rate opposite-sex faces based on the following instructions: "Rate each person on how interesting you find them in terms of being your ideal partner in a close relationship (e.g., dating, living together, or married)", using a seven-point Likert scale (not interesting-very interesting). Participants were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Following completion of six practice trials rating opposite-sex face stimuli randomly selected from the database, participants rated 500 opposite-sex

face images. The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 250 face images, they were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 30 minutes to complete. Subsequently, participants completed the Ideal Partner Scale (Fletcher et al., 1999). On completion, participants were debriefed and reimbursed with a small payment.

4.3.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23. In addition to the reliability tests, analyses of partner preferences for face images is presented. Subsequently, analysis of a verbal measure of partner preferences is presented. Finally, analysis of both preferences measured using face images and the verbal measure is presented.

4.3.2.1. Reliability

As reported in Chapter 3 Study 2, for each group of raters (i.e., 25 heterosexual men and 25 heterosexual women), inter-rater agreement in partner preference face ratings was high. All Cronbach's alphas for face image ratings were over .95 and, also, all Cronbach's alphas for the verbal measure ratings were over .70, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

4.3.2.2. Face Images

Chapter 3 Study 2 examined partner preferences for opposite-sex ambient face images in relation to Sutherland et al.'s (2013) face perception model. The current chapter involves a reanalysis of the data collected in Chapter 3 Study 2, to examine partner preferences for face images in relation to Fletcher et al.'s (1999) ideal partner factors. There were two stages in the analysis:

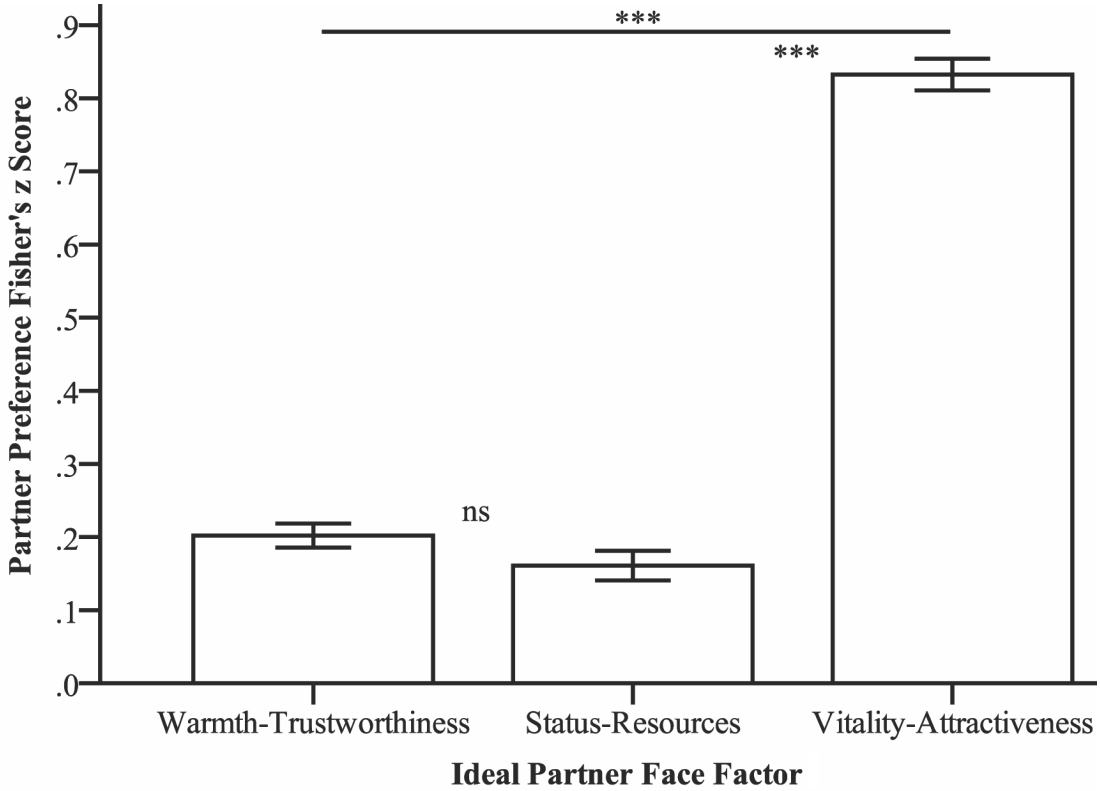
1. The ideal partner face factors in relation to the partner preference face ratings were examined. Each face image was given three scores reflecting its relationship to each of the warmth-trustworthiness, status-resources, and vitality-attractiveness factors (derived from Chapter 2). Each participant's partner preferences for the 500 faces they rated was correlated with the faces' loadings on each factor, to find out how each factor was linked to the ratings given and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The partner preference Fisher's z scores were subjected to a repeated-measures ANOVA between the ideal partner face factors.
2. To determine which ideal partner face factors and traits accounted for most of the variance in partner preference face ratings, the individual participant partner preference face ratings were correlated with the ideal partner face factor scores and with traits selected to represent these factors.

4.3.2.2.1. ANOVA

Chapter 3 Study 2 examined which of Sutherland et al.'s (2013) face perception factors were prioritised in each participant's partner preferences face ratings. In the current study, data from Chapter 3 Study 2 was reanalysed to explore which ideal partner face factors were prioritised in participants' partner preference face ratings. There were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant partner preference Fisher's z scores were subjected to a repeated-measures ANOVA between the ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix C for analysis separated by participant sex. The model did not violate sphericity.

Findings revealed a significant main effect of factors $\left(F(2, 98) = 487.04, MSE = 7.09, p < .001, \eta_p^2 = .91\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised vitality-attractiveness factor relative to warmth-trustworthiness

and status-resources (*p*s < .001, see Figure 4.1), which is in accordance with the predictions, with no significant difference between the warmth-trustworthiness and status-resources factors (p = .223). These findings are in accordance with the hypotheses and with findings from the two studies described in Chapter 3 revealing that all participants prioritised the youthful-attractiveness factor in the partner preference face ratings. These findings are, further, consistent with a meta-analysis on romantic preferences that revealed a stronger preference for attractiveness relative to earning potential for participants (Eastwick et al., 2014).



Bonferroni correction for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 4.1. Partner preferences for ambient face stimuli as a function of the ideal partner face model. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

4.3.2.2.2. Ideal Partner Face Model Correlations

To determine which ideal partner face factor accounted for most of the variance in partner preference face ratings, firstly, the regression factor scores representing each ideal partner face factor for the 1000 photographs were computed (derived from Chapter 2) and,

secondly, the individual participant partner preference face ratings were correlated with each of the ideal partner regression factor scores (see Figure 4.2; see Figure 9.16, Appendix C, for analysis separated by participant sex). Findings revealed that every participant prioritised the vitality-attractiveness factor, indicating that the emphasis on vitality-attractiveness is an overriding concern.

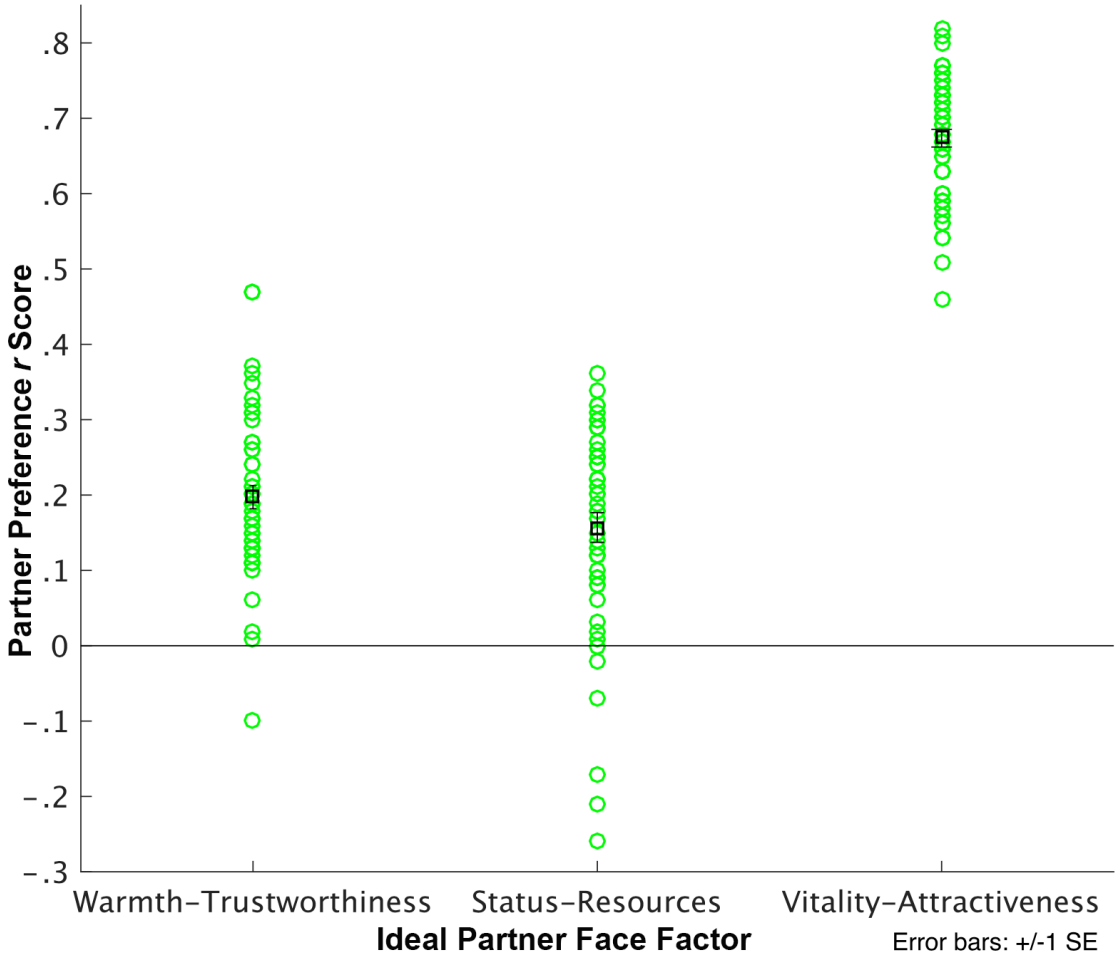


Figure 4.2. Individual participant partner preference face ratings correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values revealed that the vitality-attractiveness factor was prioritised and accounted for up to 67% (M = 46%, SD = 0.11) of the variance in partner preferences for faces. In contrast, the warmth-trustworthiness and status-resources factors respectively accounted for a mean 5% (SD = .05, maximum variance = 22%) and 4% (SD = .03, maximum variance = 13%) variance in partner preferences for face images. Hence, vitality-

attractiveness dominates partner preferences for face images, relative to the warmth-trustworthiness and status-resources factors.

4.3.2.2.3. Ideal Partner Trait Correlations

To explore which traits accounted for most of the variance in partner preference face ratings, the the individual participant partner preference face ratings for each face were correlated with independent evaluations of the face stimuli on 12 traits derived from Fletcher et al.'s (1999) verbal scale, taken from the study reported in Chapter 2. Specifically, four traits were selected to represent each of the three Fletcher et al.'s factors, which were the traits that loaded highest on their respective factors:

1. Warmth-trustworthiness traits: Trustworthiness, warmth, understanding, and supportive;
2. Status-resources traits: Status, resources, good job, and financially secure;
3. Vitality-attractiveness traits: Vitality, attractiveness, adventurous, and sexy.

The correlations for the vitality-attractiveness traits revealed moderate to strong relationships between these traits and the partner preference face ratings. In contrast, the correlations for the warmth-trustworthiness traits and the status-resources traits revealed only small relationships between these traits and the partner preference face ratings (see Figure 4.3 for the individual participant correlations; see Figure 9.17, Appendix C for analyses separated by participant sex).

The R^2 values, similarly, revealed that the vitality-attractiveness traits were prioritised and accounted for up to 66% (M = 32%, SD = 0.02) of the variance in partner preferences for faces. In contrast, the warmth-trustworthiness traits and the status-resources traits respectively accounted for a mean 3% (SD = .01, maximum variance = 20%) and 5% (SD = .02, maximum variance = 20%) variance in partner preferences for faces. Hence, vitality-attractiveness concerns seem more salient than either warmth-trustworthiness and status-resources concerns when evaluating face images in terms of partner preferences.

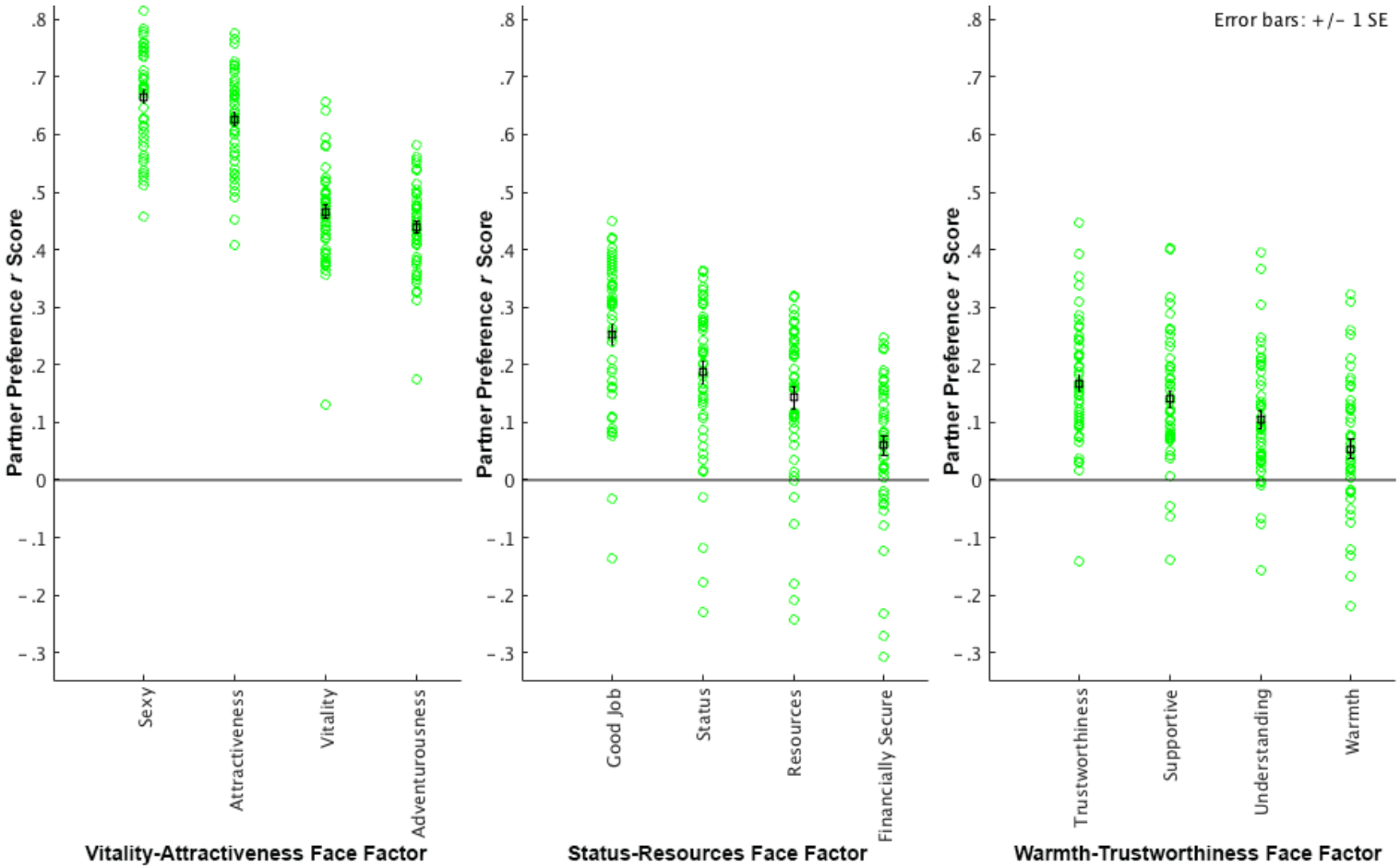
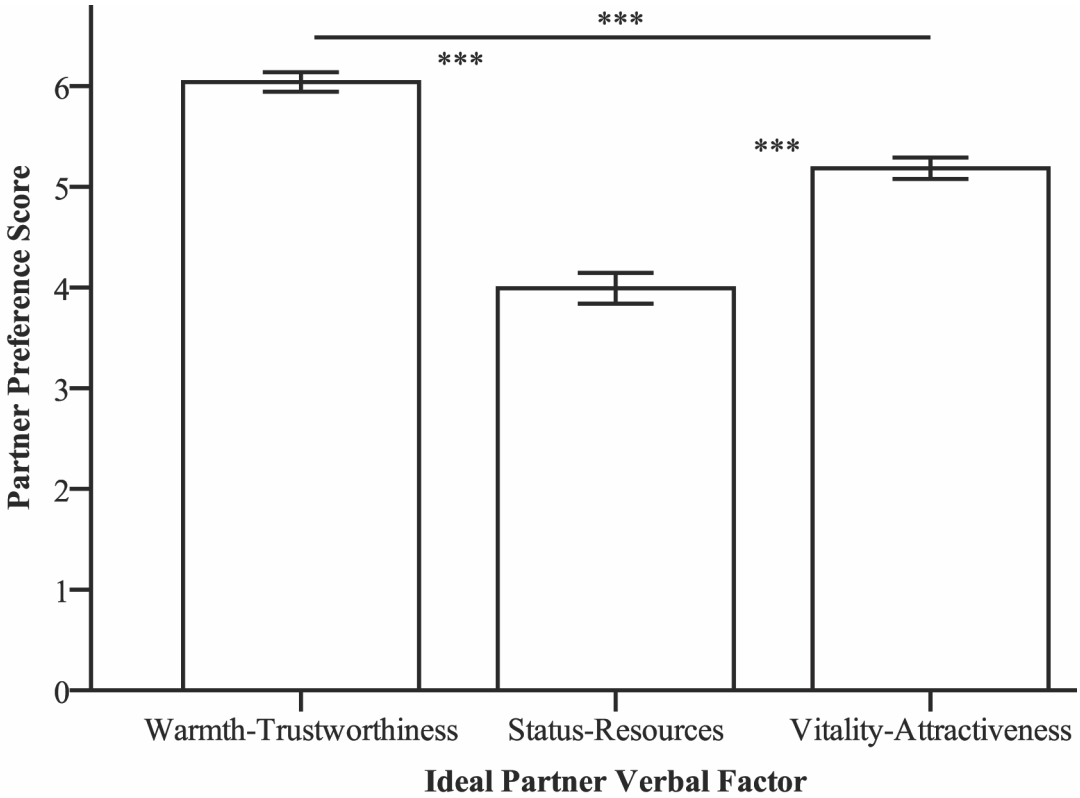


Figure 4.3. Individual participant partner preference face ratings correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

4.3.2.3. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor were subjected to a repeated-measures ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix C for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed a significant a main effect of factors $\left(F(2, 98) = 82.63, MSE = 52.90, p < .001, \eta_p^2 = .63\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least important. There were significant differences (ps < .001) between each of the three ideal partner verbal factors (see Figure 4.4). The findings are in accordance with the hypotheses and with previous research (Buss, 1989; Eastwick et al., 2014; Fletcher et al., 1999; Li et al., 2002).



Bonferroni adjustment for pairwise comparisons: ***. p < .001
Error bars: +/- 1 SE

Figure 4.4. Verbal partner preferences. Larger partner preference scores reveal a greater preference for a particular factor

4.3.2.4. Face Images and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. A dissociation between preferences measured using face stimuli and a verbal measure was expected, with face images predicted to reveal that participants prioritised vitality-attractiveness and the verbal measure predicted to reveal that participants prioritised warmth-trustworthiness.

Concerning preferences for face images, there were two steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated

for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors. The participant partner preference Fisher's z scores for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A repeated-measures 3 x 2 ANOVA was conducted between the ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and stimuli (face stimuli, verbal measure). See Appendix C for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed a significant interaction effect between the ideal partner factors and stimuli $\left(F(2,98) = 82.93, MSE = 27.13, p < .001, \eta_p^2 = .63\right)$. There was a significant main effect of factors $\left(F(2,98) = 100.29, MSE = 32.85, p < .001, \eta_p^2 = .67\right)$ and a significant main effect of stimuli $\left(F(1,49) = 3692.50, MSE = 1637.96, p < .001, \eta_p^2 = .99\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised the warmth-trustworthiness and vitality-attractiveness factors relative to the status-resources factor ($p < .001$), with no significant difference between the warmth-trustworthiness and vitality-attractiveness factors ($p = .403$). Partner preferences measured using face stimuli revealed that participants prioritised the vitality-attractiveness face factor, whereas preferences measured using the verbal measure revealed that participants prioritised the warmth-trustworthiness verbal factor. These findings are in accordance with the hypotheses.

4.3.3. Discussion

Study 1 investigated the correspondence between partner preferences measured via face stimuli and a verbal measure. Findings revealed a dissociation between partner preferences measured using ambient face stimuli versus the verbal measure. Participants prioritised warmth-trustworthiness in the verbal scale of partner preferences, yet, they prioritised vitality-attractiveness for face stimuli. Every participant prioritised the vitality-attractiveness factor when evaluating face stimuli, suggesting that vitality-attractiveness concerns were highly salient for all participants. Hence, it can be inferred that the measures using face stimuli and verbal measures capture different elements of partner preferences. From an evolutionary perspective, it can be inferred that individuals may emphasise

vitality-attractiveness cues in a potential partner as these cues may signal fertility and resistance to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). Of course, numerous alternative perspectives account for this emphasis on attractiveness.

A caveat to these results should be mentioned. Participants were young adults rating ambient face images that were unconstrained on age (excepting that all photographs represented individuals above 18 years of age). For example, a man may have rated how interested he was in a 70 year old woman, followed by a 25 year old woman and so forth, in terms of being his partner in a long-term close relationship. However, an investigation into singles advertisements revealed that men in their 20s prefer partners who are maximum +/- five years from their age (Kenrick & Keefe, 1992), whereas woman at all ages prefer men who are approximately their own age, including men who were up to 10 years their senior (Buunk, Dijkstra, Kenrick, & Warntjes, 2001; Kenrick & Keefe, 1992).

Hence, the young participants (mean age: 21 years) from Study 1 may have been less interested in much older individuals (e.g. individuals over 10 years their senior) and simply rejected these immediately, which might have obscured any subtle underlying relationships. Indeed, Study 1 findings revealed that participants were interested in images portraying youthful individuals. Research has linked attractiveness to age (Sutherland et al., 2013), therefore, the emphasis participants placed on attractiveness may have been a by-product from participants prioritising youthful-looking face images in their partner preference face ratings. Study 2 addressed this limitation by asking young adults to rate only youthful-looking opposite-sex face stimuli. Study 2 replicated the first study using age-constrained face images to reveal whether individuals still prioritised vitality-attractiveness in their first impressions of potential romantic partners.

4.4. Study 2

Study 1 revealed that all participants prioritised vitality-attractiveness and related traits in their partner preference face ratings, yet, a verbal measure revealed that participants prioritised warmth-trustworthiness. Study 2 investigated the correspondence between partner preferences for averaged face images and a verbal measure. Youthful images

representing high and low levels of each ideal partner face factor were created for this study and partner preferences for these were examined. This has important consequences because, if vitality-attractiveness concerns remain salient for young adult participants rating youthful-looking faces, then the emphasis on vitality-attractiveness may be independent of the face stimuli properties, perhaps reflecting a selection pressure to find facial cues reflecting an individual's mate value particularly attractive (e.g., averageness; Mitchell & Grant, 1984; Thornhill & Gangestad, 1993). For example, people may prioritise traits related to vitality-attractiveness in faces as these may indicate that an individual is fertile and resistant to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). Of course, alternative accounts for the emphasis on attractiveness abound.

Averaging and morphing techniques were used to explore partner preferences for youthful-looking face images. These techniques are well suited to examining this question as, by averaging across exemplars of youthful-looking face images, they retain only the cues that are stable across many different face images. Much research has focused on image averaging techniques to create face averages representing a range of traits from controlled, standardised, images (see Little, Jones, & DeBruine, 2011 and Tiddeman, Burt, & Perrett, 2001for reviews). For example, the facial attractiveness literature commonly derives averaged images from young adults with neutral expressions and standardised pose, clothes, lighting, and camera. Sutherland et al. (2013) used morphing techniques to create averaged face images representing varying degrees of specific traits (e.g., intelligence) using a database of ambient images.

This study is the first to apply image averaging techniques to investigate partner preferences derived from ambient face images. Face averages were created from ambient face images that scored high or low on warmth-trustworthiness, status-resources, and vitality-attractiveness.

4.4.1. Method

4.4.1.1. Participants

40 participants, all university students, were recruited via the University of York website. Participants were between 17 and 38 years old (*M* = 20.88, *SD* = 4.00) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

4.4.1.2. Face Images

The study used five stimuli to represent high and low levels of each factor, separately: Five high and five low warmth-trustworthiness images, five high and five low status-resources images, and five high and five low vitality-attractiveness images. In total there were 30 stimuli and participants rated each stimulus twice. The stimuli were created as follows:

1. The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information). Six participants had previously rated the stimuli on age using a seven-point Likert scale (young adult-old adult; Santos & Young, 2005, 2008, 2011). Stimuli that were given a mean rating less than or equal to four on this scale were selected to ensure that the images represented young adults.
2. Factor scores representing each factor of the ideal partner face model were computed for all 1000 photographs using the regression method (see Chapter 2). Based on the regression scores for each ideal partner factor, the stimuli were ordered from high to low on each ideal partner factor. Only the highest and lowest 50 stimuli representing each factor were selected. These groups of 50 images were divided into five groups of 10 images.

3. 179 fiducial points were manually positioned on each image using PsychoMorph (Tiddeman et al., 2001) to mark the outlines and positions of internal and external features of each face. Two experimenters verified this delineation.
4. Averaged images for each of the five groups of 10 stimuli for high and, also, for low levels of each ideal partner face factor were created using PsychoMorph (Tiddeman et al., 2001).
5. An overall average image for all of the male and female faces was created using PsychoMorph (Tiddeman et al., 2001) and the eyes and mouths of the averaged stimuli were aligned with this overall average image using PsychoMorph (Tiddeman et al., 2001). This ensured that when participants viewed the stimuli, the eyes and mouths of all images were in the same location on the computer screen.
6. The resulting images were 300 pixels in height and were cropped to reveal only the individuals' head and shoulders (see Figure 4.5).

Figure 4.5. Averaged youthful-looking face images (each made from 10 ambient images) representing high (left) and low (right) levels of warmth-trustworthiness (top row), status-resources (middle row), and vitality-attractiveness (bottom row) using male images (top) and female images (bottom).

SPSS version 23 was used to identify whether the constituent images used to create each averaged stimulus representing high and low levels of each ideal partner face factor differed significantly in terms of perceived age. Face images were rated on perceived age by six participants, using a seven-point Likert scale (young adult-old adult; Santos & Young, 2005, 2008, 2011). Only face images with a mean rating less than or equal to four on this scale were used to create the averaged stimuli. Each averaged face image was composed of ten images and the mean perceived age ratings on these ten images was subjected to a univariate 3 x 2 x 2 ANOVA between ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), level of each ideal partner face factor (high and low), and face stimuli sex.

Findings revealed a significant interaction effect between factors, level, and stimuli sex $\left(F(2, 588) = 6.72, MSE = 2.53, p = .001, \eta_p^2 = .02\right)$ and a significant interaction effect

between factors and level $\left(F(2,588) = 12.98, MSE = 4.88, p < .001, \eta_p^2 = .04\right)$. There was no significant interaction effect between factors and stimuli sex $\left(F(2,588) = 0.42, MSE = 0.16, p = .659, \eta_p^2 = .00\right)$ and no significant interaction effect between level and stimuli sex $\left(F(1,588) = 2.04, MSE = 0.77, p = .153, \eta_p^2 = .00\right)$. Further, findings revealed a significant main effect for factor $\left(F(2,588) = 6.96, MSE = 2.62, p = .001, \eta_p^2 = .02\right)$, but findings revealed no significant main effect for level $\left(F(1,588) = 0.47, MSE = 0.18, p = .492, \eta_p^2 = .00\right)$ and no significant main effect for stimuli sex $\left(F(1,588) = 2.59, MSE = 0.97, p = .108, \eta_p^2 = .00\right)$.

Examination of the interaction effects using Bonferroni's adjustment revealed that, for male face images, the constituent images used to create each averaged stimulus representing high status-resources were rated significantly older than the constituent images used to create each averaged stimulus representing high warmth-trustworthiness and high vitality-attractiveness (*p*s < .001), with no significant differences in rated age between high warmth-trustworthiness and high vitality-attractiveness. The constituent images used to create each averaged stimulus representing male low vitality-attractiveness were rated significantly older relative to male stimuli representing low status-resources (*p* = .009). There were no significant differences in rated age between low warmth-trustworthiness and low status-resources or between low warmth-trustworthiness and low vitality-attractiveness.

Concerning female face images, the constituent images used to create each averaged stimulus representing high status-resources were rated significantly older than the constituent images used to create each averaged stimulus representing high warmth-trustworthiness (*p* = .001), with no significant differences in rated age between high status-resources and high vitality-attractiveness or between high warmth-trustworthiness and high vitality-attractiveness. In addition, there were no significant differences in rated age between low levels of the ideal partner factors for female face images. The revealed differences in perceived age were not considered problematic given that the constituent images used to create each averaged stimulus were selected to represent young adults (similar to the age range of the undergraduates rating the face images) and, hence, this cohort does include some variation in terms of age. Indeed, it is likely that even images

controlled on actual age would differ in terms of perceived age, with high status individuals perhaps appearing somewhat older than individuals who are high in warmth.

4.4.1.3. Verbal Measure

Fletcher et al.'s (1999) Ideal Partner Scale is a verbal measure, revealing preferences towards warmth-trustworthiness, status-resources, and vitality-attractiveness (see Chapter 3 for more information).

4.4.1.4. Procedure

Following informed consent, in which participants were informed that the study involved romantic first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate opposite-sex faces based on the following instructions: "Rate each person on how interesting you find them in terms of being your ideal partner in a close relationship (e.g., dating, living together, or married)", using a seven-point Likert scale (not interesting-very interesting). Participants were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005).

Following completion of six practice trials rating opposite-sex face stimuli randomly selected, participants rated 30 opposite-sex face images twice (five high warmth-trustworthiness images, five low warmth-trustworthiness images, five high status-resources images, five low status-resources images, five high vitality-attractiveness images, five low vitality-attractiveness images). The presentation order of all 60 stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 30 face images, they were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 10 minutes to complete. Subsequently, participants completed the Ideal Partner Scale (Fletcher et al., 1999). On completion, participants were debriefed and reimbursed with a small payment.

4.4.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23. In addition to the reliability tests, analyses of partner preferences for face images is presented. Subsequently, analysis of a verbal measure of partner preferences is presented. Finally, analysis of both preferences measured using face images and the verbal measure is presented.

4.4.2.1. Reliability

For each group of raters (i.e., 20 heterosexual men and 20 heterosexual women), inter-rater agreement in partner preference face ratings was high. All Cronbach's alphas for face images were .92 and, also, all Cronbach's alphas for the verbal measure ratings were over .72, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

4.4.2.2. Face Images

There were two stages in the analyses:

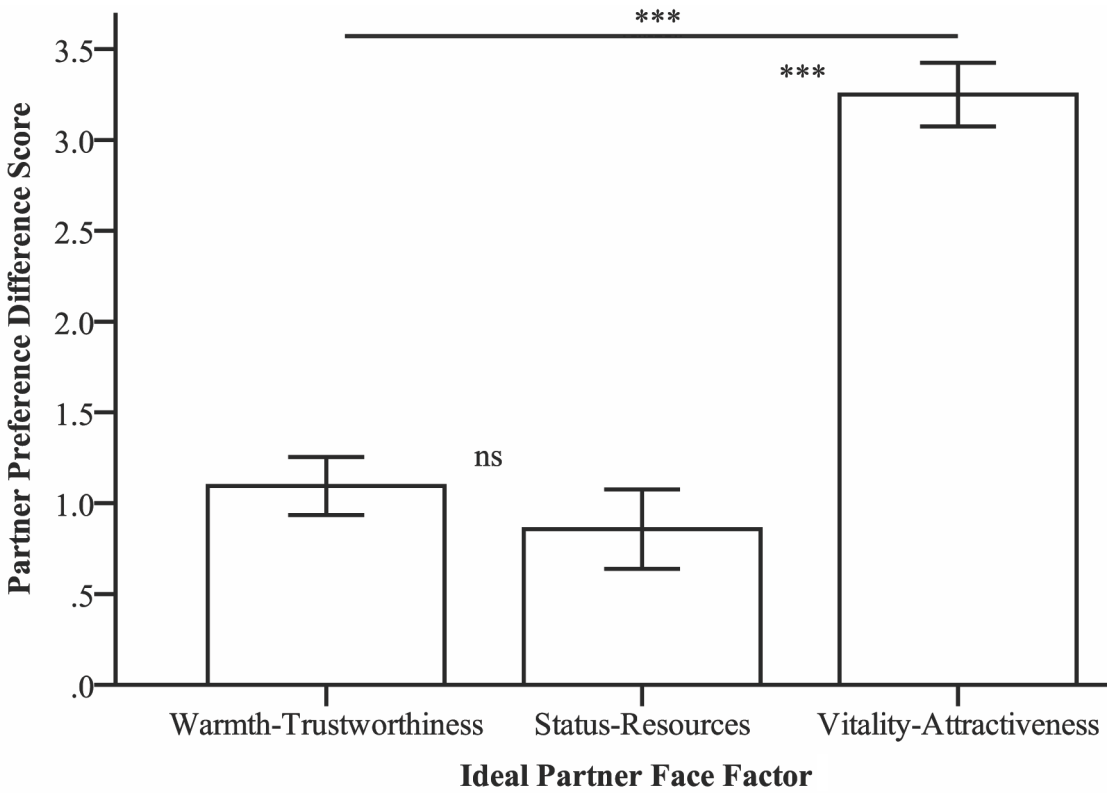
1. To determine whether there was a significant difference between the factors that are prioritised in partner preference face ratings, the individual participants' mean difference score relating to each ideal partner face factor was calculated. For each factor, this involved subtracting the mean score for the low level images from the mean score for the high level images. The individual participants' mean difference scores were submitted to a repeated-measures ANOVA between the ideal partner face factors.
2. To determine which ideal partner face factor was prioritised, the individual participants' mean difference score relating to the three ideal partner face factors, from step one, was examined.

4.4.2.2.1. ANOVA

The current study explored which ideal partner face factors were prioritised in participants' partner preference face ratings. A difference score relating to the three ideal partner face

factors was calculated. For example, for the warmth-trustworthiness images, the mean score for the low level images was subtracted from the mean score for the high level images. This mean difference score was calculated separately for the warmth-trustworthiness, status-resources, and vitality-attractiveness factors and for each participant. The individual participants' mean difference scores relating to the three ideal partner face factors were submitted to a repeated-measures ANOVA between ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix C for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed a significant main effect of factors $\left(F(2,78) = 67.31, MSE = 69.50, p < .001, \eta_p^2 = .63\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised the vitality-attractiveness factor relative to the warmth-trustworthiness or the status-resources factors (*p*s < .001), with no significant difference between the warmth-trustworthiness and the status-resources difference scores (*p* = 793; see Figure 4.6). These findings are in accordance with the hypotheses and with the findings from Chapter 3 Study 2, revealing that all participants prioritised the youthful-attractiveness factor in the partner preference face ratings. These findings are, further, consistent with a meta-analysis on romantic preferences that revealed a stronger preference for attractiveness relative to earning potential for participants (Eastwick et al., 2014).



Bonferrnoni adjustment for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 4.6. Partner preferences for youthful adult face images created with averaging techniques. Larger difference scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

4.4.2.2.2. Ideal Partner Face Model Difference Scores

To determine which ideal partner face factor was prioritised by participants, the individual participant difference scores relating to the three ideal partner face factors were examined. A positive difference score reflects that an individual prioritises high levels of a given factor, relative to low levels. Inspection of the data revealed that all participants, excepting one male participant, prioritised the vitality-attractiveness factor (see Figure 4.7; see Figure 9.20, Appendix C, for analyses separated by participant sex). Hence, the emphasis on vitality-attractiveness is clearly an overriding concern for most participants.

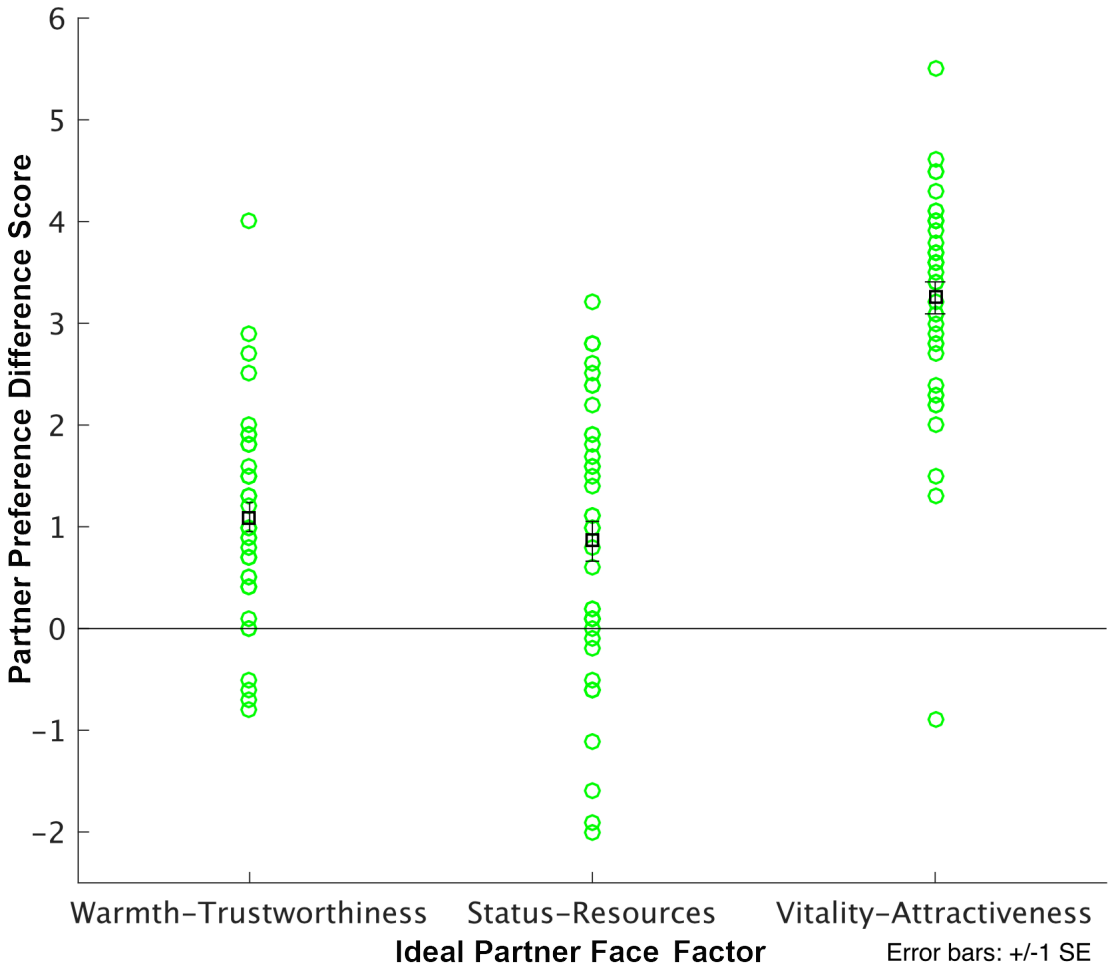
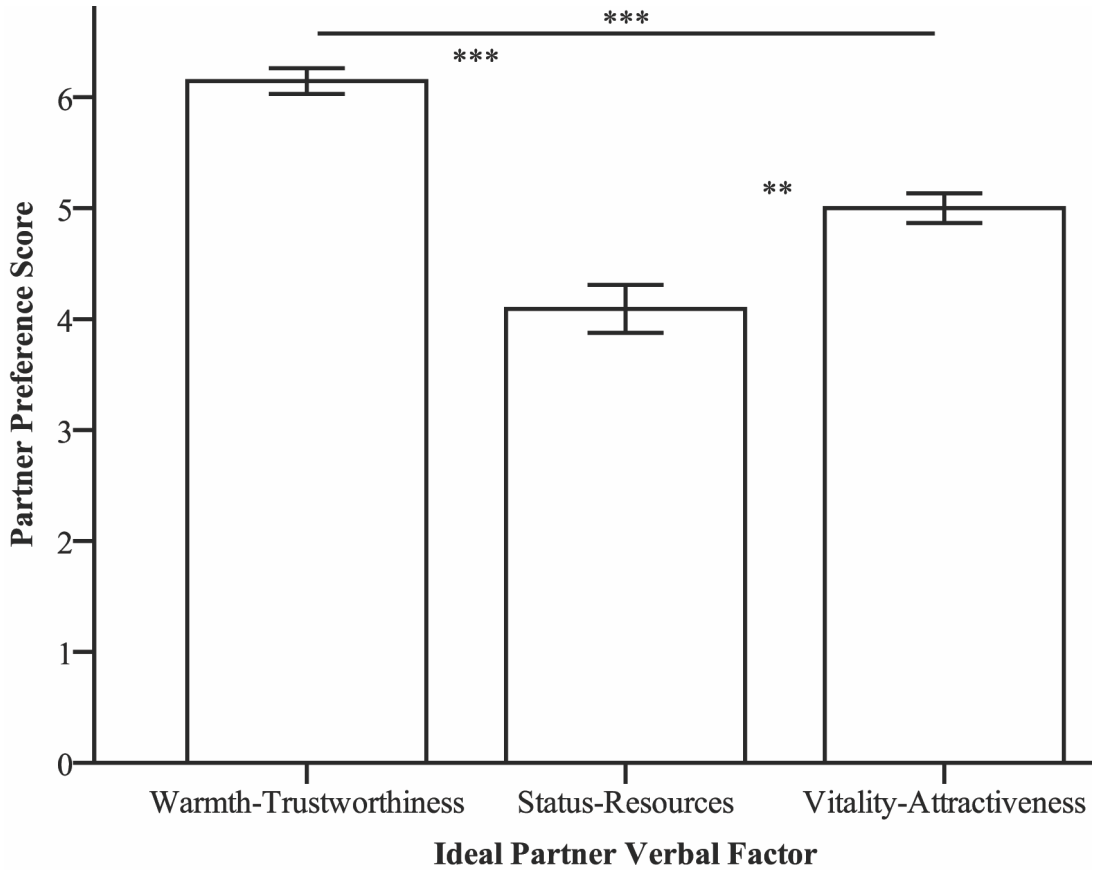


Figure 4.7. Individual participant partner preference difference scores for youthful adult face images created with averaging techniques. Larger difference scores for a factor reveal that this is prioritised in participants' partner preference face ratings. Green circles represent data for individual participants. The black squares represent the mean difference scores.

4.4.2.3. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor were subjected to a repeated-measures ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix C for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed a significant main effect of factors $\left(F(2,78) = 42.93, MSE = 42.35, p < .001, \eta_p^2 = .52\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least important (see Figure 4.8). There were significant differences (*p*s < .01) between each of the three ideal partner verbal factors. These results are consistent with the hypotheses and with much research revealing that men and women prioritise traits related to warmth-trustworthiness in a romantic partner (e.g., Buss, 1989; Fletcher et al., 1999; Li et al., 2002).



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01
Error bars: +/- 1 SE

Figure 4.8. Verbal partner preferences. Larger partner preference scores reveal a greater preference for a particular factor.

4.4.2.4. Face Images and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. A dissociation between preferences

measured using face stimuli and a verbal measure was expected, with face images predicted to reveal that participants prioritised vitality-attractiveness and the verbal measure predicted to reveal that participants prioritised warmth-trustworthiness.

Concerning preferences for face images, the individual participants' mean difference scores relating to the three ideal partner face factors was calculated. With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors. The individual participants' mean difference scores for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A repeated-measures 3 x 2 ANOVA was conducted between the ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and stimuli (face stimuli, verbal measure). See Appendix C for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between the ideal partner factors and stimuli $\left(F(1.73, 67.60) = 46.00, MSE = 63.07, p < .001, \eta_p^2 = .54\right)$. There was a significant main effect of factors $\left(F(1.91, 74.41) = 68.85, MSE = 59.95, p < .001, \eta_p^2 = .64\right)$. Furthermore, there was a significant main effect of stimuli $\left(F(1.00, 39.00) = 323.56, MSE = 671.45, p < .001, \eta_p^2 = .89\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised vitality-attractiveness relative to warmth-trustworthiness ($p = .003$) and status-resources ($p < .001$) and, furthermore, participants prioritised warmth-trustworthiness relative to status-resources ($p < .001$). Partner preferences assessed using face stimuli revealed that participants prioritised the vitality-attractiveness face factor, whereas preferences assessed using the verbal measure revealed that participants prioritised the warmth-trustworthiness verbal factor. These findings are in accordance with the hypotheses.

4.4.3. Discussion

Study 2 investigated the correspondence between partner preferences for youthful-looking face images and verbal partner preferences Findings revealed that measures of partner preferences using face stimuli and a verbal measure were not comparable. Individuals prioritised vitality-attractiveness in measures of partner preferences using youthful-looking face stimuli, whereas in verbal measures, individuals prioritised warmth-trustworthiness. Therefore, it can be inferred that these measures may capture different elements of partner preferences. Findings from Study 2 paralleled those obtained from Study 1.

One consequence of averaging images is that facial details (e.g., complexion and wrinkles) are smoothed, giving the images a more youthful appearance (Tiddeman et al., 2001), which was useful in this study as the stimuli were intended to represent youthful adults. The individual face images that were used to create the averaged images included much variation (e.g., regarding posture and hair colour) but, also, they were clearly relatively consistent regarding the underlying traits representing their associated ideal partner face factor (e.g., all images used to create the high warmth-trustworthiness averages were smiling).

Images representing high warmth-trustworthiness contained large smiles, whereas the low warmth-trustworthiness images contained more neutral expressions, which is consistent with research (Hess et al., 2004; Said et al., 2009). The high status-resources images seemed more mature than the low status-resources images and an outline of glasses and a shirt collar was vaguely present in various high status-resources images. These attributes were present in Sutherland et al.'s (2013) averaged images representing dominance, which further underscores the strong correspondence between dominance and status-resources revealed in the studies reported in Chapter 3. The high vitality-attractiveness images appeared more beautiful relative to the low vitality-attractiveness images. The apparent separation between the warmth-trustworthiness and the vitality-attractiveness averaged images counters research suggesting that the cues underlying trustworthiness and attractiveness are very similar (Xu et al., 2012), and it is in accordance with research revealing dissociations between trustworthiness and attractiveness (DeBruine, 2005; Eagly et al., 1991; Etcoff, Stock, Haley, Vickery, & House, 2011).

4.5. General Discussion

This research examined the correspondence between verbal measures of partner preferences and partner preferences for potential partners using ambient face stimuli (Study 1) and averaged youthful-looking face images (Study 2). Findings from both studies revealed that vitality-attractiveness concerns were overwhelmingly prioritised in participants' partner preferences for face images, yet, warmth-trustworthiness was prioritised in participants' verbal preferences. These findings are in accordance with the predictions.

Specifically, in a verbal measure of partner preferences, participants prioritised warmth-trustworthiness, followed by the vitality-attractiveness factor, with the status-resources factor ranking last, which is consistent with the hypotheses and with previous research (Buss, 1989; Fletcher et al., 2004; Li et al., 2002). For example, research using verbal measures reveals that individuals prioritise traits related to warmth-trustworthiness, such as love and kindness (Buss, 1989; Li et al., 2002). Furthermore, research by Fletcher et al. (2004), using a verbal measure, identified that individuals prioritise warmth-trustworthiness closely followed by vitality-attractiveness and, then, followed by status-resources.

Regarding partner preferences for face images, the emphasis placed on facial attractiveness revealed in this chapter replicates Chapter 3 Study 2 findings. Chapter 3 Study 2 examined partner preference face ratings in relation to Sutherland et al.'s (2013) face perception model, whereas the research reported in the current chapter examined partner preference face ratings in relation to the ideal partner face factors. As per Chapter 3, in the current chapter Study 1 and Study 2 revealed that attractiveness dominated partner preferences for face images.

People may prefer vitality-attractiveness as this is associated with many beneficial social consequences. The "what is beautiful is good" stereotype (Dion et al., 1972) has revealed that, relative to less attractive people, attractive people are perceived to have better job prospects (Chiu & Babcock, 2002; Marlowe et al., 1996) and be better romantic partners with better marriages (Dion et al., 1972). From an evolutionary perspective, traits related to

vitality-attractiveness may be salient as these act like a “health certificate” (Symons, 1979), signalling that a potential partner is both fertile and resilient to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999; see Rhodes, 2006, for a review).

Accounts for the correspondence between partner preferences measured via face stimuli and a verbal measure are outlined as follows. Further, the use of ambient images and face averages in relation to partner preferences is discussed, including caveats and future directions.

4.5.1. Correspondence between Measures of Partner Preferences

Findings across both studies revealed a dissociation between partner preferences measured using ambient face stimuli or averaged youthful-looking face images versus the verbal measure. The verbal measure of partner preferences used in this research (Ideal Partner Scale, Fletcher et al., 1999) involved individuals only rating their preference for specific traits, which is an abstract and psychologically remote context, as no description of a concrete potential partner is included. In contrast, when individuals rate ambient face stimuli on their partner preferences, the context is psychologically close and concrete as participants evaluate specific potential partners. Further, evaluating face images provides a complex and ambiguous context as, given that people can infer traits from faces after viewing stimuli for as little as 33 ms (Todorov et al., 2009), much trait information is available to participants rating face images.

The disparity between partner preferences revealed using face stimuli and verbal measures may be accounted for by various theories, such as construal-level theory (Liberman et al., 2007; Trope et al., 2007; Trope & Liberman, 2003, 2010), affective forecasting (Wilson & Gilbert, 2003) empathy gaps (Loewenstein, 1996, 2005), and the associative-propositional evaluation model (Gawronski & Bodenhausen, 2006, 2007, 2011). For example, construal-level theory (Liberman et al., 2007; Trope et al., 2007; Trope & Liberman, 2003, 2010) posits that the more abstract and psychologically remote verbal measure promotes high-level construals, whereas the psychologically close and concrete face rating task may promote low-level construals.

Based on the associative-propositional evaluation model (Gawronski & Bodenhausen, 2006, 2007, 2011), it can be inferred that measures of partner preferences using face stimuli and a verbal measure may reveal different components of these preferences, specifically, respectively revealing propositional beliefs and spontaneous responses. Partner preferences measured via questionnaires, such as the Ideal Partner Scale (Fletcher et al., 1999), may capture propositional beliefs concerning the characteristics people prioritise based on the interpersonal consequences that they imagine these traits will produce (Eastwick, Eagly, et al., 2011; Eastwick & Finkel, 2008a). In contrast, when participants rate ambient face stimuli on their first impressions, the combination of highly variable stimuli with instructions asking participants to respond on their initial impressions might create an ambiguous and complex task, which may be conducive to capturing spontaneous, automatic, preferences (Gawronski et al., 2003; Hugenberg & Bodenhausen, 2003). Research, indeed, suggests that evaluating faces, is to some extent, an implicit and automatic process (Engell et al., 2007; Todorov et al., 2009; Todorov & Porter, 2014; Willis & Todorov, 2006). As such, functional magnetic resonance imaging research has revealed that the amygdala automatically evaluates face images based on the approachability-dominance factors and the amygdala, further, modulates the activity of the occipital and temporal cortices, in response to faces (Engell et al., 2007; Todorov & Engell, 2008). Hence, the brain automatically infers some traits from faces.

Another explanation is that face stimuli and the verbal measure may capture the difference between intentions and behaviour or, alternatively, between long-term and short-term goals. For example, individuals may mention that they would like to be environmentally friendly as a long-term goal but then they may not regularly recycle on a day-to-day basis (short-term goal). Similarly, individuals verbally state that they would like a warm and trustworthy partner but, when looking at images of potential partners, these same individuals prefer highly attractive images as their partners.

4.5.2. Face Images: Ambient Images and Face Averages

A key strength of the present research was the complementary use of ambient face stimuli and averaged face images in the measurement of partner preferences. Ambient face stimuli are similar to the images that people upload onto social media sites, such as Facebook or

Instagram, and they are comparable to the natural contexts present in daily life. As such, the use of ambient stimuli enables research findings to be more easily extrapolated to heterogeneous real life environments, in which people view potential partners for the first time. Ambient images stand in contrast to highly controlled, standardised, images that are advantageous in testing specific research questions focused on manipulated qualities within images. The use of highly controlled images may mask underlying trends in the data (Bruce, 1994; Burton, 2013; Jenkins et al., 2011). For example, Oosterhof and Todorov (2008) identified a bidimensional model of face perception from standardised face images yet, when using ambient images, Sutherland et al. (2013) identified a third face perception factor. Hence, the underlying factors causing variability that is inherent in ambient images can be systematically examined.

A multitude of cues (e.g., expression or age) may contribute towards partner preferences. In Study 1, ambient stimuli were used to allow these facial cues to vary naturally, facilitating the identification of the dominant traits involved in partner preferences. Indeed, controlling the facial cues inherent in specific traits may impact on the perception of a given trait, modifying the effect being examined. Rather than focus solely on specific cues or traits, Study 1 examined the ideal partner face factors in a naturalistic manner, as this is a theoretically powerful approach. Of note, Keefe, Dzhelyova, Perrett, and Barraclough (2013) mention that research exploring complex trait evaluations (e.g., trustworthiness) also includes cues to other evaluations (e.g., happiness). As such, future research can explore whether the cues involved in complex trait evaluations can be isolated.

Averaged images conserve the underlying characteristics common to a specific factor (e.g., averaged images high in warmth-trustworthiness all represented smiling individuals). Indeed, the averaged images created in Study 2 from ambient images varied on numerous factors (e.g., posture, hair colour, and degree of smile). A benefit of using averaged face images in Study 2 was that it enabled high and low levels of each ideal partner face factor to be represented visually to participants. This is relevant as presenting low (or high) levels of each factor provides information regarding how much the participants want to avoid (or approach) low (or high) levels of one factor relative to another factor. In some contexts, a disadvantage of using averaged images is that facial details become less visible, giving images a clear and wrinkle-free complexion. As such, averaged images often appear

younger and more attractive than the individual images used to create the average, with extensive research relating facial averageness to attractiveness in both manipulated and non-manipulated face images (Light et al., 1981; Rhodes & Tremewan, 1996). The fact that this research replicated the findings using both ambient images and averaged images is a clear strength.

4.5.3. Caveats and Future Directions

It is interesting to note that the findings revealed that heterosexual participants of both sexes prioritised vitality-attractiveness in their partner preferences of face images, which is consistent with research revealing no sex differentiated partner preferences in adolescent boys and girls (Regan & Joshi, 2003) and with a meta-analysis revealing no sex differentiated partner preferences for attractiveness or for earning prospects in adults (Eastwick et al., 2014). Nevertheless, evolutionary theories posit that men to a greater extent than women may have evolved to prefer attractiveness in a partner, as attractiveness is an indicator of youth and, therefore, fertility (Buss & Schmitt, 1993; Buss, 1989; Trivers, 1972). Indeed, some researchers have emphasised the link between attractiveness and female facial neotony (i.e., babyfaced features, including large eyes, full lips, small chins, and small noses; D. Jones, Brace, & Jankowiak, 1995; D. Jones & Hill, 1993; Puts, 2010). For example, Furnham and Reeves (2006) found that neotenous facial features were related to ratings of attractiveness, youthfulness, and healthiness in female face images.

As such, a caveat to these findings should be mentioned. The participants were young adult students at a stage in their lives in which they are, perhaps, not looking for long-term financial stability or long-term emotional support from a romantic partner. It is possible that older participants (relative to University students; mean age in this research across both studies: 21 years) would place greater emphasis on status-resources, given that they may be more likely to seek a partner with which to marry and have children, both decisions involving significant financial resources. Further research in which each ideal partner face factor is made salient to participants rating face images would clarify whether this emphasis on vitality-attractiveness can be displaced or whether it is deeply entrenched (e.g., for the warmth-trustworthiness factor: Rate each person on how interesting you find them in terms of being your ideal partner in a loyal and close relationship?).

Examining the unique contributions of within-person and between-person variability on ideal partner preferences would be an exciting direction for further research. Burton, Kramer, Ritchie, and Jenkins (2015) found that the process of learning a new face involves learning the face in variable conditions (e.g., different postures and lighting conditions). As such, Jenkins et al. (2011) revealed greater within-person variability than between-person variability in attractiveness. Regarding partner preferences, it is possible that individuals prioritise vitality-attractiveness traits as these may contain less within-person variability in daily life, relative to traits reflecting warmth-trustworthiness or status-resources. For example, the averaged face images, used in Study 2, representing high warmth-trustworthiness were all smiling widely and the averaged face images representing high status-resources were more mature and some images contained and an outline of glasses and a shirt collar. In real life, individuals exhibit much within-person variation regarding whether they smile or wear formal clothes, therefore, these qualities may be less reliable indicators of another individual's "true" level of warmth-trustworthiness or status-resources. In contrast, vitality-attractiveness traits may be less malleable on a day-to-day basis, especially as even makeup is a minimal contributor to attractiveness (A. L. Jones & Kramer, 2015). Hence, traits related to vitality-attractiveness might be a valid indicator of another individual's level of vitality-attractiveness.

4.6. Conclusion

To summarise, individuals prioritised vitality-attractiveness when rating both ambient face images and averaged youthful-looking face images in terms of their partner preferences. From an evolutionary perspective, it can be inferred that traits related to vitality-attractiveness may be especially salient in a potential partner as these may signal fertility and resistance to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). In contrast, a verbal measure of partner preferences revealed that participants prioritised warmth-trustworthiness. As such, it can be concluded that measures using face stimuli and a verbal measure may capture different components of partner preferences, specifically, these may respectively capture spontaneous responses and propositional beliefs (Eastwick, Eagly, et al., 2011; Eastwick, Finkel, Krishnamurti, & Loewenstein, 2008; Gawronski & Bodenhausen, 2006, 2007, 2011).

Chapter 5. Potential Partner Preferences for Faces are Dominated by Physical Attractiveness

5.1. Abstract

This research examined factors that influence potential partner preferences to images of faces, and whether these can be changed by asking participants to focus on a particular relationship type. Participants rated highly variable face images in terms of their preferences for a loyal relationship, a lavish relationship, and an exciting relationship. These types of relationship were respectively selected to represent the warmth-trustworthiness, status-resources, and vitality-attractiveness ideal partner factors (Fletcher et al., 1999). Findings revealed that, independent of relationship type, participants prioritised attractiveness-related traits and vitality-attractiveness in their partner preferences. First impressions of potential partners may be relatively inflexible, given the potential gains accrued by obtaining an attractive partner (e.g., from an evolutionary perspective, fertility and resilience to environmental and genetic stressors; Jasienska, Lipson, Ellison, Thune, & Ziomkiewicz, 2006; Lassek & Gaulin, 2008; Møller, 1999).

Key words: Attractiveness, close relationships, and partner preferences.

5.2. Introduction

Participants of both sexes prioritise attractiveness-related traits when rating face images of potential partners. Chapter 3 and Chapter 4 Study 1 revealed that attractiveness-related traits dominated partner preferences for ambient face images. Chapter 4 Study 2 revealed that vitality-attractiveness was prioritised by men and women rating youthful-looking averaged face images representing high and low levels warmth-trustworthiness, status-resources, and vitality-attractiveness on their partner preferences. The current research explored the flexibility of partner preferences for face images, specifically, examining whether attractiveness dominates preferences. The study involved heterosexual participants rating opposite-sex face images on their partner preferences for a specific type of relationship (e.g., a loyal relationship). Partner preferences that shift when specific types of relationships are made salient (e.g., preferences for trustworthy face images as potential partners for a loyal relationship) would suggest that preferences based on first impressions of potential partners are flexible.

Attractiveness does not invariably dominate partner choices. For example, Hunt, Eastwick, and Finkel (2015) revealed that couples who knew each other for longer before dating engaged in less assortative mating based on attractiveness (diminished tendency to have a partner with similar levels of attractiveness to themselves). With longer periods of acquaintance prior to dating, individuals have increased opportunities to identify other romantically desirable traits in the potential partner rather than prioritising attractiveness. In addition, partner preferences are flexible in response to numerous factors, such as environmental pathogens and individual immunocompetence. For instance, Watkins, DeBruine, Little, Feinberg, and Jones (2012) revealed that women primed to have concerns regarding environmental pathogens displayed greater preferences for masculinised men, relative to women primed to have concerns regarding resource scarcity (see, also, DeBruine, Jones, Crawford, Welling, & Little, 2010; DeBruine, Jones, Little, Crawford, & Welling, 2011). Furthermore, de Barra, DeBruine, Jones, Mahmud, and Curtis (2013) revealed that frequency of childhood illness was correlated with greater preferences for sexually dimorphic opposite-sex face images, although, not with preferences for sexually dimorphic same-sex face images. Other research has revealed that pathogen disgust – being particularly worried about infectious diseases – in women predicts preferences for

masculinised faces, bodies, and voices in both their current romantic partners and in their ideal partner preferences (B. C. Jones, Feinberg, et al., 2013). Regarding men, individuals with greater levels of salivary cortisol – a biomarker for immunosuppression – reveal greater preferences for facial femininity in women in both their current romantic partners and in their ideal partner preferences (B. C. Jones, Fincher, et al., 2013). These preferences have been attributed to the gains accrued by prioritising cues to heritable disease resistance (DeBruine, Jones, Crawford, et al., 2010).

Research has not examined the malleability of first impressions of faces of potential partners, which is the focus of the current study. When no specific type of relationship is made salient, partner preferences for face images are dominated by attractiveness-related concerns (Chapters 3 and 4). There are multiple reasons for why individuals might prioritise attractiveness. For instance, from an evolutionary perspective, facial attractiveness signals fertility and resilience to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). Hence, individuals prioritising cues related to attractiveness in their partner preferences may be more likely to have healthy offspring. As such, it is possible that first impressions of faces of potential partners are relatively inflexible, being dominated by attractiveness. Nevertheless, Fletcher et al. (1999) posit each ideal partner factor offers a route to reproductive success. For example, prioritising warmth-trustworthiness can be advantageous as this may result in a partner who is able and willing to care for off-spring. Therefore, first impressions of faces of potential partners may shift from prioritising attractiveness, when no specific type of relationship is made salient, to prioritising alternative traits (e.g., status-related traits) when a specific relationship type (e.g., a lavish relationship) is made salient.

5.2.1. Research Overview

The first step of this research involved identifying three relationship descriptors to represent the three ideal partner factors (Study: Part 1). The second step of this research involved asking heterosexual participants to rate ambient opposite-sex face images in terms of a specific relationship (i.e., a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship) using a descriptor to represent each type of relationship (e.g., loyal to represent a warmth-trustworthiness

relationship). Given the paucity of research examining the malleability of partner preferences in first impressions of faces, it was unclear whether partner preferences would remain dominated by attractiveness when a warmth-trustworthiness or a status-resources relationship were made salient.

In addition, participants completed a verbal measure of partner preferences in order to further explore the findings from Chapter 4, which revealed a dissociation between preferences measured using face images versus preferences captured using a verbal measure. A dissociation between these measures would suggest that face stimuli and the verbal scale may capture different elements of partner preferences. It is possible that measures using face images capture spontaneous responses whereas verbal measures may tap into propositional beliefs (Eastwick, Eagly, et al., 2011; Gawronski & Bodenhausen, 2006, 2007, 2011). Based on research, the verbal measure of partner preferences was expected to reveal that participants prioritise warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranking last (e.g., Chapter 4; Buss, 1989; Fletcher et al., 1999; Fletcher, Tither, O'Loughlin, Friesen, & Overall, 2004; Li, Bailey, Kenrick, & Linsenmeier, 2002).

5.3. Study: Part 1

5.3.1. Method

5.3.1.1. Participants

12 participants, all university students, were recruited via the University of York website. Participants were between 18 and 21 years old (M = 18.83, SD = 0.83) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

5.3.1.2. Relationship Descriptor

The relationship descriptors did not overlap with any of the traits that Fletcher et al. (1999) used to represent the ideal partner verbal factors. Three relationship descriptors were selected to potentially represent each ideal partner factor:

1. Warmth-trustworthiness: Intimate, committed, and loyal;
2. Status-resources: Extravagant, lavish, and luxurious;
3. Vitality-attractiveness: Fun, exciting, and passionate.

5.3.1.3. Procedure

Following informed consent, in which participants were informed that the study involved rating descriptors of traits, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate a set of words based on their first impressions in terms of how closely they relate to warmth-trustworthiness, status-resources, and vitality-attractiveness. Specifically, when rating descriptors in terms of warmth-trustworthiness, the instructions were: "We know that in choosing a long-term partner for dating, living together, or marriage, many people look for warmth and trustworthiness. For example, people look for the following traits in a partner: Kind, supportive, understanding, considerate, and a good listener. Please rate the following descriptors for how closely you think they involve warmth/trustworthiness." Participants completed the task using a seven-point Likert scale (unrelated-closely related).

When rating descriptors in terms of status-resources and vitality-attractiveness, the instructions were the same only the words warmth and trustworthiness were replaced by the relevant ideal partner labels (e.g., status and resources, for the status-resources factor). The example traits provided were five traits that were selected from Fletcher et al.'s (1999) Ideal Partner Scale and were the traits that loaded highest on their respective ideal partner verbal factors. For status-resources, the example traits were: Successful (or potential to achieve), nice house or apartment (or potential to achieve), financially secure (or potential to achieve), dresses well (or potential to achieve), and good job (or potential to achieve).

For vitality-attractiveness, the example traits were: Sexy, attractive appearance, good lover, outgoing, and adventurousness.

For each warmth-trustworthiness, status-resources, and vitality-attractiveness task, participants rated the relationship descriptors: Intimate relationship, committed relationship, loyal relationship, extravagant relationship, lavish relationship, luxurious relationship, fun relationship, exciting relationship, and passionate relationship. The presentation order of the relationship descriptors was in a different random order for each warmth-trustworthiness, status-resources, and vitality-attractiveness task. The order in which participants completed each task was counterbalanced. The experiment was completed using pen and paper and took approximately 5 minutes to complete. On completion, participants were debriefed.

5.3.2. Results and Discussion

Data analyses were completed using SPSS version 23.

5.3.2.1. Reliability

Inter-rater agreement was high. The Cronbach's alpha for descriptor ratings was .79, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

5.3.2.2. Relationship Descriptor

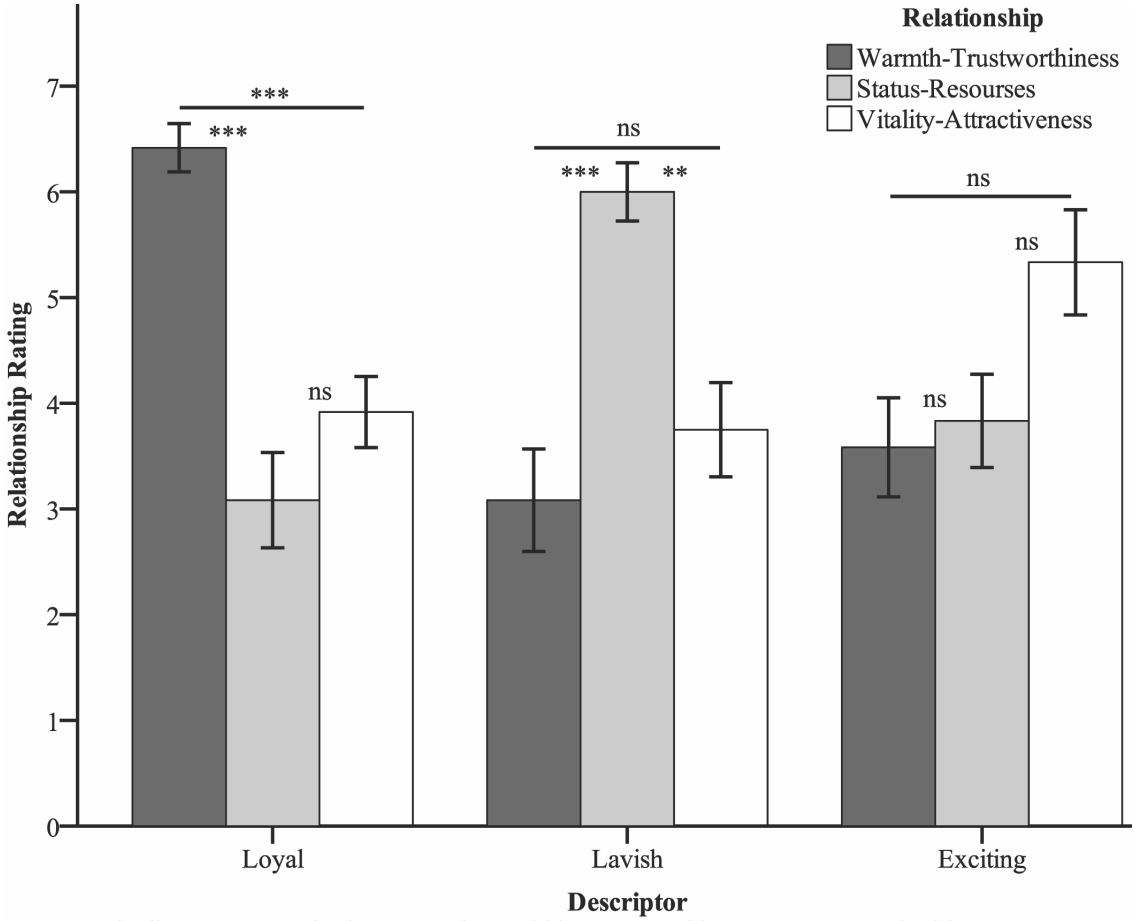
To determine which relationship descriptors were most suitable for a warmth-trustworthiness, status-resources, and vitality-attractiveness relationship, an ANOVA was conducted using the individual participant ratings of the descriptors in terms of relationship type. A repeated-measures 3 x 9 ANOVA was conducted between type of relationship (warmth-trustworthiness, status-resources, and vitality-attractiveness) and descriptor (intimate, committed, loyal, extravagant, lavish, luxurious, fun, exciting, and passionate). See Appendix D for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between type of relationship and descriptor $\left(F(5.61, 61.75) = 18.58, MSE = 84.27, p < .001, \eta_p^2 = .63\right)$. Furthermore, findings revealed a significant main effect for descriptor $\left(F(3.63, 39.98) = 4.17, MSE = 13.44, p = .008, \eta_p^2 = .28\right)$, with no significant main effect for type of relationship $\left(F(1.61, 17.74) = 2.25, MSE = 14.63, p = .142, \eta_p^2 = .17\right)$. Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that for the warmth-trustworthiness relationship, the descriptors intimate, committed, loyal, and passionate were rated most appropriate in describing a warmth-trustworthiness relationship and there were no significant differences between these descriptors (*p*s = 1.000), although only committed and loyal obtained significantly higher warmth-trustworthiness ratings (*p*s < .01) relative to all the other descriptors, excluding intimate and passionate. Loyal was selected as the descriptor for a warmth-trustworthiness relationship.

Regarding the status-resources relationship, the descriptors extravagant, lavish, and luxurious were rated most appropriate in describing a status-resources relationship and there were no significant differences between these descriptors (*p*s = 1.000), although only lavish obtained significantly higher status-resources ratings (*p*s < .05) relative to all the other descriptors, excluding extravagant, luxurious, and committed. Hence, lavish was selected as the most appropriate descriptor for a status-resources relationship. For the vitality-attractiveness relationship, the descriptors fun, exciting, and passionate were rated most appropriate in describing a vitality-attractiveness relationship and there were no significant differences between these descriptors (*p*s = 1.000). Exciting was selected as the descriptor for a vitality-attractiveness relationship, particularly as passionate seemed to encapsulate attractiveness elements, fun seemed to represent vitality elements, whereas exciting seemed to encapsulate both vitality and attractiveness combined.

See Figure 5.1 for the three selected descriptors and their respective ratings on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship; see Figure 9.25, Figure 9.26, and Figure 9.27, Appendix D for plots of all of the tested descriptors as a function of their ratings on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship. The

loyal and lavish relationship descriptors obtained significantly higher (*p*s < .01) ratings on the relevant type of relationship (e.g., loyal for a warmth-trustworthiness relationship) relative to their ratings on other types of relationships (e.g., loyal for a status-resources relationship). Nevertheless, there were no significant differences in the warmth-trustworthiness, status-resources, and vitality-attractiveness relationship ratings for the descriptor exciting – this was not considered problematic as exciting obtained significantly higher (*p*s < .05) ratings on a vitality-attractiveness relationship relative to the loyal and lavish descriptors.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 5.1. Ratings of the descriptors loyal, lavish, and exciting on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship. Higher ratings reveal that a particular descriptor is better suited to represent a specific type of relationship.

To summarise, the three selected descriptors were loyal for a warmth-trustworthiness relationship, lavish for a status-resources relationship, and exciting for a vitality-

attractiveness relationship. These descriptors obtained significantly higher ratings on their respective relationship type relative to the two other selected descriptors ratings on the same type of relationship (i.e., loyal obtained significantly higher ratings for a warmth-trustworthiness relationship, relative to the descriptors lavish and exciting).

5.4. Study: Part 2

This research aimed to identify whether first impressions of potential partners are always dominated by attractiveness-related concerns. Specifically, heterosexual participants were asked to rate opposite-sex face images in terms of their partner preferences when either a warmth-trustworthiness relationship, a status-resources relationship, or a vitality-attractiveness relationship was made salient. Three descriptors were selected on the basis of Part 1 of this study to represent each type of relationship. Part 1 of this study revealed that loyal can represent a warmth-trustworthiness relationship, lavish can represent a status-resources relationship, and exciting can represent a vitality-attractiveness relationship. Partner preferences that remain dominated by attractiveness-related concerns when a loyal relationship or a lavish relationship are made salient would suggest that first impressions of faces of potential partners are relatively inflexible.

5.4.1. Method

5.4.1.1. Participants

60 participants, all university students, were recruited via the University of York website. Participants were between 18 and 32 years old (M = 21.23, SD = 3.02) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

5.4.1.2. Relationship Descriptor

Three different types of relationship descriptors were chosen to represent the ideal partner factors. The relationship descriptors did not overlap with any of the traits that Fletcher et al. (1999) used to represent the ideal partner verbal factors and were selected based on findings from Part 1 of this study, described earlier. The relationship descriptors selected as best representing each ideal partner factor were as follows:

1. Warmth-trustworthiness: Loyal;
2. Status-resources: Lavish;
3. Vitality-attractiveness: Exciting.

5.4.1.3. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).

5.4.1.4. Verbal Measure

Fletcher et al.'s (1999) Ideal Partner Scale is a verbal measure, revealing preferences towards warmth-trustworthiness, status-resources, and vitality-attractiveness (see Chapter 3 for more information).

5.4.1.5. Procedure

Following informed consent, in which participants were informed that the study involved romantic first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate opposite-sex faces based on the following instructions: "Rate each person on how interesting you find them in terms of being your ideal partner in a LOYAL close relationship (e.g., dating, living together, or married)", using a seven-point Likert scale (not interesting-very interesting); the word loyal was substituted for the relevant

relationship descriptor (loyal, lavish, or exciting). Participants were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Following completion of six practice trials rating opposite-sex face stimuli randomly selected from the database, participants rated the 500 face images on a single type of relationship (i.e., a loyal or lavish or exciting relationship) so that there would be no carry-over effects (e.g., Clifford & Rhodes, 2005; Hamermesh & Abrevaya, 2013; Rhodes, 2006). Groups of 20 participants (10 male) were randomly assigned to rate face images based on one of the relationship types.

The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 250 face images, they were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 30 minutes to complete. Subsequently, participants completed the Ideal Partner Scale (Fletcher et al., 1999). On completion, participants were debriefed and reimbursed with a small payment.

5.4.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23. In addition to the reliability tests, there were three stages in the analyses:

1. The effect of type of relationship on partner preferences for face images was explored using an ANOVA and, also, via individual participant correlations with the ideal partner face factors (ideal partner factors as applied to face images) and traits.
2. A verbal measure of partner preferences was examined using an ANOVA.
3. The correspondence between partner preferences measured using face stimuli and a verbal measure were explored using an ANOVA.

5.4.2.1. Reliability

For each group of raters (i.e., 10 heterosexual men and 10 heterosexual women rating each relationship descriptor: Loyal, lavish, and exciting), inter-rater agreement in trait ratings was high. All Cronbach's alphas for face image ratings were over .86 and, also, all Cronbach's alphas for the verbal measure ratings were over .77, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

5.4.2.2. Relationship Type: Face Images

To identify which ideal partner face factors were prioritised when evaluating ambient face images in terms of a specific type of relationship, two analyses were conducted:

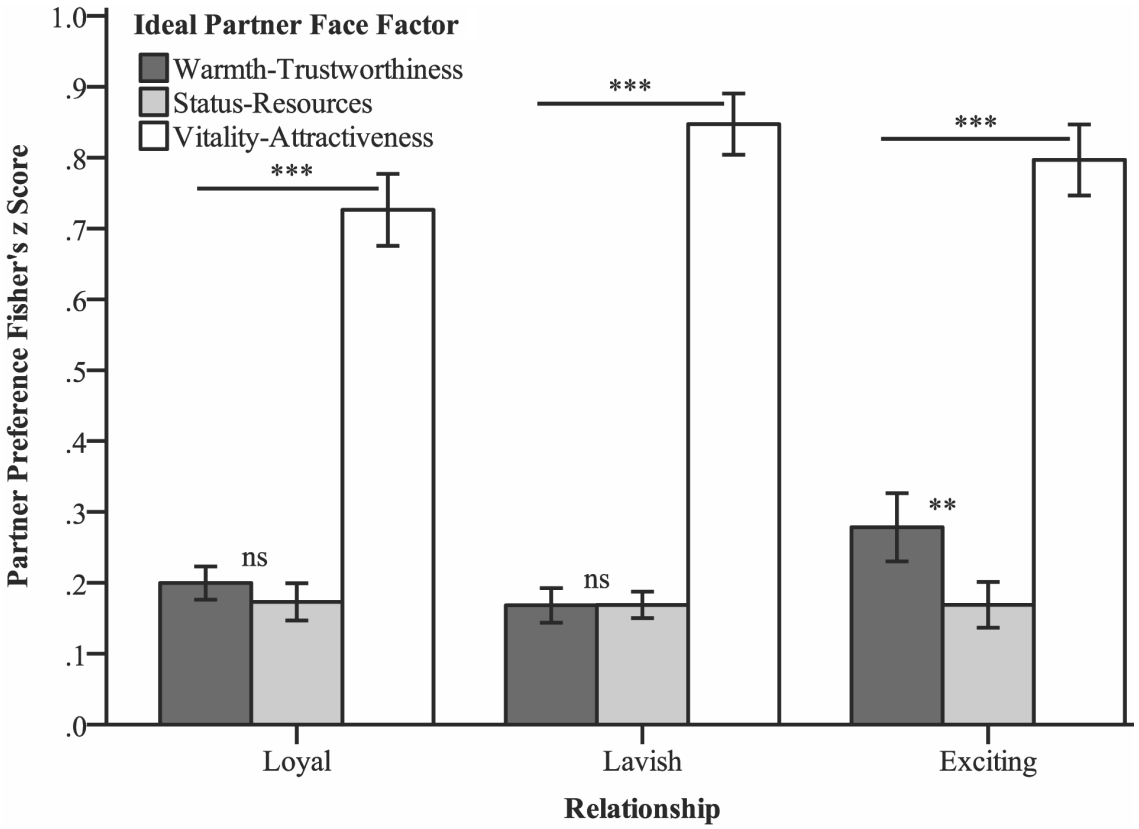
1. The partner preference face ratings for each type of relationship were examined in relation to the ideal partner face factors. Each face image was given three scores reflecting its relationship to each of the warmth-trustworthiness, status-resources, and vitality-attractiveness factors (derived from Chapter 2). Each participant's partner preferences for the 500 faces they rated was correlated with the faces' loadings on each factor, to find out how each factor was linked to the ratings given and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The partner preference Fisher's z scores were subjected to a mixed ANOVA between the ideal partner face factors and relationship type.
2. To determine which ideal partner face factors and traits accounted for most of the variance in partner preference face ratings as a function of relationship type, the individual participant partner preference face ratings were correlated with the ideal partner face factor scores and with traits selected to represent these factors.

5.4.2.2.1. ANOVA

To determine whether there was a significant difference between the factors that are prioritised in partner face ratings as a function of type of relationship (loyal, lavish, and exciting), there were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner model for the 1000 photographs were

computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant partner preference Fisher's z scores were subjected to a mixed 3 x 3 ANOVA between type of relationship (loyal, lavish, and exciting) and ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix D for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed no significant interaction effect between type of relationship and factors $\left(F(2.96, 84.24) = 2.02, MSE = 0.07, p = .118, \eta_p^2 = .07\right)$. Hence, participants did not shift their partner preferences in accordance with the specific type of relationship specified (see Figure 5.2). Findings, further, revealed a significant main effect for factors $\left(F(1.48, 84.24) = 281.20, MSE = 9.69, p < .001, \eta_p^2 = .83\right)$, but not for type of relationship $\left(F(2, 57) = 1.10, MSE = 0.04, p = .340, \eta_p^2 = .04\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised vitality-attractiveness relative to warmth-trustworthiness and status-resources (*p*s < .001) with no significant difference between the warmth-trustworthiness and status-resources factors ($p = .089$). These findings are consistent with previous results (Chapters 3 and 4) revealing that individuals prioritise vitality-attractiveness, including attractiveness-related traits.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 5.2. Partner preferences for ambient face stimuli for a loyal, lavish, and exciting relationship, as a function of the ideal partner face model. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

5.4.2.2.2. Ideal Partner Face Model Correlations

To determine which ideal partner face factor accounted for most of the variance in partner preference face ratings as a function of relationship type, firstly, the regression factor scores representing each ideal partner face factor for the 1000 photographs were computed (derived from Chapter 2) and, secondly, the individual participant partner preference face ratings were correlated with each of the ideal partner regression factor scores. Findings revealed that almost every participant prioritised the vitality-attractiveness factor independent of relationship type (with the exception of two participants in the exciting relationship condition), indicating that the emphasis on vitality-attractiveness was an overriding concern for most participants (see Figure 5.3, Figure 5.4, and Figure 5.5; see Figure 9.31, Figure 9.32, and Figure 9.33, Appendix D, for analysis separated by participant sex).

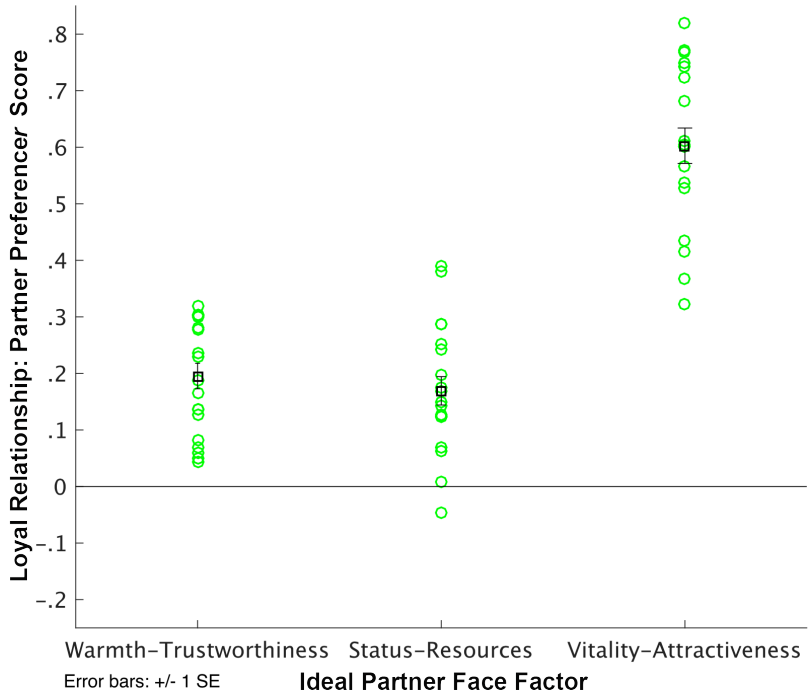


Figure 5.3. Individual participant partner preference face ratings for a loyal relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

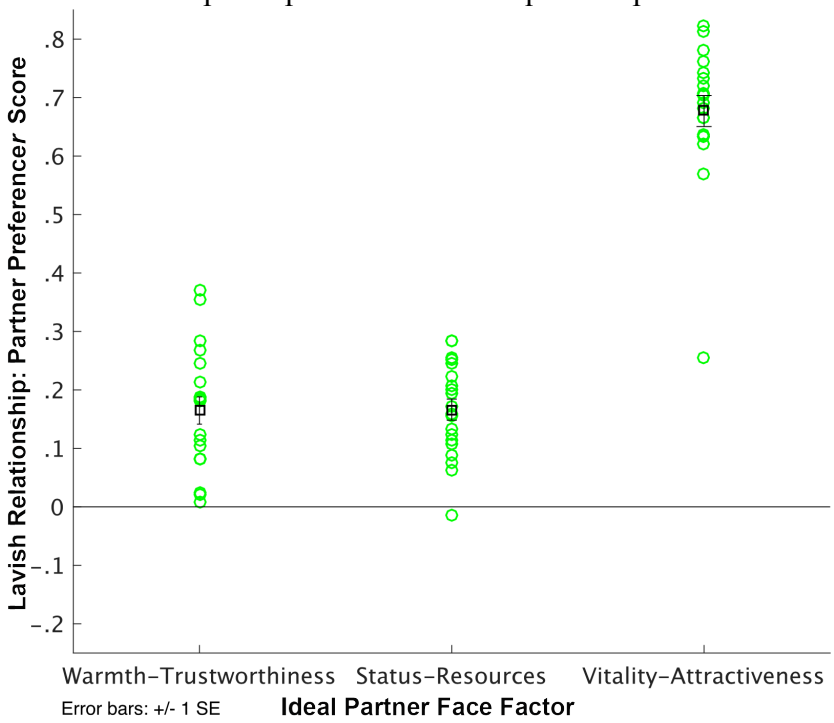


Figure 5.4. Individual participant partner preference face ratings for a lavish relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

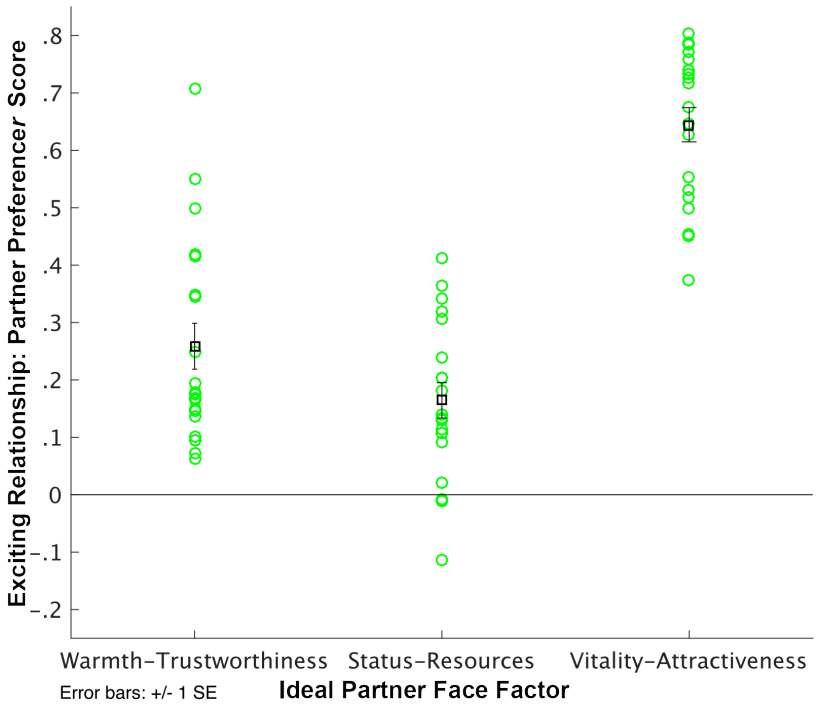


Figure 5.5. Individual participant partner preference face ratings for an exciting relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values, likewise, revealed that the vitality-attractiveness factor was prioritised in a loyal, lavish, and exciting relationship and overall accounted for up to 68% of the variance in partner preferences for faces (see Table 5.1). In contrast, across the three relationship types, the warmth-trustworthiness factor accounted for up to 50% of the variance in partner preferences for faces and the status-resources factor accounted for for up to 17% of the variance in partner preferences for faces. Therefore, vitality-attractiveness dominated partner preferences for face images, independent of relationship type.

Table 5.1. Maximum %, mean %, and SD of R^2 values for a loyal, lavish, and exciting relationship as a function of the ideal partner face factors

Relationship Type	Ideal Partner Face Factor	Maximum %	Mean %	*SD*
Loyal	Warmth-Trustworthiness	10	5	0.04
	Status-Resources	15	4	0.04
	Vitality-Attractiveness	67	38	0.16
Lavish	Warmth-Trustworthiness	14	4	0.04
	Status-Resources	8	3	0.03
	Vitality-Attractiveness	68	47	0.13
Exciting	Warmth-Trustworthiness	50	10	0.13
	Status-Resources	17	5	0.05
	Vitality-Attractiveness	64	43	0.16

5.4.2.2.3. Ideal Partner Trait Correlations

To explore which traits accounted for most of the variance in partner preference face ratings as a function of relationship type, the individual participant partner preference face ratings for each face were correlated with independent evaluations of the face stimuli on 12 traits derived from Fletcher et al.'s (1999) verbal scale, taken from the study reported in Chapter 2. Specifically, four traits were selected to represent each of the three Fletcher et al.'s verbal factors, which were the traits that loaded highest on their respective factors:

1. Warmth-trustworthiness traits: Trustworthiness, warmth, understanding, and supportive;
2. Status-resources traits: Status, resources, good job, and financially secure;
3. Vitality-attractiveness traits: Vitality, attractiveness, adventurous, and sexy.

The correlations for the vitality-attractiveness traits revealed moderate to strong correlations between these traits and the partner preference face ratings, independent of relationship type. In contrast, the correlations for the warmth-trustworthiness traits and the status-resources traits revealed small and moderate correlations between these traits and the partner preference face ratings for each relationship type (see Figure 5.6, Figure 5.7, and Figure 5.8 for the individual participant correlations; see Figure 9.34, Figure 9.35, and Figure 9.36, Appendix D, for analyses separated by participant sex).

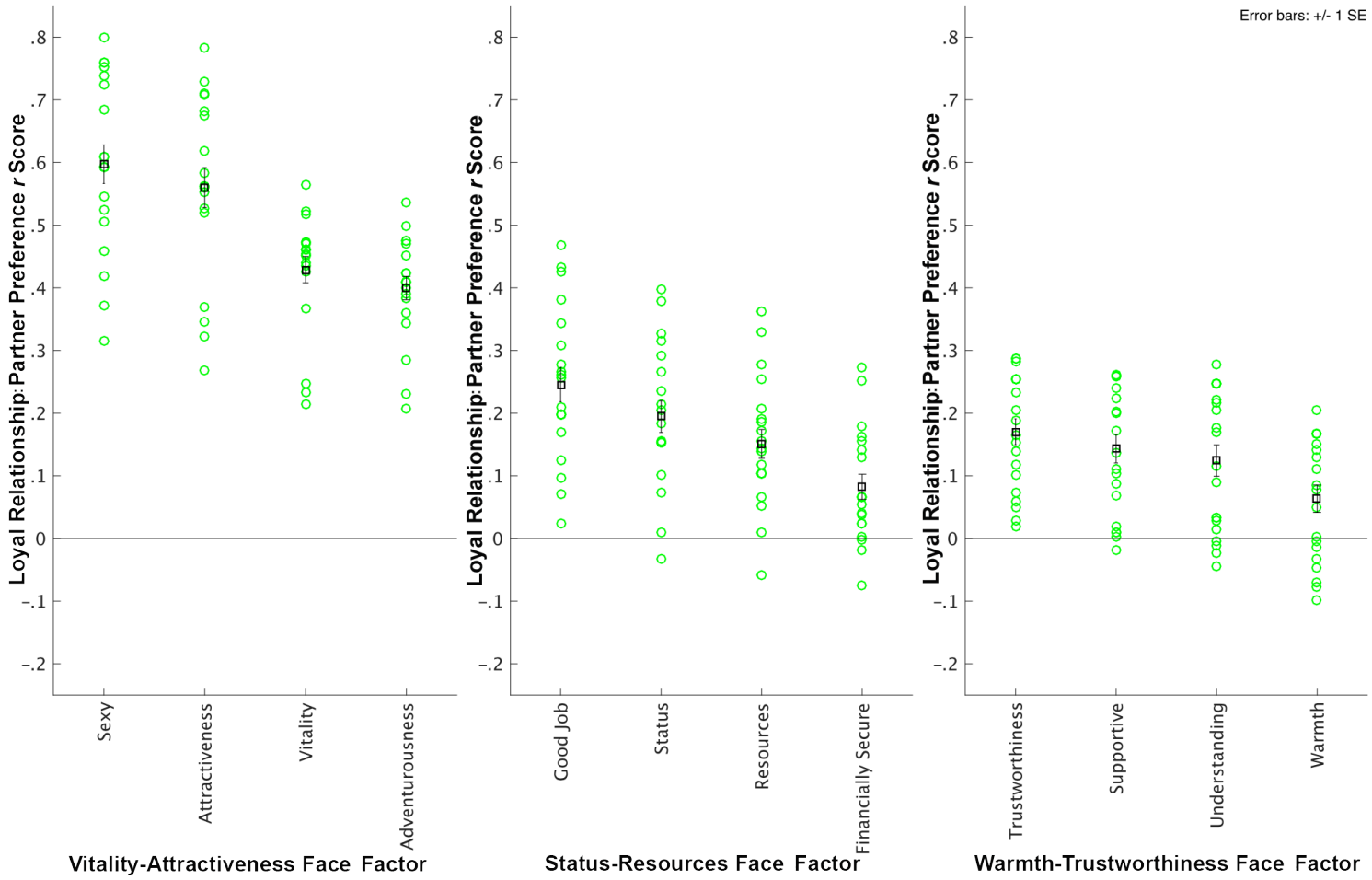


Figure 5.6. Individual participant partner preference face ratings for a loyal relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

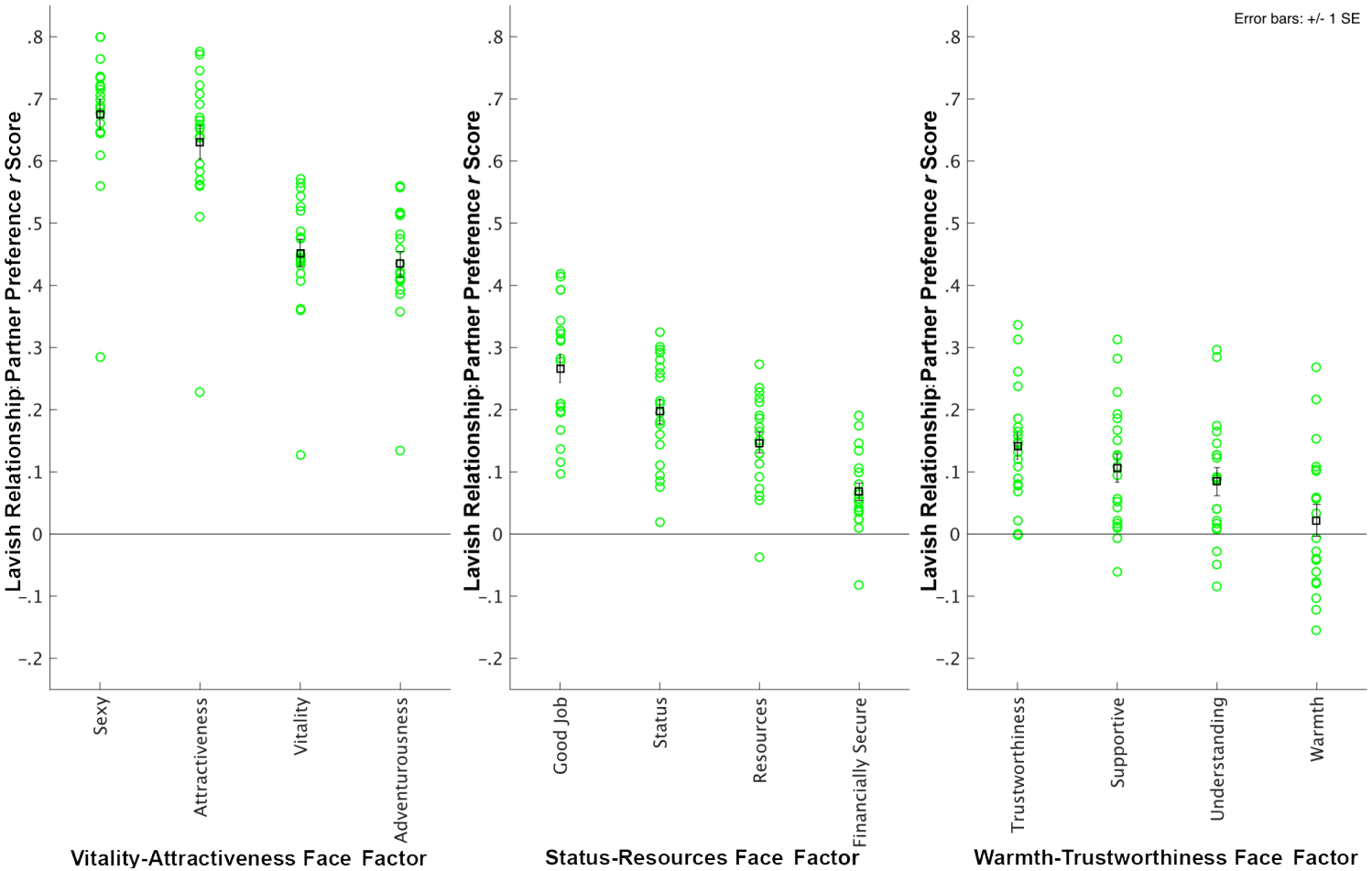


Figure 5.7. Individual participant partner preference face ratings for a lavish relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

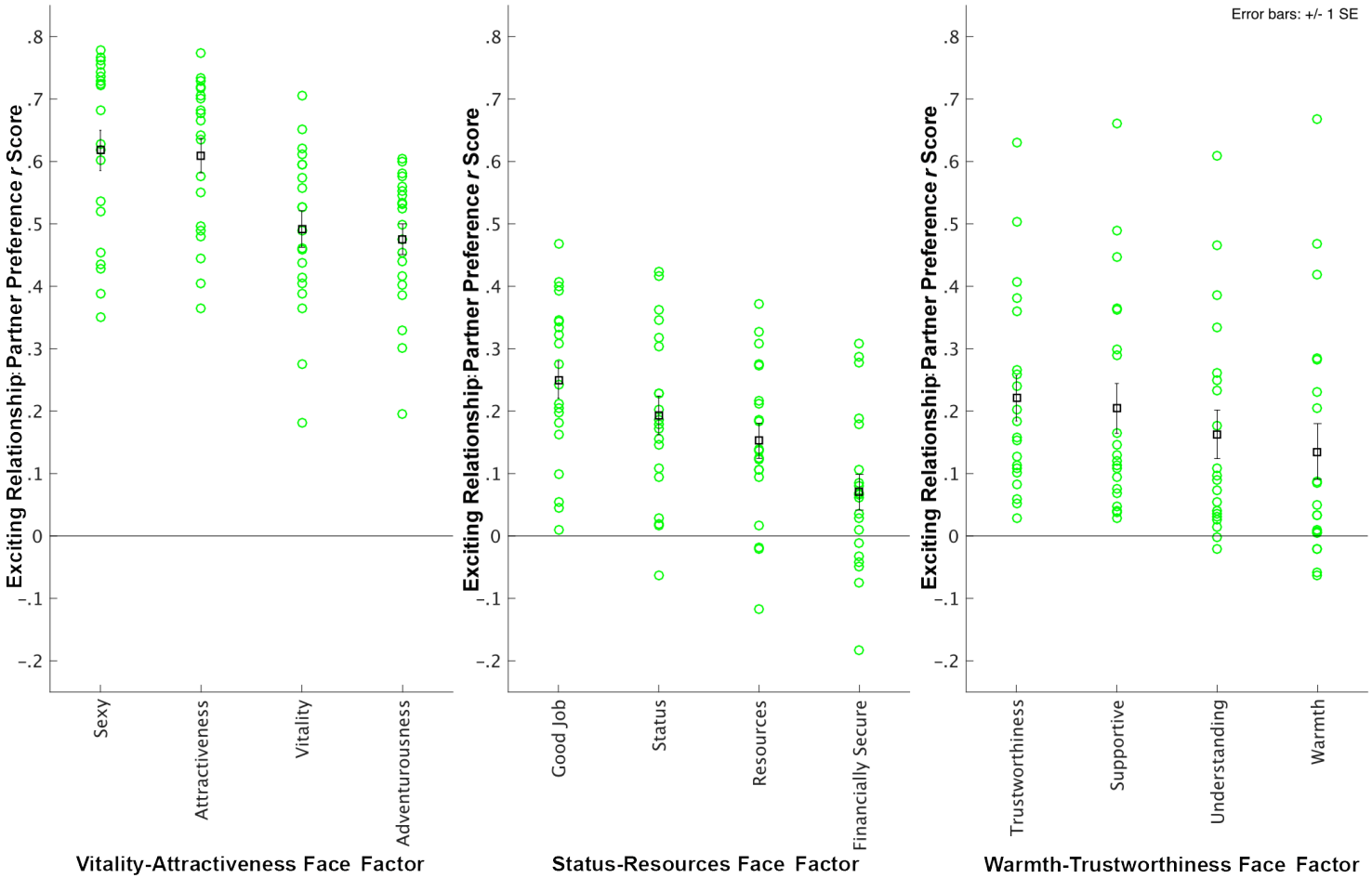


Figure 5.8. Individual participant partner preference face ratings for an exciting relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values, likewise, revealed that for a loyal, lavish, and exciting relationship the vitality-attractiveness traits were prioritised and overall accounted for up to 64% of the variance in partner preferences for faces (see Table 5.2). In contrast, across the three relationship types, the warmth-trustworthiness traits accounted for up to 44% of the variance in partner preferences for faces and the status-resources traits accounted for for up to 22% of the variance in partner preferences for faces. Therefore, vitality-attractiveness dominates partner preferences for face images, independent of relationship type.

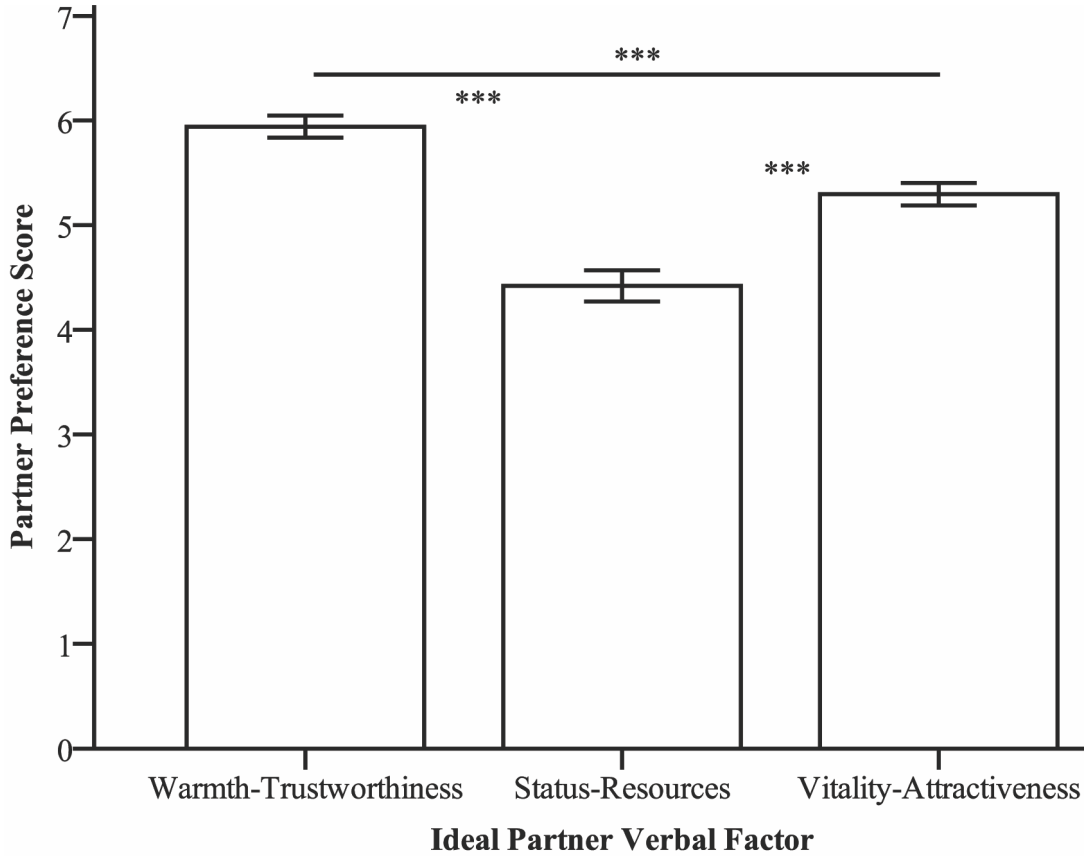
Table 5.2. Maximum %, mean %, and SD of R^2 values for a loyal, lavish, and exciting relationship as a function of the traits representing the ideal partner face factors

Relationship Type	Ideal Partner Face Factor	Trait	Maximum %	Mean %	*SD*
Loyal	Warmth-Trustworthiness	Warmth	4	1	0.01
		Trustworthiness	8	4	0.03
		Understanding	8	3	0.03
		Supportive	7	3	0.03
	Status-Resources	Status	16	5	0.05
		Resources	13	3	0.04
		Good Job	22	7	0.06
		Financially Secure	8	1	0.02
	Vitality-Attractiveness	Vitality	32	19	0.07
		Attractiveness	61	33	0.15
		Sexy	64	37	0.16
		Adventurousness	29	17	0.06
Lavish	Warmth-Trustworthiness	Warmth	7	1	0.02
		Trustworthiness	11	3	0.03
		Understanding	9	2	0.03
		Supportive	10	2	0.03
	Status-Resources	Status	11	4	0.03
		Resources	7	3	0.02
		Good Job	18	7	0.05
		Financially Secure	4	1	0.01
	Vitality-Attractiveness	Vitality	32	20	0.08
		Attractiveness	60	38	0.15
		Sexy	64	44	0.15
		Adventurousness	31	18	0.08
Exciting	Warmth-Trustworthiness	Warmth	44	6	0.11
		Trustworthiness	40	7	0.10
		Understanding	37	6	0.09
		Supportive	44	7	0.11
	Status-Resources	Status	18	6	0.06
		Resources	14	4	0.04
		Good Job	22	8	0.06
		Financially Secure	10	2	0.03
	Vitality-Attractiveness	Vitality	50	26	0.12
		Attractiveness	60	39	0.14
		Sexy	61	40	0.17
		Adventurousness	37	24	0.09

5.4.2.3. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor were subjected to a repeated-measures ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix D for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed a significant main effect of factors $\left(F(2, 118) = 43.99, MSE = 35.00, p < .001, \eta_p^2 = .43\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least important. There were significant differences (*p*s < .001) between each of the three ideal partner verbal factors (see Figure 5.9). The findings are in accordance with the hypotheses and with a meta-analysis on romantic preferences revealing stronger preferences for attractiveness relative to earning potential (Eastwick et al., 2014). In addition, much research reveals that individuals prioritise traits related to warmth-trustworthiness when completing a verbal measure of partner preferences (e.g., Chapter 4, Buss, 1989; Fletcher et al., 1999; Li et al., 2002).



Bonferroni adjustment for pairwise comparisons: ***. p < .001
Error bars: +/- 1 SE

Figure 5.9. Verbal partner preferences. Larger partner preference scores reveal a greater preference for a particular factor.

5.4.2.4. Relationship Type, Face Images, and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. Concerning preferences for face images, there were two steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings for each type of relationship were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors. The participant partner preference Fisher's z scores for each relationship

type for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A mixed 3 x 3 x 2 ANOVA was conducted between type of relationship (loyal, lavish, and exciting), ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and stimuli (face stimuli, verbal measure). See Appendix D for analyses separated by participant sex. The model did not violate sphericity.

Findings revealed no significant interaction effect between relationship type, ideal partner factors, and stimuli $\left(F(4,114) = 1.11, MSE = 0.45, p = .357, \eta_p^2 = .04\right)$, no significant interaction effect between relationship type and ideal partner factors $\left(F(4,114) = 1.08, MSE = 0.45, p = .370, \eta_p^2 = .04\right)$, and no significant interaction effect between relationship type and stimuli $\left(F(2,57) = 0.86, MSE = 0.49, p = .428, \eta_p^2 = .03\right)$. Findings revealed a significant interaction effect between the ideal partner factors and stimuli $\left(F(2,114) = 46.35, MSE = 18.66, p < .001, \eta_p^2 = .45\right)$. There was a significant main effect of factors $\left(F(2,114) = 56.37, MSE = 23.50, p < .001, \eta_p^2 = .50\right)$ and a significant main effect of stimuli $\left(F(1,57) = 3671.38, MSE = 2097.53, p < .001, \eta_p^2 = .99\right)$, but no significant main effect of relationship type $\left(F(2,57) = 0.81, MSE = 0.48, p = .449, \eta_p^2 = .03\right)$.

Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised the warmth-trustworthiness and the vitality-attractiveness factors relative to the status-resources factor (*p*s < .001), with no significant difference between the warmth-trustworthiness and the vitality-attractiveness factors (*p* = 1.000). Partner preferences assessed using face stimuli revealed that participants prioritised the vitality-attractiveness face factor, relative to the warmth-trustworthiness and status-resources face factors (*p*s < .001), with no significant difference between the warmth-trustworthiness and status-resources face factors (*p* = .089). Preferences assessed using a verbal measure revealed that participants prioritised the warmth-trustworthiness verbal factor, followed by vitality-attractiveness, with status-resources ranking last. There were significant differences between each of these verbal factors (*p*s < .001). These findings are in accordance with the

hypotheses and with Chapter 4, which revealed a dissociation between verbal measures and preferences measured using face stimuli (e.g., Chapter 4).

5.4.3. Discussion

This research examined whether people invariably prioritise attractiveness-related traits in first impressions of potential partners. Participants were asked to rate face images in terms of their partner preferences for a loyal relationship, a lavish relationship, and an exciting relationship. The relationship descriptors were selected to represent different types of relationships: Loyal to represent a warmth-trustworthiness relationship, lavish to represent a status-resources relationship, and exciting to represent a vitality-attractiveness relationship. Given the limited research examining the malleability of partner preferences in first impressions of highly variable faces in terms of relationship context, this research was novel. Findings revealed that first impressions of potential partners were dominated by attractiveness-related concerns, even when loyal or lavish relationships were made salient. Specifically, independent of relationship type, individuals rated the faces images that were related to the vitality-attractiveness ideal partner face factor more favourably relative to face images that were related to the warmth-trustworthiness or status-resources ideal partner face factors. In addition, attractiveness-related traits were prioritised in the partner preference face ratings, independent of type of relationship.

This research, additionally, examined the correspondence between partner preferences measured via face stimuli and a verbal measure, in order to further explore the findings from Chapter 4. Findings revealed a dissociation between partner preferences measured using ambient face stimuli versus the verbal measure. In the verbal measure, participants prioritised warmth-trustworthiness, followed by the vitality-attractiveness factor, with status-resources ranking last, which is consistent with the hypotheses and with previous research (Buss, 1989; Fletcher et al., 2004; Li et al., 2002). These findings replicate those obtained in Chapter 4. Measures of partner preferences using face images may capture spontaneous responses whereas verbal measures may tap into propositional beliefs (Eastwick, Eagly, et al., 2011; Eastwick et al., 2008; Gawronski & Bodenhausen, 2006, 2007, 2011).

Research has revealed that partner preferences are context dependent, for example, in response to environmental pathogens and individual immunocompetence (de Barra et al., 2013; Hunt et al., 2015; B. C. Jones, Fincher, et al., 2013; Watkins, Jones, Little, DeBruine, & Feinberg, 2012). As such, it is important to note that this research does not reveal that partner preferences are inflexible and always dominated by attractiveness-related concerns, rather, just in conditions when individuals rate variable face images on their partner preferences and when different type of relationships are emphasised. Given the findings, it can be tentatively suggested that the possible gains accrued by prioritising attractiveness-related traits outweigh those possible gains obtained by prioritising traits related to warmth-trustworthiness or status-resources.

From an evolutionary perspective, facial attractiveness conveys cues to fertility and resilience to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). Therefore, people whose partner preferences are dominated by attractiveness-related concerns may be more likely to have healthy offspring. Research has revealed links between health and various cues related to facial attractiveness, such as sexual dimorphism (Folstad & Karter, 1992; Jasienska et al., 2006; Little & Hancock, 2002; Manning et al., 1997; Møller, 1999; Rhodes et al., 2003; Roberts et al., 2005; Thornhill & Gangestad, 2006; Zahavi, 1975), averageness (Little & Hancock, 2002; Mitchell & Grant, 1984; Thornhill & Gangestad, 1993), and symmetry (Jasienska et al., 2006; Manning et al., 1997). For example, both individuals with high levels of childhood illness and men with higher levels of a biomarker for immunosuppression have stronger preferences for sexually dimorphic opposite-sex face images (de Barra et al., 2013; B. C. Jones, Fincher, et al., 2013).

An alternative explanation is that individuals prioritise attractiveness-related traits in first impressions of potential partners simply because they may not consider a potential partner if s/he does not attain a minimum level of attractiveness. Once this minimum level of attractiveness is attained, warmth-trustworthiness and status-resources evaluations may become more salient. As such, future research could ascertain whether individuals emphasise warmth-trustworthiness or status-resources in high attractiveness face images. It is, also, possible that first impressions may be dominated by attractiveness because it is

easier to detect from face images, relative to trustworthiness or status. This question is explored in Chapter 6.

Previous research has revealed that individuals prioritise attractiveness-related traits in their partner preferences. For example, in a recent meta-analysis Eastwick et al. (2014) revealed that attractiveness predicts romantic interest with a moderate to strong effect size ($r = \sim .40$), whereas earning prospects predicts romantic interest with a small effect size ($r = \sim .10$). Eastwick et al. (2014) additionally revealed that partner preferences for physical attractiveness were strongest when individuals reported on potential partners, relative to when reporting on partners they were dating or married to. Further, individuals' preferences for attractiveness strengthened once more in accordance with relationship duration. Hence, Eastwick, et al. (2014) tentatively suggest a curvilinear relationship between attractiveness and partner preferences over time: Attractiveness is prioritised when evaluating potential romantic partners, subsequently, this emphasis on attractiveness is attenuated during the early stages of a relationship, finally, the emphasis individuals place on attractiveness increases as a function of relationship duration. Future research could examine whether, if individuals lower their emphasis on attractiveness during the early phases of a relationship, perhaps they, instead, prioritise the warmth-trustworthiness or status-resources ideal partner face factors.

5.5. Conclusion

This research examined the malleability of partner preferences as a function of relationship type. More specifically, the current study investigated whether vitality-attractiveness concerns dominate partner preferences. Participants rated face images in terms of their partner preferences for a loyal relationship, a lavish relationship, and an exciting relationship, which were respectively selected to represent warmth-trustworthiness, status-resources, and vitality-attractiveness. Regardless of relationship type, participants prioritised vitality-attractiveness and related traits in their partner preferences, favouring face images that were related to this factor. Hence, it can be speculated that prioritising attractiveness-related traits in a potential partner may be of more benefit – with possible gains such as fertility and resilience to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999) – from an evolutionary standpoint,

compared to benefits derived from prioritising traits related to warmth-trustworthiness or status-resources.

Chapter 6. Evaluating Faces on Ideal Partner Traits after Minimal Time Exposure

6.1. Abstract

This research examined the relative salience of trustworthiness, status, and attractiveness in first impressions of face images, using the minimal exposure paradigm. Participants rated opposite-sex faces on trustworthiness, status, and attractiveness following 33 ms, 100 ms, and 500 ms exposure times, in a blocked design. Findings revealed that the correspondence between evaluations made following minimal exposure and time unconstrained judgments were significantly higher at 100 ms, relative to 33 ms, but did not improve with a longer exposure time of 500 ms. Hence, 100 ms suffices to form trait evaluations from faces and a longer exposure time does not impact on these evaluations. This research further identified a stronger correspondence between judgments following minimal exposure and time unconstrained judgments for attractiveness, relative to trustworthiness. Therefore, attractiveness is particularly salient in face images, which is consistent with research revealing that attractiveness-related traits dominate ideal partner face evaluations (Chapters 3, 4, and 5). Given that, in the current study, evaluations were made based on first impressions only, attractiveness-related traits may be particularly salient in romantic contexts and certain non-romantic face evaluation contexts.

Key words: Minimal exposure, Fourier-scrambled mask, and first impressions.

6.2. Introduction

Person perception is both fast and spontaneous, enabling trait evaluations to occur from faces based on minimal information (Todorov et al., 2009; Todorov & Uleman, 2003; Uleman, Blader, & Todorov, 2005). Judgments of faces are consequential (see Chapter 1). For instance, competence judgments of faces predict the U.S. congressional results (Todorov et al., 2005) and government elections results (Ballew & Todorov, 2007; Hall et al., 2009), and dominance evaluations of face images predicts military rank achievement (Mazur et al., 1984; Mueller & Mazur, 1996).

Despite research suggesting that face evaluations are, in general, fast and automatic (e.g., Todorov et al., 2005), only a few studies have directly shown that these judgments occur following minimal time exposure (Ballew & Todorov, 2007; Bar, Neta, & Linz, 2006; Todorov et al., 2009; Willis & Todorov, 2006). Various studies examined trait evaluations following a minimum exposure time of 100 ms (Ballew & Todorov, 2007; Willis & Todorov, 2006). For instance, Locher, Unger, Sociedade, and Wahl (1993) revealed that people can judge facial attractiveness following 100 ms viewing time. Bar et al. (2006) revealed that facial judgments of threat derived from neutral images at 39 ms corresponded with judgments made at 1700 ms. Todorov et al. (2009) identified that, at 33 ms exposure, evaluations of facial trustworthiness corresponded with time unconstrained judgments, and this correspondence improved with increased exposure times up to 167 ms. Trustworthiness evaluations following only 17 ms exposure times were no different from chance (Todorov et al., 2009). In addition, Olson and Marshuetz (2005) revealed that individuals could evaluate face images on attractiveness following 17 ms exposure using forward and backward masking procedures; nevertheless, the backward mask was presented 13 ms after each face stimulus, resulting in 26 ms exposure before presentation of a mask. These findings are notable as exposure times under 100 ms are not long enough for saccadic eye movements to take place, curtailing visual exploration of a face image. Hence, these judgements are, as Olivola and Todorov (2010a, p. 86) describe, “single glance” impressions.

Following this work, the objective of the current research was to examine the relative salience of trustworthiness, status, and attractiveness face evaluations using the minimal

exposure paradigm. This research focused on judgments of trustworthiness, status, and attractiveness given that these traits represent Fletcher et al.'s (1999) three ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and are, additionally, representative of two of the face perception factors (trustworthiness/valence and youthful-attractiveness; Oosterhof & Todorov, 2008; Sutherland et al., 2013). As such, these three traits a good approximation of the key elements underlying person perception in both romantic and non-romantic contexts.

Willis and Todorov (2006) revealed that judgments of face images on trustworthiness and attractiveness were faster, relative to judgments of likeability, competence, and aggressiveness. Evaluations of attractiveness are of particular significance, given that attractiveness-related traits dominate partner preference face ratings (Chapters 3, 4, and 5). As such, attractiveness might be more easily detected in face images, relative to trustworthiness and status. This research explores whether attractiveness is more salient, relative to trustworthiness and status, in a non-romantic minimal exposure context. Evolutionary psychologists posit that both attractiveness and trustworthiness evaluations are critical. For instance, detection of trustworthiness is linked to survival (Cosmides & Tooby, 1992) and the research presented in previous chapters outlines that attractiveness judgements are related to partner selection.

Further, when examining face evaluations of ideal partner traits, the warmth-trustworthiness factor emerged as the first factor, accounting for 52% variance in the ideal partner face model (Chapter 2). With regards to the face perception model, the trustworthiness/valence factor again emerged as the first factor and accounted for 63% variance, with positive trait evaluations (e.g., intelligent) loading positively on this factor and negative trait evaluations (e.g., weird) loading negatively on this factor (Oosterhof & Todorov, 2008). Todorov et al., (2009) suggest that trustworthiness judgments of faces can be used as a proxy for valence judgments, given that the amygdala - a subcortical brain structure involved in identifying potentially threatening stimuli (Amaral, 2002) - has a role in trustworthiness evaluations (Todorov & Engell, 2008). Functional neuroimaging research has revealed greater amygdala activity following exposure to untrustworthy face images, relative to trustworthy images (Engell et al., 2007; Todorov, Baron, et al., 2008; Winston, Strange, O'Doherty, & Dolan, 2002). Furthermore, Adolphs, Tranel, and

Damasio (1998) revealed that individuals with damage to the bilateral amygdala have deficiencies concerning the differentiation of face images typically perceived as trustworthy and untrustworthy.

Even though individuals evaluate face images rapidly, these evaluations are not necessarily less accurate relative to evaluations made under conditions with no viewing time restrictions. For instance, Ballew and Todorov (2007) revealed that evaluations of facial competence following 100 ms viewing time predicted governmental election outcomes to almost the same level of accuracy as ratings made following viewing times of 250 ms and unlimited viewing times. Ballew and Todorov revealed, in an additional study, that imposing a 200 ms time limit on face evaluations did not impact on the accuracy of these evaluations (mean response time with no time limit ~ 350 ms), although instructing to participants to make thoughtful and good evaluations resulted in reduced accuracy. Ballew and Todorov's findings are consistent with other research indicating that asking individuals to make deliberate evaluations introduces noise within these evaluations (e.g., Levine, Halberstadt, & Goldstone, 1996; Wilson & Schooler, 1991). Hence, Ballew and Todorov suggest that accuracy is related to automatic evaluation processes. The current research furthers this work by examining the relationship between evaluations made under minimal exposure conditions and time unconstrained judgements as a function of trait (trustworthiness, status, and attractiveness). It is possible that certain traits are easier to detect from face images at shorter exposure times and these trait evaluations correspond better with time unconstrained evaluations.

6.2.1. Research Overview

Research using behavioural and neuroimaging procedures reveal that evaluations of face images occur fast and spontaneously (Todorov et al., 2009; Todorov & Uleman, 2003; Uleman et al., 2005), with trustworthiness having a clear neural imprint (Adolphs et al., 1998; Engell et al., 2007; Todorov, Baron, et al., 2008; Todorov & Engell, 2008; Winston et al., 2002). This research examined the relative salience of trustworthiness, status, and attractiveness in first impressions of face images, using the minimal exposure paradigm. Specifically, participants rated opposite-sex faces on trustworthiness, status, and attractiveness. Face stimuli were presented to participants for 33 ms, 100 ms, and 500 ms

in a blocked design. Following presentation of each stimulus for a specific exposure time, a Fourier-scrambled version of the same image (mask) was presented on the screen, to overlap the previous image, remaining until participants had evaluated the original face image. As this research focused on first impressions, participants only viewed each face image once.

A Fourier-scrambled version of the preceding face image was selected as a mask. Fourier-scrambling adds the same random phase structure to the existing three (rgb) phase structures within the original face image. Hence, the relative phases of the r, g, and b layers in the scrambled image were the same as their relative phases in the original face image and the colour composition, brightness, and spatial frequency of the scrambled image were the same as in the original face image. The use of a phase scrambled mask, corresponding with each face image presented to participants, constitutes an advance in previous masking techniques used in minimal exposure paradigms. For example, Todorov et al., (2009) used one mask for all face stimuli, which was a mosaic of facial segments of many face images, and Willis and Todorov (2006) did not use any mask following presentation of face stimuli. Masks are relevant as they ensure that the stimuli are presented for only the required amount of time. Indeed, masking protocols enable the examination of timing of information processing in the visual system given that they allow processing to be interrupted at specific times (Bacon-Macé, Macé, Fabre-Thorpe, & Thorpe, 2005).

The current research investigated the relative salience of trustworthiness, status, and attractiveness face evaluations using the minimal exposure paradigm, which is a novel approach. Given the relevance of the selected traits in terms of romantic and non-romantic person perception, it was unclear which of these would be most salient under minimal exposure conditions. Furthermore, previous research has not examined evaluations of status within a minimal exposure paradigm. Hence, this research aimed to identify the lower bound of time exposure for status. Based on previous research, there were three hypotheses (e.g., Ballew & Todorov, 2007; Todorov et al., 2009). Firstly, it was expected that evaluations of trustworthiness, status, and attractiveness following 33 ms exposure time would correlate with time unconstrained evaluations. Secondly, stronger correlations between face evaluations made under minimal exposure times and time unconstrained evaluations were expected at longer exposure times (i.e., stronger correlations at 100 ms

relative to at 33 ms exposure time). Lastly, trait evaluations made following 100 ms exposure were not expected to differ significantly from those made following 500 ms exposure.

6.3. Method

6.3.1. Participants

30 participants, all university students, were recruited via the University of York website. Participants were between 18 and 33 years old (*M* = 21.23, *SD* = 3.09) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

6.3.2. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information). From this database, 300 male and 300 female images were randomly selected. The images were randomly grouped into 10 sets of 30 images for male and female images separately. No image was repeated at all across the 10 sets of face images as this research focused on first impressions of faces (see Table 9.12, Appendix E, for the means and *SD*s as a function of stimuli set, revealing approximately similar means and *SD*s across sets).

6.3.3. Masks

Image processing was performed in MATLAB R2015b to create Fourier-scrambled masks for each face stimulus (see Figure 6.1). Hence, following presentation of a specific face image, its corresponding mask was presented to participants.

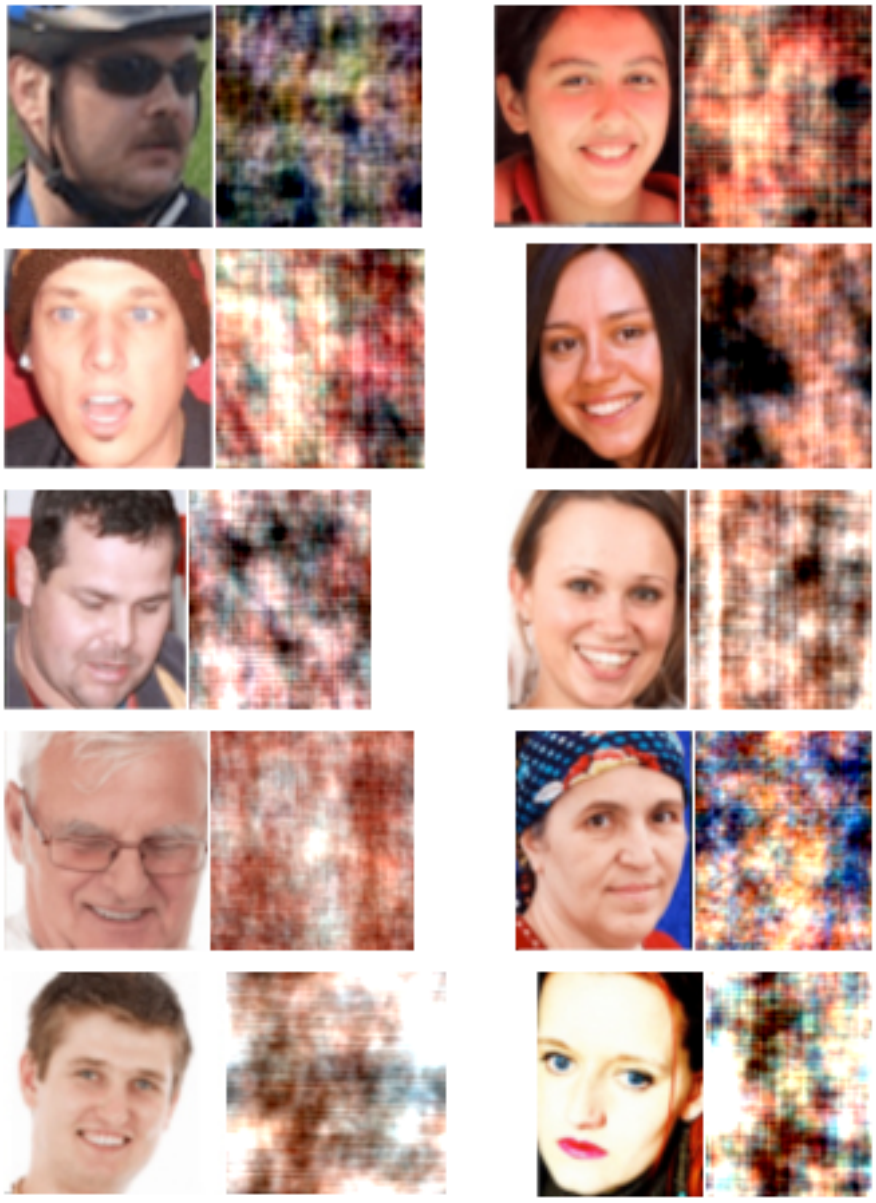


Figure 6.1. Example ambient male (left) and female (right) face images with their corresponding Fourier-scrambled masks, which were not included in the actual study.

6.3.4. Procedure

Following informed consent, in which participants were informed that the study involved first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they could take their time when rating, although, they were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Participants rated opposite-sex faces on

trustworthiness, status, and attractiveness. Face stimuli were presented to participants for 33 ms, 100 ms, and 500 ms in a blocked design. Face images were grouped into 10 sets of 30 male and 10 sets of 30 female face images and no face image was repeated at all across the 10 sets.

Each trial started with a fixation point (+) presented for 500 ms at the centre of the screen. Participants were shown a face image and, following an exposure time (33 ms, 100 ms, or 500 ms), a Fourier-scrambled version of the same image (mask) was presented on the screen so that this overlapped exactly where the previous image had been located. The mask remained on the screen until participants rated the original (not Fourier-scrambled) image on trustworthiness (very untrustworthy-very trustworthy), status (low status-high status), or attractiveness (very unattractive-very attractive), using a seven-point Likert scale. The inter-trial interval was 750ms.

For example, within the trustworthiness block, a participant may have rated practice stimuli (following an exposure time of 1000 ms; e.g., face images set 1), then this participant may have rated images following a 33 ms exposure time (e.g., face images set 9), followed by a 100 ms exposure time (e.g., face images set 5), and then a 500 ms exposure time (e.g., face images set 8). After the trustworthiness block, this participant may have rated images on status and then on attractiveness. All participants rated the same set of practice face images (face images set 1) and the remaining sets of face images were rotated randomly around the conditions (exposure time and traits) so that participants did not rate any face image twice, given that this research focused on first impressions of faces. In addition, trait order (trustworthiness, status, and attractiveness) and exposure time order (33 ms, 100 ms, and 500 ms) were counterbalanced between participants. To minimise confusion for participants, the exposure time order was kept constant within each participant (i.e., if Jane rated face images on trustworthiness following 100 ms exposure time, then following 33 ms exposure time, then following 500 ms exposure time, this pattern of exposure times remained constant when Jane was rating face images on status, and attractiveness).

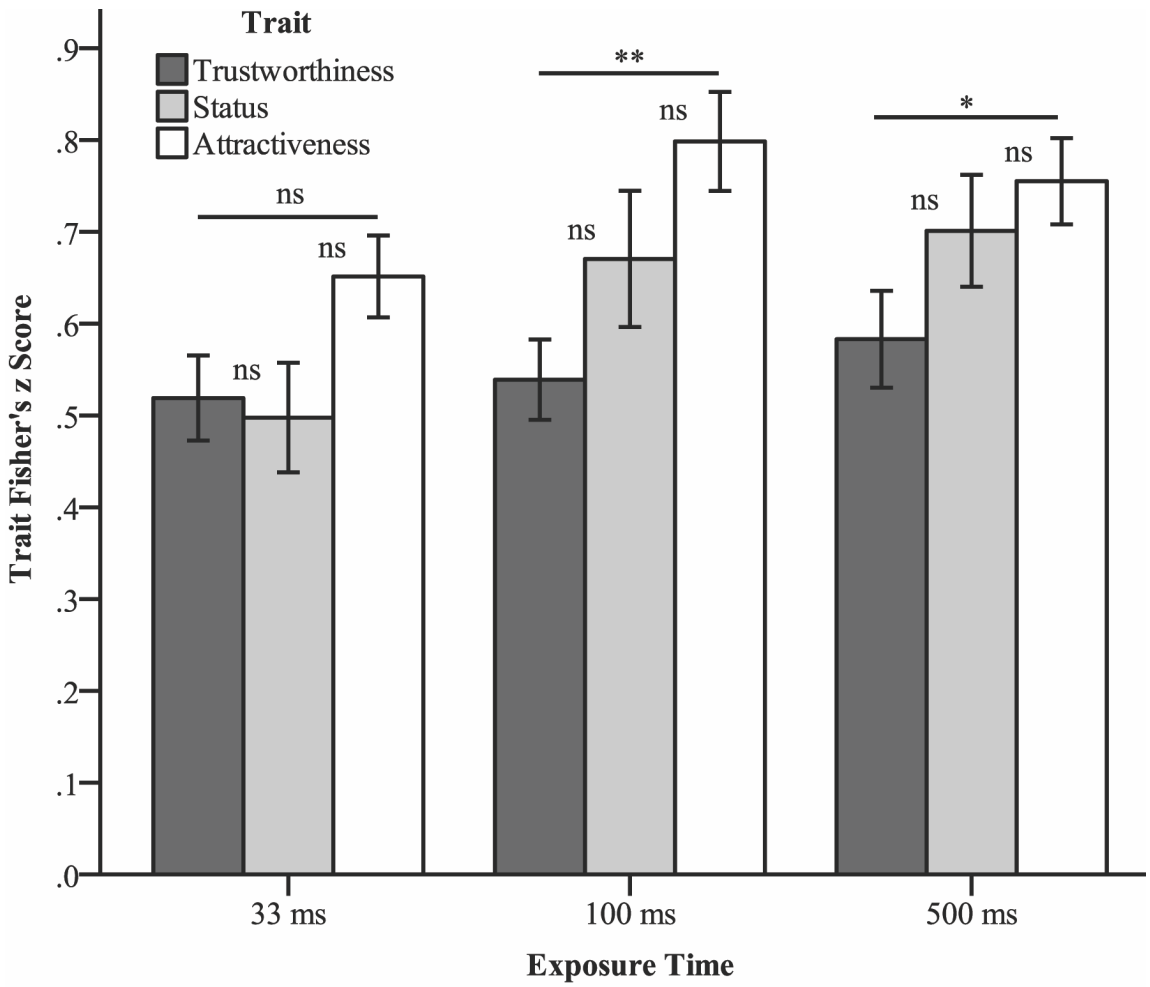
Participants were informed that they could take breaks at any point and, after rating each set of images, they were additionally prompted to take a break. The task was programmed

using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 25 minutes to complete. On completion, participants were debriefed and reimbursed with a small payment.

6.4. Results

Data analyses were completed using SPSS version 23. To determine whether there was a significant difference between the trait ratings at differing exposure times, the trait ratings for each ambient face image made with minimal exposure times were correlated with the time unconstrained trait ratings for the same face images derived from Chapter 2 and these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The individual participant Fisher's z scores were subjected to an ANOVA. A repeated-measures 3 x 3 ANOVA was conducted between traits (trustworthiness, status, and attractiveness) and exposure times (33 ms, 100 ms, and 500 ms). See Appendix E for analysis separated by participant sex. The model did not violate sphericity.

Findings revealed no significant interaction effect between exposure times and traits $\left(F(4, 116) = 1.28, MSE = 0.07, p = .282, \eta_p^2 = .04\right)$ although there was a significant main effect for traits $\left(F(2, 58) = 6.89, MSE = 0.81, p = .002, \eta_p^2 = .19\right)$ and a significant main effect for exposure times $\left(F(2, 58) = 10.95, MSE = 0.42, p < .001, \eta_p^2 = .27\right)$. The interaction is presented in Figure 6.2 as this reveals the complete pattern of the data, even though the interaction did not reach significance (although see Figure 9.39 and Figure 9.40, Appendix E, for plots of the main effects separately).



Bonferroni adjustment for pairwise comparisons: **. p < .01, *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 6.2. Trustworthiness, status, and attractiveness Fisher's z scores for face stimuli presented at 33 ms, 100 ms, and 500 ms exposure times. Larger Fisher's z scores reveal a greater correspondence between ratings made with these minimal exposure times and with time unconstrained ratings.

Examination of the main effect of traits using Bonferroni's adjustment for multiple pairwise comparisons revealed that the trustworthiness Fisher's z scores were significantly lower than the attractiveness Fisher's z scores (p = .001). There were no significant differences between the Fisher's z scores for trustworthiness or status (p = .522) and no significant differences between the Fisher's z scores for status and attractiveness (p = .127). Therefore, relative to trustworthiness, attractiveness is easier to detect from face images presented at 33 ms, 100 ms, and 500 ms exposure times.

Examination of the main effect of exposure times using Bonferroni's adjustment for multiple pairwise comparisons revealed that Fisher's z scores at 33 ms exposure time were

significantly smaller than at 100 ms ($p = .001$) or at 500 ms ($p < .001$) exposure times, with no significant difference between Fisher's z scores at 100 ms or at 500 ms ($p = 1.000$). Hence, the correspondence between time unconstrained evaluations and face ratings made following 100 ms or 500 ms exposure is significantly larger, relative to face ratings made following 33 ms exposure. Of note, relative to 100 ms exposure, evaluations made with exposure times at 500 ms do not result in better correspondence with time unconstrained evaluations. Therefore, these findings suggest that 100 ms suffices to make evaluations of face images based on first impressions. These findings are consistent with the hypotheses.

6.5. Discussion

This research examined the relative salience of trustworthiness, status, and attractiveness in first impressions of face images, using the minimal exposure paradigm. Findings revealed that evaluations following even 33 ms exposure to face stimuli were correlated with time unconstrained evaluations. Previous research has not examined evaluations of status with a minimal exposure paradigm. This research confirms that status, like trustworthiness and attractiveness, can also be evaluated in face images following 33 ms viewing time. The correspondence between evaluations made following minimal exposure and time unconstrained evaluations were significantly higher at 100 ms, relative to 33 ms, but did not improve with a longer exposure time of 500 ms. Hence, 100 ms provided enough time to form trait evaluations from faces and additional time did not impact on these evaluations. These findings are in accordance with the hypotheses and with previous research (e.g., Ballew & Todorov, 2007; Todorov et al., 2009).

The findings, additionally, revealed that attractiveness is more easily judged from face images relative to trustworthiness, which is consistent with research revealing that attractiveness-related concerns dominate partner preferences for face images (Chapters 3, 4, and 5). Indeed, Fletcher, Kerr, Li, and Valentine (2014) asked opposite-sex strangers to engage in a 10 minute date with the objective of perhaps arranging another date and revealed that vitality-attractiveness was a more salient and a more accurate predictor of romantic interest relative to warmth-trustworthiness or status-resources. Of note, the current study revealed no significant difference between evaluations of status and attractiveness, yet, partner preferences for status-related traits are comparably low (see

Chapters 3, 4, and 5). Therefore, it is unlikely that partner preferences for face images are dominated by attractiveness-related traits only because these are easily perceived in first impressions of face images.

The current research did not ask participants to evaluate face images in terms of a romantic context, rather, participants rated face images on their first impressions. Hence, based on these findings, attractiveness-related traits may be particularly salient in romantic contexts and in certain non-romantic face evaluation contexts. There are numerous perspectives accounting for why attractiveness is a particularly salient trait in facial first impressions (see Chapter 8, Themes). For instance, from an evolutionary perspective, attractiveness may be particularly salient as it provides cues to fertility and resilience to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999), which is relevant in the context of partner preferences. Further, an attractive face image may be particularly salient as attractiveness is linked to multiple social consequences. For example, the "what is beautiful is good" stereotype (Dion, Berscheid, & Walster, 1972) posits that people attribute many positive qualities to attractive individuals (see Ashmore, Makhijani, Longo, & Eagly, 1991; Feingold, 1992; Langlois et al., 2000, for meta-analytical reviews of attractiveness stereotypes), such as better career and financial prospects (Chiu & Babcock, 2002; Marlowe et al., 1996; Elder, 1969; Holmes & Hatch, 1938). Hence, people may feel that they can derive benefits from associating with attractive individuals beyond a romantic context.

One strength of the research involved the use of a Fourier-scrambled version of the preceding each face image as a mask. As such, the mask matched the original image in terms of colour composition, brightness, and spatial frequency content. This masking technique is an improvement relative to previous methods (e.g., Todorov et al., 2009; Willis & Todorov, 2006). Effective masking protocols are essential in minimal exposure paradigms, given that they pause the processing of a given image following a set time (Bacon-Macé et al., 2005).

A caveat of this research ought to be mentioned. Despite identifying that status can be evaluated from first impressions of face images at only 33 ms, which is a novel contribution of this research, previous research has already identified that trustworthiness

and attractiveness can be evaluated at minimal exposure times. For example, Todorov et al. (2009) identified that individuals can evaluated face images on trustworthiness following 33 ms viewing time. In addition, Olson and Marshuetz, (2005) identified that individuals can evaluate face images on attractiveness following 17 ms viewing time (followed by a 13 ms delay before a mask was presented, resulting in 26 ms total exposure time). Hence, future research can explore exposure times below 33 ms in relation to trustworthiness, status, and attractiveness evaluations. Another possible caveat of this research is that attractiveness halo effects were not controlled for (unlike in Fletcher, et al.'s, 2014, 10 min date research). Therefore, Chapter 7 examined whether first impressions of face images are dominated by attractiveness-related concerns in other non-romantic contexts, which would suggest a possible attractiveness halo effect.

Future research could examine whether specific traits become more salient in certain contexts. For instance, close to ovulation (time of maximum fertility), relative to other menstrual phases, women have a greater preference for facial masculinity (Johnston, Hagel, Franklin, Fink, & Grammer, 2001; Jones et al., 2005; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999) and dominance (Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004). As such, it is possible that the traits attractiveness, masculinity, and dominance become particularly salient in first impressions of male face images at shorter minimal exposure times, for women close to ovulation.

6.6. Conclusion

This research examined the relative salience of trustworthiness, status, and attractiveness in first impressions of face images. Consistent with previous research (e.g., Ballew & Todorov, 2007; Todorov et al., 2009), findings revealed that evaluations following minimal time exposures were correlated with time unconstrained evaluations even at 33 ms. In addition, 100 ms sufficed to make first impression trait evaluations from faces and additional time did not result in better correspondence with time unconstrained evaluations. This research, further, identified that attractiveness is more easily evaluated in first impressions of face images, relative to trustworthiness, following minimal exposure. This finding is consistent with research revealing that attractiveness-related traits dominate

evaluations of face images in terms of partner preferences (Chapters 3, 4, and 5). As such, it is possible that attractiveness-related traits are particularly salient in romantic contexts and in specific non-romantic face evaluation contexts.

Chapter 7. Facial Judgements of Occupations are not Dominated by Attractiveness

7.1. Abstract

Research on partner preferences has revealed that preferences for face images are dominated by attractiveness-related concerns (Chapters 3, 4, and 5). The consistency of this finding raises the question of whether attractiveness is prioritised in the context of partner preferences per se, or whether it is a pervasive influence on any evaluations of faces. This research, therefore, examined whether attractiveness-related concerns are prioritised in evaluations of face images in terms of their suitability for specific occupations. Participants rated ambient face images in terms of three occupations selected to represent Fletcher et al.'s (1999) warmth-trustworthiness, status-resources, and vitality-attractiveness ideal partner verbal factors. Findings revealed that vitality-attractiveness, including related traits, were prioritised in one occupation only (dancer). Vitality-attractiveness and attractiveness-related traits were negatively related to other occupations. Hence, attractiveness-related concerns do not dominate non-romantic evaluations of face images. Rather, evaluations reflect the stereotypical traits associated with a specific occupation.

Key words: Stereotypes, attractiveness halo effect, and occupations.

7.2. Introduction

Attractiveness-related traits dominate first impressions of face images of potential partners for both men and women. This effect remains when individuals evaluate ambient face images or morphed youthful-looking face images in terms of their partner preferences (see Chapters 3 and 4). Indeed, individuals still prioritise attractiveness-related traits even when specific relationship types (e.g., a warmth-trustworthiness relationship) are made salient (see Chapter 5). Other research by Fletcher et al. (2014) also revealed that vitality-attractiveness concerns dominate partner preferences, when comparing these directly to preferences for warmth-trustworthiness and status-resources. Specifically, Fletcher et al. (2014) asked opposite-sex strangers to engage in a 10 minute date with the idea of possibly arranging another date. Findings suggested that men and women's ratings of partners on vitality-attractiveness were both most accurate and relevant in determining romantic interest for a future date, relative to ratings on warmth-trustworthiness, and status-resources. Luo and Zhang (2009), also, revealed that for both sexes attractiveness predicted romantic attraction in a speed-dating paradigm.

Further, attractiveness is particularly salient in face images in both romantic and some non-romantic contexts. For instance, Chapter 6 revealed that in a non-romantic context, attractiveness evaluations at minimal exposure times correspond with time unconstrained evaluations significantly better, relative to trustworthiness judgements. The current research explored whether first impressions of face images are inevitably dominated by attractiveness. The study involved heterosexual participants rating opposite-sex face images in terms of specific occupations. Facial stereotypes of occupations were selected as a vehicle for investigating the potential flexibility of face evaluations. For example, if first impressions of face images for the occupation president of a company were to remain dominated by attractiveness-related traits, this would reveal that facial evaluations are relatively inflexible – perhaps indicative of an attractiveness halo effect – rather than emphasising specific traits in accordance with the task instructions (e.g., facial stereotypes of the occupation president of a company may reflect status-related traits).

Even though people make numerous trait judgements of face images (e.g., trustworthiness and understanding; Chapters 2 and 3), and these evaluations can be rapid - in as little as 33 ms (Chapter 6) - attractiveness evaluations might take precedence in first impression contexts as these traits may be particularly salient (Chapter 6). It is, additionally, possible that individuals prioritise attractiveness-related traits in first impressions of face images, given that attractiveness is related to multiple favourable social consequences (e.g., better financial prospects and perceived improved romantic outcomes; Berscheid, Dion, Walster, & Walster, 1971; Chiu & Babcock, 2002; Elder Jr., 1969; Marlowe, Schneider, & Nelson, 1996; Riggio & Woll, 1984; Walster, Aronson, Abrahams, & Rottman, 1966). As such, individuals may perceive that they derive benefits from associating with an attractive person even if they do not consider this attractive person as a potential romantic partner.

Nevertheless, there are various key reasons why facial first impressions might not uniformly prioritise attractiveness-related traits. For instance, many people would describe the average pre-school teacher as appearing young, trustworthy, and caring, whereas the average builder is considered to be relatively dominant and masculine. These cognitive representations of job groups members are stereotypes, which typically vary in the traits they emphasise. Stereotypical traits involve semantic associations to social groups. For instance, traits such as kindness and forgetfulness are related to the older generation (Cuddy, Norton, & Fiske, 2005) caring and emotionality are related to women (Eagly & Steffen, 1984), and athleticism and sportiness are related to African Americans (Devine & Elliot, 1995). Moreover, research reveals that even indirect cues to social groups result in related stereotypical traits being triggered both automatically and unconsciously (Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000; Lewicki, 1986; Nosek, Banaji, & Greenwald, 2002).

Given that social groups and face images are readily evaluated on traits spontaneously and automatically (e.g., Willis & Todorov, 2006; Zebrowitz, Fellous, Mignault, & Andreoletti, 2003), the cognitive representations of social groups may involve both semantic group information as well as facial information. For example, Shepherd, Ellis, McMurran, and Davies (1978) asked individuals to recreate either the face of a murderer or a hero from memory using templates of features, with both faces being, in reality, the same image. A

separate group of individuals rated the constructed face images, revealing a more attractive and intelligent face in the hero condition, relative to the murderer condition. Research has revealed similar findings for popular and unpopular celebrity face images that were recreated via a computer program (Davies & Oldman, 1999). Furthermore, xenophobic Dutch individuals, relative to non-xenophobic Dutch individuals, perceived Moroccan averaged face images to be less trustworthy and more criminally inclined (Dotsch, Wigboldus, Langner, & Knippenberg, 2008). Hence, stereotypes towards social groups impact on the facial representations of these and attractiveness might only dominate first impressions of face images only if an attractiveness-related stereotype is made salient.

7.2.1. Research Overview

This research examined whether non-romantic first impressions of face images, like partner preferences for face images, were dominated by attractiveness-related concerns. Occupation stereotypes were used to explore the malleability of face ratings, specifically, to identify whether specific traits (e.g., trustworthiness) were emphasised in face ratings of certain occupations (e.g., children's nurse). Part 1 of the study involved identifying three occupations selected to represent each of the ideal partner factors. In Part 2 of the study, participants rated 500 opposite-sex face images in terms of one of these three occupations. The face ratings were correlated with the ideal partner face factor scores and, also, with traits relating to these factors, to reveal which traits and factors were prioritised in a particular occupation.

Research on facial stereotypes reveals that face images representing social groups are not universally rated high in attractiveness-related traits or even high in positively valenced traits (e.g., Davies & Oldman, 1999; Dotsch et al., 2008; Shepherd et al., 1978). Hence, facial stereotypes of occupations are not expected to be dominated by attractiveness-related concerns. Instead, face ratings of occupations were expected to be related to the specific ideal partner face factor, and respective traits, that they were selected to represent. For example, face ratings in terms of the occupation president of a company selected to represent status-resources were expected to correlate strongly with the status-resources face factor and the traits: Resources, good job, status, and financially secure. Further, face

ratings in terms of the occupation president of a company were not expected to reveal strong positive correlations with the vitality-attractiveness factor or attractiveness-related traits (i.e., sexy, attractiveness, vitality, and adventurousness).

7.3. Study: Part 1

7.3.1. Method

7.3.1.1. Participants

24 participants, all university students, were recruited via the University of York website. Participants were between 18 and 26 years old (M = 20.12, SD = 2.23) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

7.3.1.2. Occupation

Six occupations were initially selected to potentially represent high levels of each of Fletcher et al.'s (1999) ideal partner verbal factors:

1. Warmth-trustworthiness occupations: Children's nurse, preschool teacher, animal care worker, waiter/waitress, therapist, and lollipop man/lady;
2. Status-resources occupations: President of a company, banker, chief executive officer, brain surgeon, professor, and pilot;
3. Vitality-attractiveness occupations: Dancer, fashion model, actor/actress, television presenter, secretary, and sales person.

7.3.1.3. Procedure

Following informed consent, in which participants were informed that the study involved rating occupations, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate a set of occupations based on their first impressions in terms of how closely they relate to warmth-trustworthiness, status-resources, and vitality-attractiveness. Specifically, when rating occupations in terms of warmth-trustworthiness the instructions were: "We know that people with occupations that have high warmth and trustworthiness involves them having the following traits: Kind, supportive, understanding, considerate, and a good listener. Please rate the extent that the following occupations represent high warmth/trustworthiness". Participants completed the task using a seven-point Likert scale (a low warmth-trustworthiness occupation-a high warmth-trustworthiness occupation).

When rating occupations in terms of status-resources and vitality-attractiveness, the instructions were the same and only the words warmth and trustworthiness were replaced by the relevant ideal partner labels (e.g., status and resources, for the status-resources factor). The example traits provided were five traits that were selected from Fletcher et al.'s (1999) Ideal Partner Scale and were the traits that loaded highest on their respective ideal partner factors. For status-resources, the example, these traits were: Successful (or potential to achieve), nice house or apartment (or potential to achieve), financially secure (or potential to achieve), dresses well (or potential to achieve), and good occupation (or potential to achieve). For vitality-attractiveness, the example, the traits were: Sexy, attractive appearance, good lover, outgoing, and adventurousness.

For each warmth-trustworthiness, status-resources, and vitality-attractiveness task, participants rated 18 occupations: Children's nurse, preschool teacher, animal care worker, waiter/waitress, therapist, lollipop lady/man, president of a company, banker, chief executive officer, brain surgeon, professor, pilot, dancer, fashion model, actor/actress, television presenter, secretary, and sales person. The presentation order of the occupations was in a different random order for each warmth-trustworthiness, status-resources, and vitality-attractiveness task. The order in which participants completed each task was

counterbalanced. The experiment was completed using pen and paper and took approximately 5 minutes to complete. On completion, participants were debriefed.

7.3.2. Results and Discussion

All data analyses were completed using SPSS version 23.

7.3.2.1. Reliability

Inter-rater agreement was high. All Cronbach's alphas were over .97, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

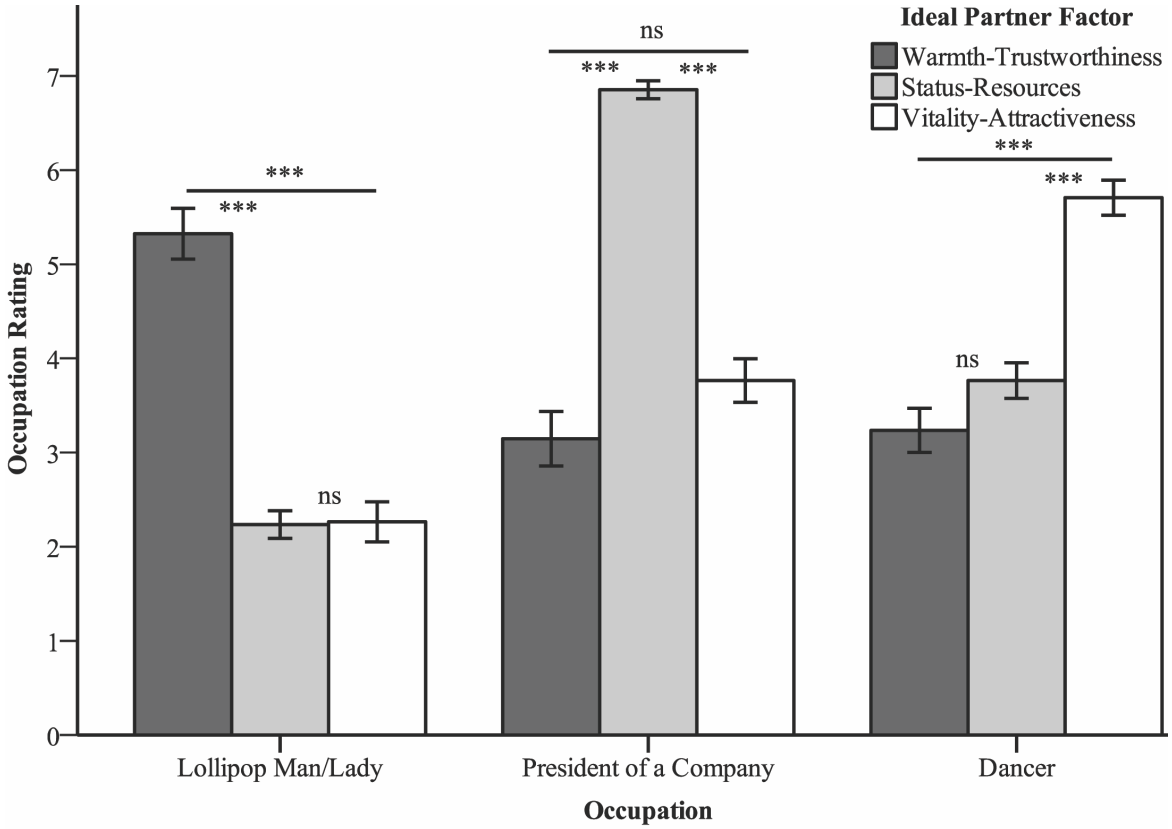
7.3.2.2. Occupation

To determine which occupations represented high levels of warmth-trustworthiness, status-resources, and vitality-attractiveness, an ANOVA was conducted using the individual participant ratings of the occupations in terms of each ideal partner factor. A repeated-measures 3 x 18 ANOVA was conducted between ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and occupations (children's nurse, preschool teacher, animal care worker, waiter/waitress, therapist, lollipop lady/man, president of a company, banker, chief executive officer, brain surgeon, professor, pilot, dancer, fashion model, actor/actress, television presenter, secretary, and sales person). See Appendix F for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between ideal partner factors and occupations $\left(F(10.78, 290.93) = 53.60, MSE = 188.10,\ p < .001, \eta_p^2 = .67\right)$. Furthermore, findings revealed a significant main effect for ideal partner factors $\left(F(1.73, 46.62) = 21.53, MSE = 65.33,\ p < .001, \eta_p^2 = .44\right)$ and a significant main effect for occupations $\left(F(6.71, 181.17) = 15.89, MSE = 65.75,\ p < .001, \eta_p^2 = .37\right)$. Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that, for the warmth-trustworthiness occupations, lollipop man/lady,

children's nurse, preschool teacher, animal care worker, and therapist were rated significantly higher (*p*s < .01) in warmth-trustworthiness relative to their ratings on both status-resources and vitality-attractiveness. Regarding the status-resources occupations, president of a company, banker, chief executive officer, banker, brain surgeon, professor, and pilot were rated significantly higher (*p*s < .05) in status-resources relative to their ratings on both warmth-trustworthiness and vitality-attractiveness. For the vitality-attractiveness occupations, dancer and fashion model were rated significantly higher (*p*s < .001) in vitality-attractiveness relative to their ratings on both warmth-trustworthiness and status-resources.

To select the most appropriate occupation for each ideal partner factor, a mean difference score was calculated for the occupations representing each ideal partner factor. For example, for the warmth-trustworthiness occupations, each participant's ratings of these occupations on status-resources were subtracted from their ratings on warmth-trustworthiness and, also, participants' ratings of these occupations on vitality-attractiveness were subtracted from their ratings on warmth-trustworthiness and, finally, an overall mean difference score was calculated from these two numbers. Occupations with larger mean difference scores represented higher levels of warmth-trustworthiness whilst also representing relatively lower levels of status-resources and vitality-attractiveness (see Table 9.13, Appendix F). Using a mean difference score for each ideal partner factor, lollipop lady/man was selected as a high warmth-trustworthiness occupation with comparably low status-resources and vitality-attractiveness, president of a company was selected as a high status-resources occupation with comparably low warmth-trustworthiness and vitality-attractiveness, and dancer was selected as a high vitality-attractiveness occupation with comparably low warmth-trustworthiness and status-resources. See Figure 7.1 for a plot of the three selected occupations and their respective ratings on a warmth-trustworthiness occupation, a status-resources occupation, and a vitality-attractiveness occupation; see Figure 9.41, Figure 9.42, and Figure 9.43, Appendix F, for plots of all of the tested occupations as a function of their ratings on a warmth-trustworthiness occupation, a status-resources occupation, and a vitality-attractiveness occupation.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 7.1. Ratings of the occupations lollipop man/lady, president of a company, and dancer on a warmth-trustworthiness occupation, a status-resources occupation, and a vitality-attractiveness occupation. Higher ratings reveal that a particular occupation is better suited to represent a specific ideal partner factor.

7.4. Study: Part 2

This research aimed to identify whether first impressions of people in terms of occupations are dominated by attractiveness-related concerns. Specifically, participants were asked to rate opposite-sex face images in terms of either a warmth-trustworthiness occupation, a status-resources occupation, or a vitality-attractiveness occupation. Three occupations were selected on the basis of Part 1 of this study to represent each factor. Part 1 of this study revealed that lollipop man/lady can represent a warmth-trustworthiness occupation, president of a company can represent a status-resources occupation, and dancer can represent a vitality-attractiveness occupation. Face ratings for the occupations lollipop man/lady or president of a company that remain dominated by attractiveness-related concerns would, therefore, indicate an attractiveness halo effect. Nevertheless, based on

previous research (e.g., Davies & Oldman, 1999; Dotsch et al., 2008; Oldmeadow, Sutherland, & Young, 2013), facial stereotypes of occupations are not expected to be dominated by attractiveness-related concerns. For instance, Chapters 2 and 3 revealed that individuals can perceive different traits (not just attractiveness) in face images.

7.4.1. Method

7.4.1.1. Participants

60 participants, all university students, were recruited via the University of York website. Participants were between 18 and 36 years old (*M* = 21.13, *SD* = 3.33) and 50% of the participants were male. Participants were self-reported heterosexual native English speakers and were raised in a Western environment. The participants provided written consent and the study obtained ethical approval from the Ethics Committee of the University of York Psychology Department. Participants did not take part in the other reported studies.

7.4.1.2. Occupation

Three different occupations were chosen to represent the ideal partner factors and these were selected based on findings from Part 1. The occupations selected as best representing each ideal partner factor were as follows:

1. Warmth-trustworthiness: Children's nurse;
2. Status-resources: President of a company;
3. Vitality-attractiveness: Dancer.

7.4.1.3. Face Images

The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).

7.4.1.4. Procedure

Following informed consent, in which participants were informed that the study involved first impressions of faces, participants were seated in a quiet room and were asked to complete demographic questions. Participants were informed that they would rate opposite-sex faces in terms of how much each person looks like a specific occupation. Participants were encouraged to rely on their first impressions (Sutherland et al., 2013; Todorov et al., 2005). Following completion of six practice trials rating opposite-sex face stimuli randomly selected from the database, participants rated the 500 face images on a single occupation (i.e., lollipop man/lady, president of a company, or dancer) so that there were no carry-over effects between different occupations (e.g., Clifford & Rhodes, 2005; Hamermesh & Abrevaya, 2013; Rhodes, 2006). Participants rated the face images based on the following instructions: "Rate the faces in terms of how much each person looks like a LOLLIPOP MAN/LADY", using a seven-point Likert scale (not a lollipop man/lady-a lollipop man/lady); the words lollipop man/lady were substituted for the relevant occupation (lollipop man/lady, president of a company, or dancer). Groups of 20 participants (10 male) were randomly assigned to rate face images based on a single occupation.

The presentation order of the stimuli was randomised for each participant. Each stimulus remained on the computer screen until participants had rated the face and the inter-trial interval was 750ms. Participants were informed that they could take breaks at any point and, after rating 250 face images, they were additionally prompted to take a break. The task was programmed using E-Prime 2.0 (Psychology Software Tools, Pittsburgh, USA) and took approximately 30 minutes to complete. On completion, participants were debriefed and reimbursed with a small payment.

7.4.2. Results

Data analyses were completed using MATLAB R2015b and SPSS version 23.

7.4.2.1. Reliability

For each group of raters (i.e., 10 heterosexual men and 10 heterosexual women rating each occupation: Lollipop man/lady, president of a company, and dancer), inter-rater agreement in trait ratings was high, all Cronbach's alphas were over .72, which is considered sufficiently reliable (Nunnally & Bernstein, 1994).

7.4.2.2. Occupation

To identify which traits and ideal partner face factors were prioritised when evaluating ambient face images in terms of specific occupations, two analyses were conducted:

1. The face ratings for each occupation were examined in relation to the ideal partner face factors. Each face image was given three scores reflecting its relationship to each of the warmth-trustworthiness, status-resources, and vitality-attractiveness factors (derived from Chapter 2). Each participant's evaluations of the 500 face images that they rated was correlated with the faces' loadings on each factor, to find out how each factor was linked to the ratings given and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The Fisher's z scores were subjected to a mixed ANOVA between the ideal partner face factors and occupation.
2. To determine which ideal partner face factors and traits accounted for most of the variance in face ratings as a function of occupation, the individual participant face ratings were correlated with the ideal partner face factor scores and with traits selected to represent these factors.

7.4.2.2.1. ANOVA

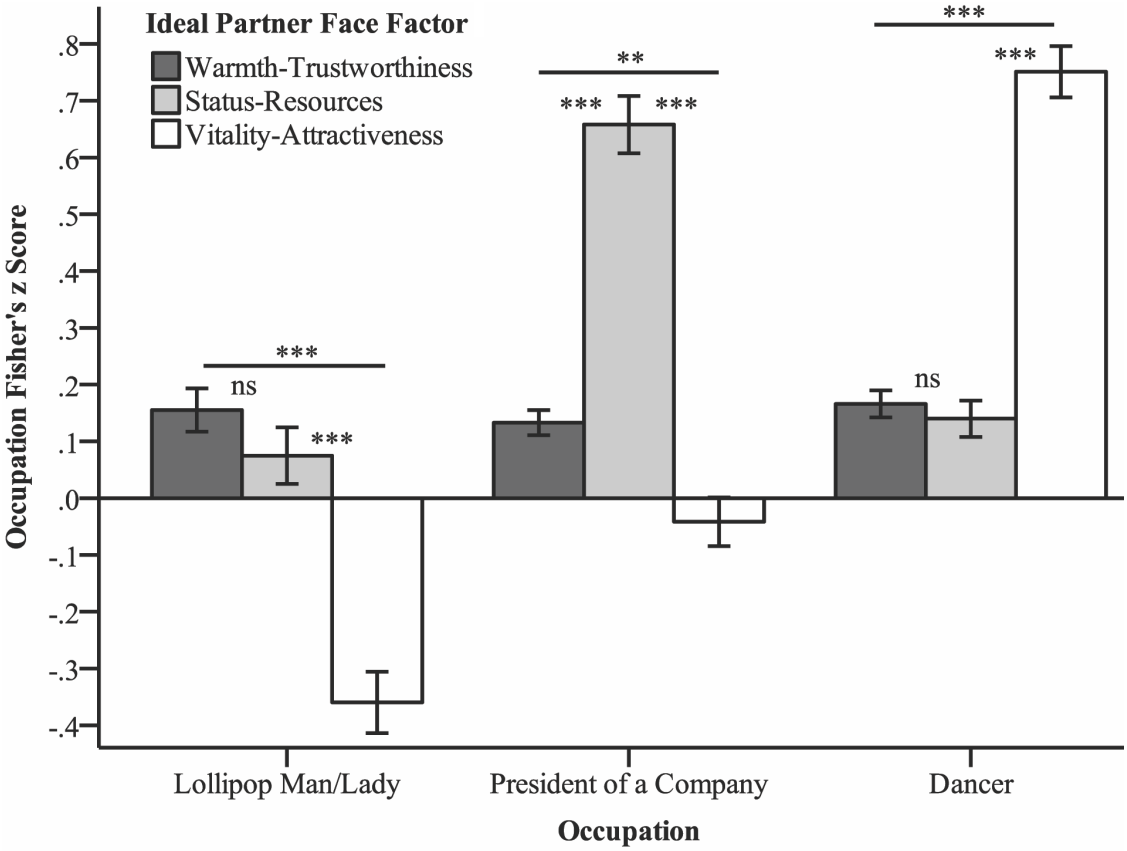
To determine whether there was a significant difference between the factors that are prioritised in face ratings as a function of occupation (lollipop man/lady, president of a company, and dancer), there were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant face ratings

were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant Fisher's z scores were subjected to a mixed 3 x 3 ANOVA between occupation (lollipop man/lady, president of a company, and dancer) and ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness). See Appendix F for analyses separated by participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between factors and occupations $\left(F(2.97, 86.21) = 105.02, MSE = 4.12, p < .001, \eta_p^2 = .78\right)$. Furthermore, findings revealed a significant main effect for factors $\left(F(1.49, 86.21) = 17.80, MSE = 0.70, p < .001, \eta_p^2 = .24\right)$, and for occupations $\left(F(2, 58) = 55.08, MSE = 2.61, p < .001, \eta_p^2 = .66\right)$. Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that for the warmth-trustworthiness factor, there were no significant differences between the three occupations. Therefore, lollipop man/lady was not related to the warmth-trustworthiness factor more than the remaining two occupations. For the status-resources factor, the occupation president of a company revealed significantly higher Fisher's z scores relative to the occupations lollipop man/lady and dancer (*p*s < .001), with no significant difference between the Fisher's z scores for lollipop man/lady and dancer. Hence, president of a company was related to the status-resources factor significantly more than the remaining two occupations. For the vitality-attractiveness factor, there were significant differences between all of the occupations (*p*s < .001); dancer obtained significantly higher Fisher's z scores, followed by president of a company, with lollipop man/lady ranking last. As such, dancer was related to the vitality-attractiveness factor significantly more than the remaining two occupations.

Furthermore, for the occupation lollipop man/lady, there were no significant differences between the warmth-trustworthiness and status-resources Fisher's z scores. Lollipop man/lady was negatively related to the vitality-attractiveness factor, revealing significantly lower vitality-attractiveness scores relative to warmth-trustworthiness and status-resources (*p*s < .001; see Figure 7.2). The occupation president of a company revealed significant

differences between the status-resources and both warmth-trustworthiness and vitality-attractiveness Fisher's z scores (*p*s < .001). President of a company was negatively related to the vitality-attractiveness factor. The occupation dancer revealed significant differences between the vitality-attractiveness and both warmth-trustworthiness and status-resources Fisher's z scores (*p*s < .001), with no significant difference between the warmth-trustworthiness and status-resources scores.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 7.2. Ratings of ambient face stimuli in terms of occupation (lollipop man/lady, president of a company, and dancer), as a function of the ideal partner face model. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the face ratings.

To summarise, the vitality-attractiveness ideal partner face factor was prioritised only in face ratings on the occupation dancer, but was negatively related to face ratings for the occupations lollipop man/lady and president of a company. In addition, status-resources was prioritised in the occupation president of a company. These findings are in accordance

with the hypothesis and with research (e.g., Davies & Oldman, 1999; Dotsch et al., 2008; Oldmeadow et al., 2013) revealing that people do not prioritise vitality-attractiveness when rating face images independent of context but, rather, that context has an impact on whether this factor is prioritised at all.

7.4.2.2.2. Ideal Partner Face Model Correlations

To determine which ideal partner face factor accounted for most of the variance in face ratings as a function of occupation, firstly, the regression factor scores representing each ideal partner face factor for the 1000 photographs were computed (derived from Chapter 2) and, secondly, the individual participant face ratings were correlated with each of the ideal partner regression factor scores. Findings revealed that vitality-attractiveness was prioritised only for the occupation dancer and it was moderately negatively related to the occupation lollipop man/lady and somewhat negatively related to the occupation president of a company (see Figure 7.3, Figure 7.4, and Figure 7.5; see Figure 9.50, Figure 9.51, and Figure 9.52, Appendix F for analysis separated by participant sex).

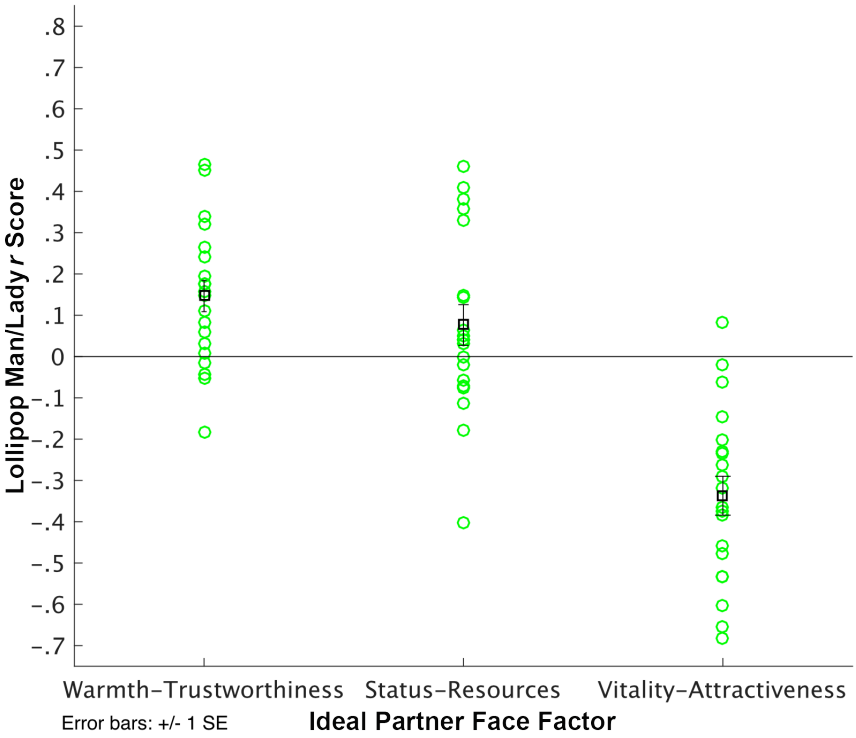


Figure 7.3. Individual participant face ratings for the occupation lollipop man/lady correlated with the ideal partner factor face scores. Larger participant correlations for a factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

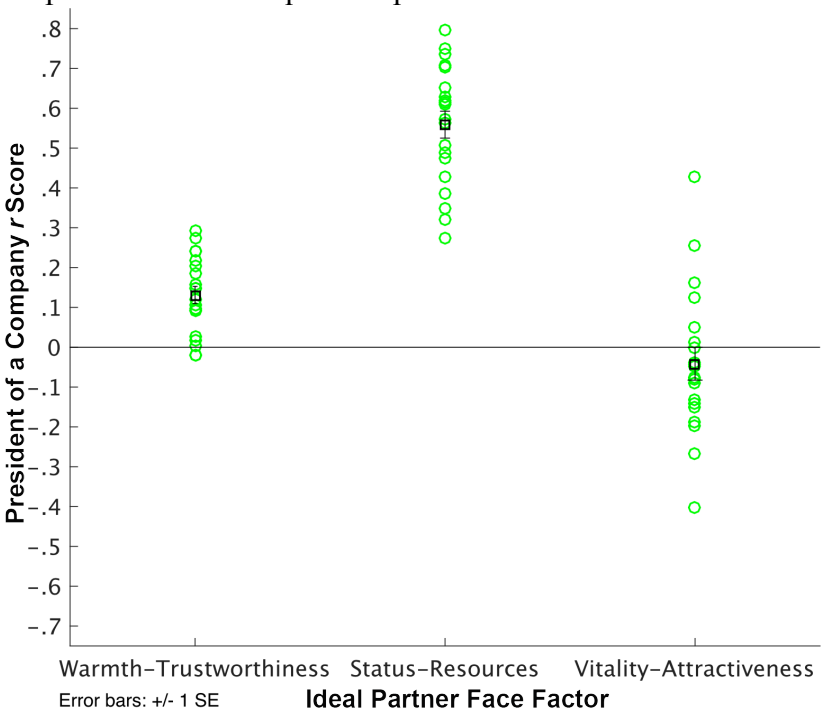


Figure 7.4. Individual participant face ratings for the occupation president of a company correlated with the ideal partner factor face scores. Larger participant correlations for a

factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

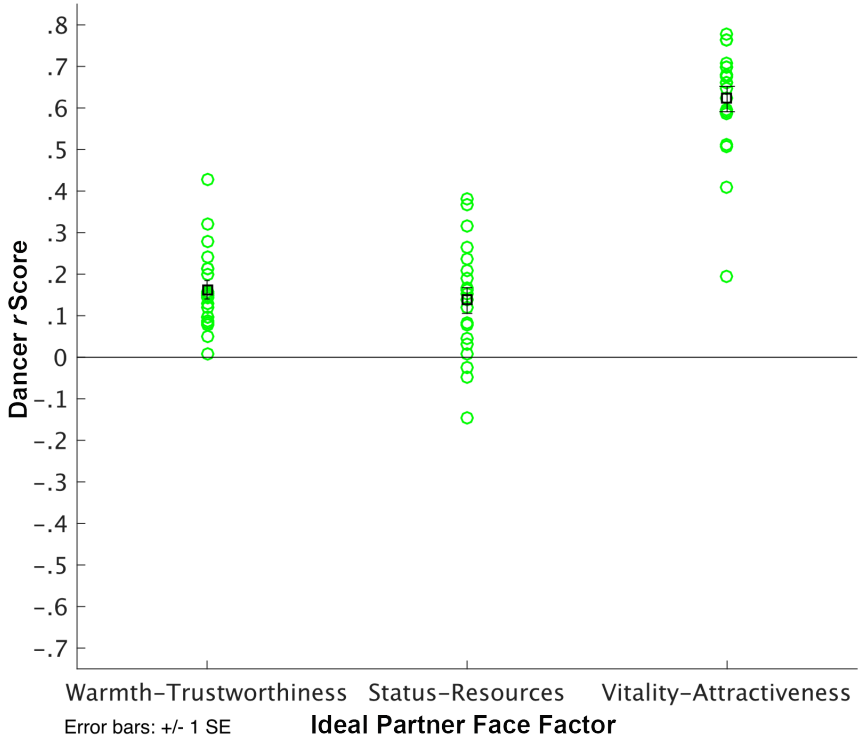


Figure 7.5. Individual participant face ratings for the occupation dancer correlated with the ideal partner factor face scores. Larger participant correlations for a factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values, likewise, revealed that the face ratings for the occupation dancer prioritised vitality-attractiveness, which accounted for up to 61% of the variance in face ratings (see Table 7.1). Face ratings for the occupation lollipop man/lady were negatively related to vitality-attractiveness, accounting for up to 46% of the variance in ratings. Further, face ratings for the occupation president of a company were dominated by status-resources, which accounted for up to 63% of the variance in ratings.

Table 7.1. Maximum %, mean %, and SD of R^2 values for the occupations lollipop man/lady, president of a company, and dancer as a function of the ideal partner face factors

Occupation	Ideal Partner Face Factor	Maximum %	Mean %	*SD*
Lollipop man/lady	Warmth-Trustworthiness	22	5	0.06
	Status-Resources	21	5	0.07
	Vitality-Attractiveness	46	16	0.14
President of a company	Warmth-Trustworthiness	9	3	0.03
	Status-Resources	63	33	0.16
	Vitality-Attractiveness	18	3	0.05
Dancer	Warmth-Trustworthiness	18	4	0.04
	Status-Resources	14	4	0.04
	Vitality-Attractiveness	61	40	0.14

7.4.2.2.3. Ideal Partner Trait Correlations

To explore which traits accounted for most of the variance in face ratings as a function of occupation, the individual participant face ratings for each face were correlated with independent evaluations of the face stimuli on 12 traits derived from Fletcher et al.'s (1999) verbal scale, taken from the study reported in Chapter 2. Specifically, four traits were selected to represent each of the three Fletcher et al.'s factors, which were the traits that loaded highest on their respective factors:

1. Warmth-trustworthiness traits: Trustworthiness, warmth, understanding, and supportive;
2. Status-resources traits: Status, resources, good job, and financially secure;
3. Vitality-attractiveness traits: Vitality, attractiveness, adventurous, and sexy.

The occupation lollipop man/lady revealed moderate negative correlations with the vitality-attractiveness traits and, overall, small positive correlations with the warmth-trustworthiness traits and the status-resources traits (see Figure 7.6; see Figure 9.53, Appendix F, for analyses separated by participant sex).The occupation president of a company revealed moderate positive correlations with the status-resources traits and small correlations with the warmth-trustworthiness traits and the vitality-attractiveness traits (see Figure 7.7; see Figure 9.54, Appendix F, for analyses separated by participant sex). The

occupation dancer revealed moderate positive correlations with the vitality-attractiveness traits and small positive correlations with the warmth-trustworthiness traits and the status-resources traits (see Figure 7.8; see Figure 9.55, Appendix F, for analyses separated by participant sex).

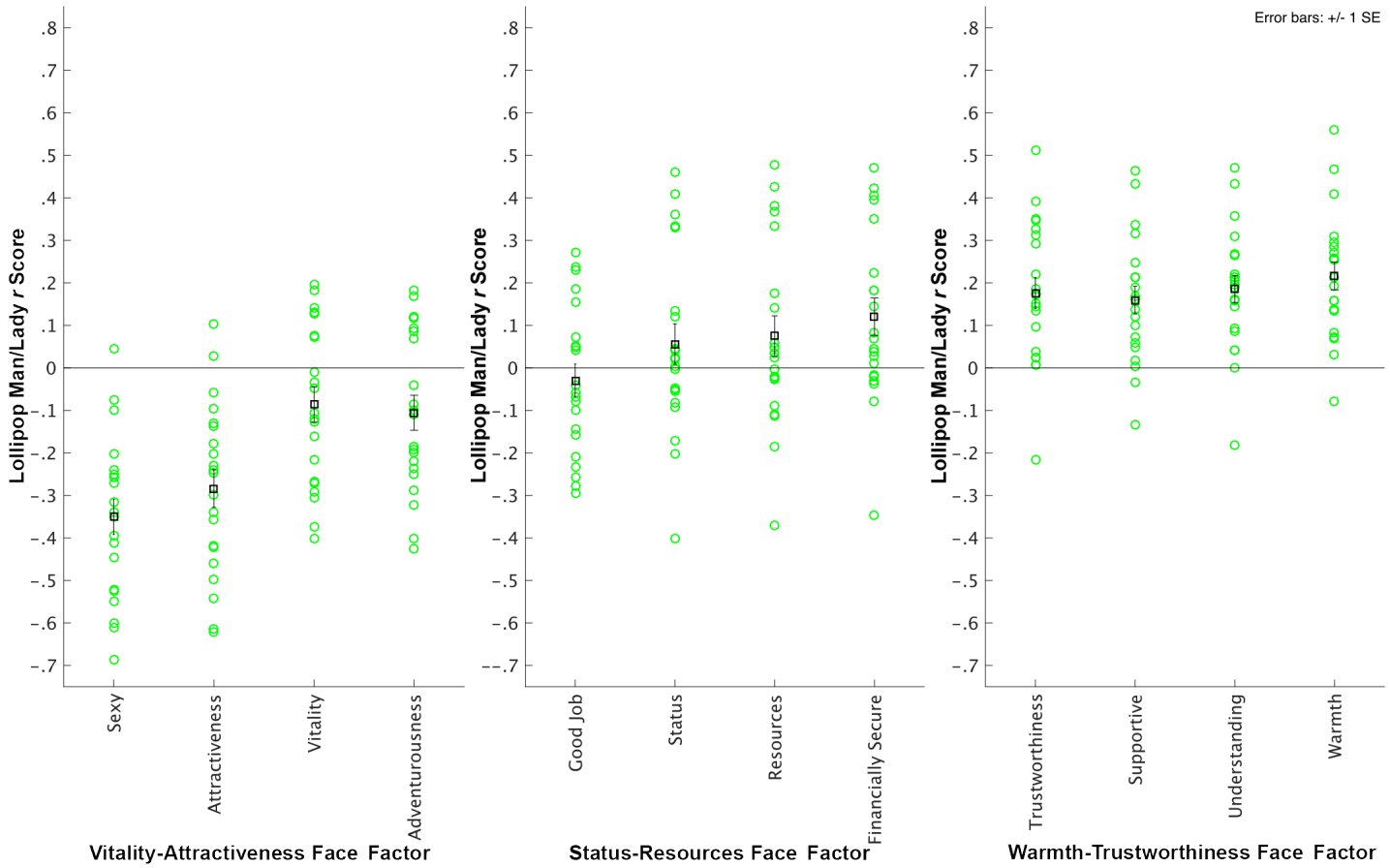


Figure 7.6. Individual participant face ratings for the occupation lollipop man/lady correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

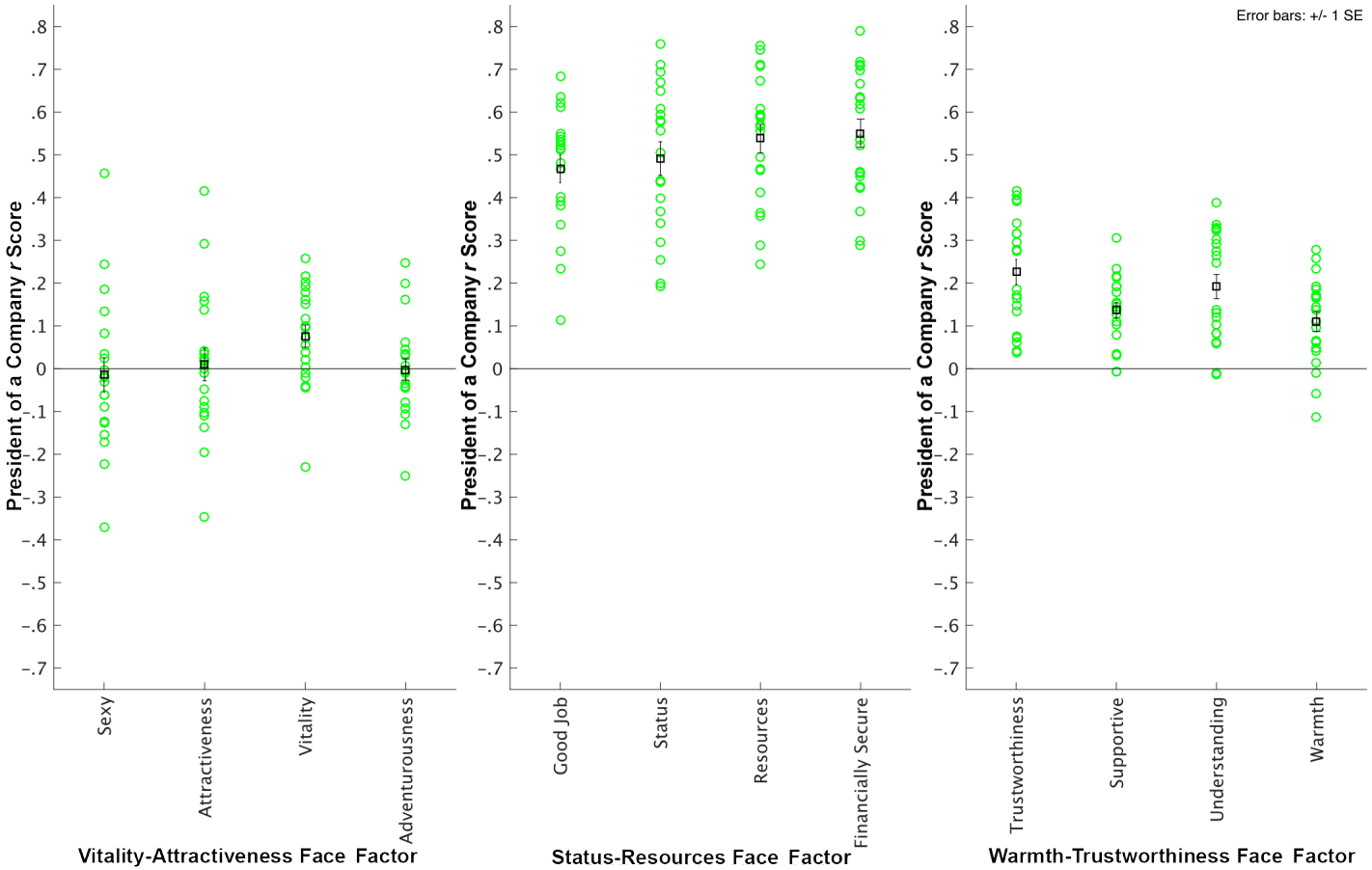


Figure 7.7. Individual participant face ratings for the occupation president of a company correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

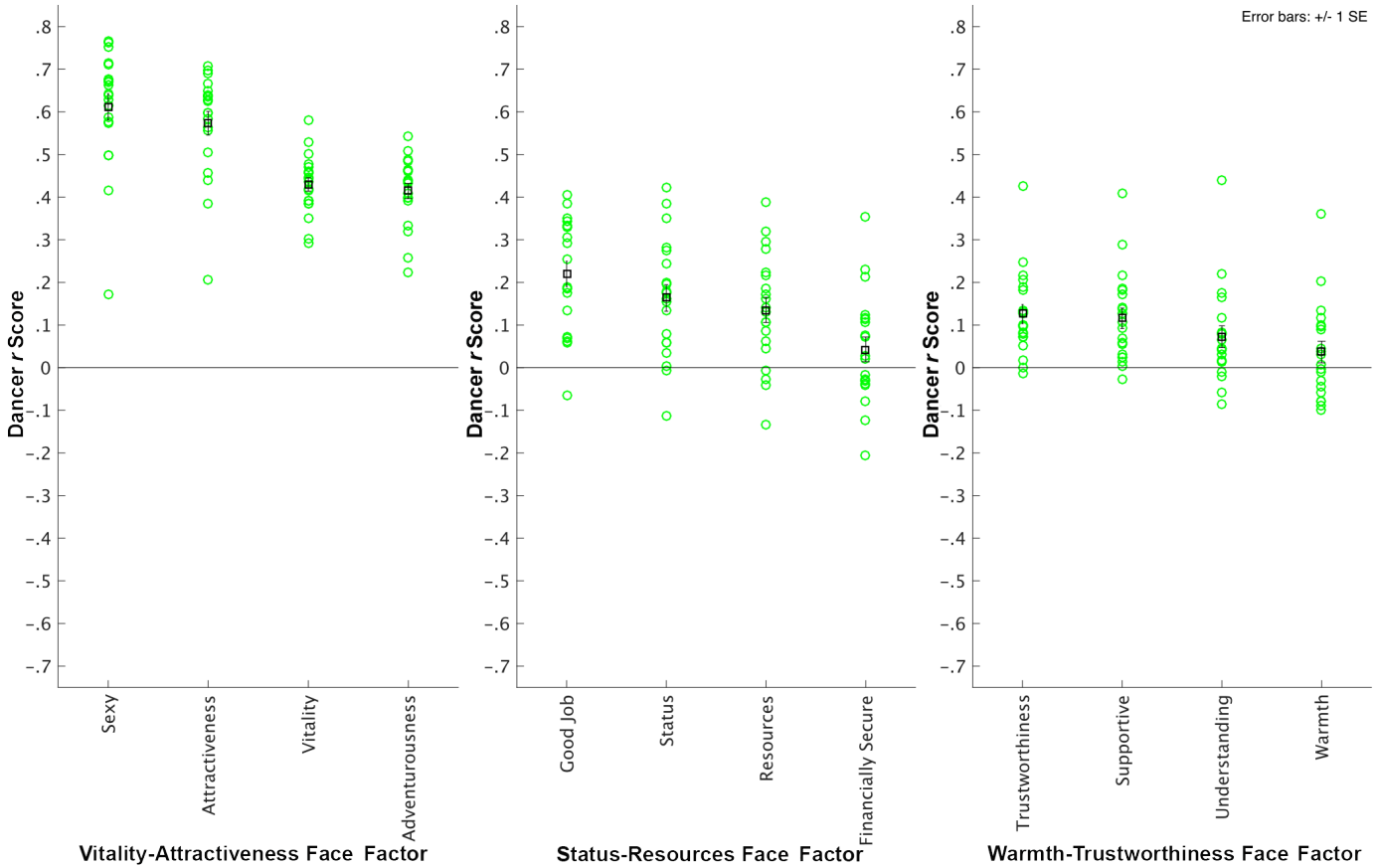


Figure 7.8. Individual participant face ratings for the occupation dancer correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual participants. The black squares represent the mean r values.

The R^2 values, likewise, revealed that the face ratings for the occupation dancer prioritised the vitality-attractiveness traits, with the trait sexy accounting for up to 59% of the variance in ratings (see Table 7.2). Face ratings for the occupation lollipop man/lady were negatively related to the vitality-attractiveness traits, with the trait sexy accounting for up to 47% of the variance in ratings. In addition, face ratings for the occupation lollipop man/lady were related to the warmth-trustworthiness traits to a larger extent than the occupations president of a company and dancer. Further, face ratings for the occupation president of a company were dominated by the status-resources traits, with the trait financially secure accounting for up to 62% of the variance in face ratings.

Table 7.2. Maximum %, mean %, and SD of R^2 values for the occupations lollipop man/lady, president of a company, and dancer as a function of the traits representing the ideal partner face factors

Occupation	Ideal Partner Face Factor	Trait	Maximum %	Mean %	*SD*
Lollipop Man/Lady	Warmth-Trustworthiness	Warmth	31	7	0.08
		Trustworthiness	26	6	0.07
		Understanding	22	6	0.06
		Supportive	22	5	0.06
	Status-Resources	Status	21	5	0.07
		Resources	23	5	0.07
		Good Job	9	3	0.03
		Financially Secure	22	6	0.07
	Vitality-Attractiveness	Vitality	16	4	0.05
		Attractiveness	39	12	0.12
		Sexy	47	16	0.14
		Adventurousness	18	5	0.05
President of a company	Warmth-Trustworthiness	Warmth	8	2	0.02
		Trustworthiness	17	7	0.06
		Understanding	15	5	0.05
		Supportive	9	2	0.02
	Status-Resources	Status	58	27	0.17
		Resources	57	31	0.15
		Good Job	47	24	0.12
		Financially Secure	62	32	0.16
	Vitality-Attractiveness	Vitality	7	2	0.02
		Attractiveness	17	3	0.05
		Sexy	21	3	0.05
		Adventurousness	6	1	0.02
Dancer	Warmth-Trustworthiness	Warmth	13	1	0.03
		Trustworthiness	18	3	0.04
		Understanding	19	2	0.04
		Supportive	17	2	0.04
	Status-Resources	Status	18	4	0.05
		Resources	15	3	0.04
		Good Job	16	7	0.05
		Financially Secure	13	2	0.03
	Vitality-Attractiveness	Vitality	34	19	0.06
		Attractiveness	50	34	0.12
		Sexy	59	39	0.14
		Adventurousness	30	18	0.06

Hence, in accordance with the hypotheses, facial stereotypes pertaining to specific occupations are related to certain traits and these stereotypes are not dominated by attractiveness-related concerns. Lollipop man/lady was related to the warmth-trustworthiness traits to a greater extent than the occupations president of a company or dancer. President of a company was strongly related to the status-resources traits to a greater extent than the occupations lollipop man/lady or dancer. Dancer was strongly related to the vitality-attractiveness traits to a greater extent than the occupations lollipop man/lady or president of a company.

Visual representations of participant ratings of ambient face images on the occupations lollipop man/lady, president of a company, and dancer are presented in Appendix F, which consist of 18 averaged face images (each made from 50 ambient images) representing high and low levels of each occupation, separated by face image sex. These face averages reveal distinct images for each occupation and gender, reflecting the stereotypical traits associated with these occupations. For instance, the male and female averaged images for the occupation lollipop man/lady represent older individuals, relative to the occupation dancer, which is consistent with the stereotype that mature individuals volunteer for the occupation lollipop man/lady. Indeed, the mean age of lollipop workers in Acomb primary school (York, UK) is over 60 years.

7.4.3. Discussion

This research examined whether facial stereotypes of occupations were dominated by attractiveness-related concerns. Individuals evaluated opposite-sex face images in terms of specific occupations. Vitality-attractiveness and its associated traits were only prioritised for the occupation dancer and, further, they were negatively related to the occupations lollipop man/lady and president of a company. In addition, president of a company was related to status-resources and its associated traits. Hence, facial stereotypes reflect the stereotypical traits that are related to a particular occupation, rather than being dominated by attractiveness-related concerns. The findings are consistent with both the hypothesis and with previous research (e.g., Davies & Oldman, 1999; Dotsch et al., 2008; Oldmeadow et al., 2013).

Facial stereotypes have been revealed for diverse social groups (e.g., ethnic groups; Blair et al., 2002; Dotsch et al., 2008; Livingston & Brewer, 2002) and these facial stereotypes are associated via semantic associations to stereotypical traits. For example, Cuddy et al. (2005) revealed that the traits kindness and forgetfulness are associated with the older generation. The current findings build on previous literature, emphasising that evaluations of face images are not dominated by vitality-attractiveness but, rather, reflect the stereotypical traits associated with a specific occupation.

Romantic evaluations of face images reveal that individuals prioritise attractiveness-related traits and the vitality-attractiveness ideal partner face factor (Chapters 3, 4, and 5). Nevertheless, it was unclear whether this emphasis on attractiveness was due to an attractiveness halo effect, given that attractiveness is linked to many positive social consequences (e.g., better romantic prospects; Berscheid et al., 1971; Dion, Berscheid, & Walster, 1972; Riggio & Woll, 1984; Walster et al., 1966). Other research by Fletcher et al. (2014) used a 10 minute date paradigm to reveal that vitality-attractiveness evaluations were both most accurate and salient in determining romantic interest for a future date, relative to preferences for warmth-trustworthiness and status-resources. Hence, another possibility was that evaluations of attractiveness-related traits may take precedence in romantic evaluations and perhaps non-romantic evaluations, particularly as Chapter 6 revealed that attractiveness was more easily judged from face images relative to trustworthiness in a non-romantic context.

The current research suggests that the emphasis on attractiveness-related traits and the vitality-attractiveness ideal partner face factor revealed in Chapters 3, 4, and 5 is neither due to an attractiveness halo effect nor is it due to attractiveness-related traits being more salient, relative to other traits, in any face evaluation context. Rather, the findings suggest that whilst attractiveness-related traits and the vitality-attractiveness ideal partner face factor may dominate romantic evaluations of face images, they do not dominate all non-romantic evaluations, such as evaluations of face images in terms of occupations.

7.5. Conclusion

When rating highly variable face images on their partner preferences, individuals prioritise attractiveness-related traits and the vitality-attractiveness ideal partner face factor (Chapters 3, 4, and 5). This research examined whether facial stereotypes of occupations were, also, dominated by attractiveness-related concerns. Individuals evaluated opposite-sex face images in terms of three occupations: Lollipop man/lady, president of a company, and dancer that were selected to represent the three ideal partner factors. Findings revealed that vitality-attractiveness and its associated traits were only prioritised for the occupation dancer and they were not related to the occupations lollipop man/lady and president of a company. In addition, president of a company was correlated with status-resources and its associated traits. Hence, these findings suggest that facial stereotypes reflect the stereotypical traits associated with particular social groups, rather than reflecting only vitality-attractiveness. These findings underscore the absence of an attractiveness halo effect in evaluations of face images.

Chapter 8. Discussion

Within the last chapter of this thesis, a summary of the empirical findings is presented and the main themes arising from these are discussed. Subsequently, potential limitations and future directions are outlined.

8.1. Summary of Findings

Chapter 2 explored the potential of using face stimuli as measures of Fletcher et al.'s (1999) ideal partner verbal factors. Findings revealed that individuals can perceive 12 traits representative of the warmth-trustworthiness, vitality-attractiveness, and status-resources factors. A factor analysis suggested a tripartite structure underlying ideal partner trait judgements of face images, which overlaps largely with Fletcher et al.'s ideal partner verbal factors. Chapter 3 confirmed this tripartite factor structure for ideal partner trait judgements of face images when using traits that were neither Fletcher et al.'s factor heading labels (e.g., vitality) nor were they overlapping with the traits selected by Sutherland et al. (2013) to represent their face perception model.

Chapter 3 examined the relationship between the ideal partner face model and the face perception model in both a neutral (Study 1) and a romantic context (Study 2). Study 1 examined the factor structure of the two models combined, using trait ratings in which participants rated face images based on their first impressions, with no romantic context specified. Findings revealed strong correlations between (1) the warmth-trustworthiness ideal partner face factor and the trustworthiness face perception factor, (2) the vitality-attractiveness ideal partner face factor and the youthful-attractiveness face perception factor, and (3) the status-resources ideal partner face factor and the dominance face perception factor. Study 2 involved heterosexual participants rating opposite-sex face images in terms of their partner preferences. All participants prioritised the youthful-attractiveness face perception factor and attractiveness-related traits accounted for up to 62% variance in partner preference face ratings. Findings revealed that, despite a large overlap between these two models, these are distinct when accounting for variance in

partner preference face ratings. Each model mirrored the contexts in which it was derived: person perception versus impressions of potential partners.

Chapter 4 used ambient face images (Study 1) and face averaging techniques (Study 2) to explore the correspondence between two measures of partner preferences: Face images and a verbal measure. Specifically, heterosexual participants rated opposite-sex face images in terms of their partner preferences and completed a verbal measure of partner preferences. Findings revealed that attractiveness-related traits dominated partner preferences for face stimuli. In contrast, a verbal measure of partner preferences revealed that participants prioritised warmth-trustworthiness. Hence, it is possible that measures using face stimuli and a verbal measure may capture different components of partner preferences. These findings were reiterated in another study reported in Chapter 5, which examined whether attractiveness-related concerns dominated partner preferences when specific relationship types were made salient (e.g., a loyal relationship). Chapter 5 revealed that, independent of relationship type, partner preferences for face images prioritised attractiveness-related traits. From an evolutionary perspective, it can be speculated that attractiveness-related traits may be particularly salient in a potential partner, given that these signal fertility and resilience to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999). Further, individuals may prioritise attractiveness-related traits in a potential partner given that attractiveness is linked to numerous social consequences (e.g., improved career and financial opportunities; Chiu & Babcock, 2002; Holmes & Hatch, 1938; Marlowe, Schneider, & Nelson, 1996).

Chapter 6 explored the relative salience of trustworthiness, status, and attractiveness in first impressions of face images, using the minimal exposure paradigm. Findings revealed that individuals could evaluate opposite-sex face images following exposure times as little as 33 ms. In addition, 100 ms exposure sufficed for individuals to evaluate face images and a longer exposure time of 500 ms had no significant effect on the correspondence between evaluations made under minimal exposure conditions and time-unconstrained judgements. Findings further revealed that attractiveness was particularly salient in face images even when no romantic context was specified.

Chapter 7 examined whether attractiveness-related concerns dominated judgements of occupations based on heterosexual individuals rating opposite-sex face images. This was important as face evaluations dominated by attractiveness would suggest an attractiveness halo effect. Findings revealed that vitality-attractiveness, including related traits, did not dominate judgements of the occupations lollipop man/lady or president of a company and evaluations of these occupations reflected the stereotypical traits linked to these specific occupations. For instance, attractiveness-related traits were negatively related to the occupation lollipop man/lady, which is consistent with the stereotype that older people volunteer for this job. Therefore, an attractiveness halo effect was not apparent in first impressions of opposite-sex face images. The themes examined are discussed in the subsequent section.

8.2. Themes

8.2.1. Can the Ideal Partner Verbal Factors be Represented by Ambient Face Images?

A theme emerging from this research is that more partner preferences studies and face perception studies would benefit from using highly variable and naturalistic photographs, such as ambient images. Indeed, researchers suggest that naturalistic, variable, face images can capture the facial cues implicit in trait evaluations that might be absent in standardised images, particularly when examining within-person variability (Burton et al., 2011; Jenkins et al., 2011). For example, Sutherland et al. (2013) identified a third factor underlying facial impressions when using ambient images, which was not present in the original bidimensional model of face perception derived from standardised images (Oosterhof & Todorov, 2008). As such, the research presented in this thesis used a sample of 1000 ambient face images (Santos & Young, 2005, 2008, 2011) unconstrained on all variables, excepting that the images depicted Caucasian adults. The database included only one image of each individual as this research examined first impressions.

Image variability is particularly relevant in trait impressions, like trustworthiness or attractiveness evaluations, in which within-person variability can be equal to between-person variability (Jenkins et al., 2011; Todorov & Porter, 2014). These findings suggest

that trait evaluations are related to a specific image rather than to the individual portrayed in the image. Future research could use multiple ambient images of each individual – as per Jenkins et al. (2011) – to investigate whether the warmth-trustworthiness ideal partner face factor reveals greater within-person variability relative to the status-resources and vitality-attractiveness face factors. This would be expected if warmth-trustworthiness evaluations were primarily reliant on emotional expression, which is changeable across images, whereas status-resources and vitality-attractiveness evaluations may reveal less within-person variability as these evaluations could, in part, be attributed to facial structure.

The ambient image approach provides improved ecological validity by shifting the emphasis of face perception research towards image variability, rather than focusing exclusively on image identity. Factors other than facial variability may impact on trait impressions from faces, for example, the environment depicted in the image or accessories (e.g., earrings). These other sources of image variability cannot be explored when using standardised images, yet, they are present in any real life image. Nonetheless, standardised images remain useful in improving sensitivity to detect small effects and in manipulating images to determine causal effects. As such, the complementary use of both ambient and standardised images (as used in Chapter 4), including other methods (e.g., videos) is relevant in obtaining a comprehensive understanding of person perception.

8.2.2. The Relation between the Ideal Partner and Face Perception Models

Chapter 3 examined the possibility that the underlying structure of non-romantic first impressions of individuals does not differ from that used in forming first impressions of potential partners. Specifically, given the ostensible similarity between Fletcher et al.'s (1999) ideal partner verbal factors and the face perception factors (Oosterhof & Todorov, 2008; Sutherland et al., 2013), exploring the relationship between these two models was a pertinent theme. Using both a neutral and a romantic context, findings revealed that the two models were correlated, yet, each accounted for some unique variance in partner preference face ratings. As such, the ideal partner model is relevant to romantic face perception contexts, in addition to romantic contexts, in which no face stimuli are present (Campbell et al., 2001; Fletcher et al., 2014, 2000a, 2000b, 1999). In contrast, the face

evaluation model is applicable to person perception more generally (Caulfield et al., 2014; Todorov, Baron, et al., 2008; Todorov et al., 2005; Todorov, 2008; Watkins, Jones, et al., 2010), without being limited to a romantic context.

Oosterhof and Todorov (2008) posit that trustworthiness/valence and dominance attributions are relevant in determining threat, specifically, the intent and capacity of another individual to inflict harm. For example, Elizabeth might not approach Paul if he appears to be both untrustworthy and dominant. First impressions of potential partners may function somewhat similarly in that individuals may decide whether to approach a potential partner based on the trait impressions derived from a single glance of a face image. With the rising popularity of social media, in which individuals present themselves to an online community via a profile consisting typically of few photographs and sparse verbal information, impressions of potential partners based on photographs may be highly consequential given the limited additional information available.

8.2.3. Partner Preferences for Face Images

First impressions of faces of potential partners have received far less attention, relative to verbal measures (e.g., Brand, Melzer, & Hagemann, 2011; Govan & Williams, 2004; Stieger, Göritz, & Burger, 2010; Thush et al., 2008). Examining preferences using face images provides a more naturalistic approach, relative to verbal measures, given that individuals often view potential partners in daily life, rather than being exposed to verbal information pertaining to a potential partner. Indeed, this is perhaps more relevant in online dating contexts, whereby profile images might be more salient than the verbal information within the profiles, although future research is required to confirm this possibility. Chapter 4 examined first impressions of potential partners using ambient face stimuli (Study 1) and face averaging techniques (Study 2). Findings revealed that almost all participants prioritised vitality-attractiveness and related traits. Chapter 5 replicated this strong emphasis on vitality-attractiveness and related traits, even when specific relationships emphasising each ideal partner face factor (e.g., a lavish relationship to represent status-resources) were made salient.

8.2.4. Correspondence between Measures of Partner Preferences: Face Images and a Verbal Measure

Chapters 4 and 5 examined the divergence in partner preferences measured via face images and a verbal measure. Findings revealed that individuals prioritised vitality-attractiveness when evaluating face images on their partner preferences, whereas a verbal measure revealed that individuals prioritised warmth-trustworthiness. It is possible that face images capture different elements of partner preferences relative to verbal measures. Given that people can make trait impressions from face images spontaneously (Todorov & Uleman, 2002, 2003), quickly, and largely unconsciously (Kahneman, 2003), face images may capture spontaneous evaluations of potential partners. In contrast, verbal measures may capture proposition beliefs regarding ideal partner traits based on the interpersonal consequences that people imagine these traits produce (Eastwick, Eagly, et al., 2011; Eastwick & Finkel, 2008a).

The correspondence between measures can be accounted for by various perspectives. For example, individuals may prioritise certain traits in an ideal partner based on the interpersonal consequences and associated emotional reactions these traits will elicit (Eastwick & Finkel, 2008a). Affective forecasting (Wilson & Gilbert, 2003) and empathy gaps (Loewenstein, 1996, 2005) perspectives posit that people often inaccurately estimate their future emotional reactions. As such, verbally reported preferences may differ from preferences based on spontaneous reactions. Nonetheless, the research presented only portrays the incongruence between verbal preferences and preferences for face images, without providing support for any specific perspective accounting for divergence between measures more generally.

8.2.5. Potential Partner Preferences for Faces are Dominated by Physical Attractiveness

Preferences for facial attractiveness of potential partners form a pertinent theme given that the research presented repeatedly revealed that both sexes prioritised the vitality-attractiveness face factor and related traits in their partner preference face ratings. For example, Chapter 4 revealed this emphasis on attractiveness in ambient face images and

youthful-looking averaged face images and Chapter 5 revealed that individuals still prioritised vitality-attractiveness and related traits even when specific relationships representing warmth-trustworthiness and status-resources were made salient. As such, partner preferences for facial attractiveness appear robust. Further, evaluations of face images on occupations did not reveal that ratings were dominated by attractiveness (see Chapter 7). Hence, the emphasis that individuals place on facial attractiveness cannot be attributed to an attractiveness halo effect as, otherwise, face ratings in terms of occupations would also reflect attractiveness-related traits.

There are multiple reasons accounting for why first impressions of face images might be dominated by attractiveness-related concerns. It is possible that individuals only consider a potential partner who attains a minimum level of attractiveness, before considering warmth-trustworthiness or status-resources traits. Indeed, Todd, Penke, Fasolo, and Lenton (2007) used a speed-dating paradigm to examine men's partner preferences and suggested that these "are best described as an avoidance of unattractiveness".

From an evolutionary perspective, Symons (1979) compares attractiveness to that of a "health certificate", providing cues to fertility and resistance to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999; see Rhodes, 2006, for a review). For instance, facial femininity in women is associated with attractiveness, covaries with age, and is linked to greater concentrations of oestrogen metabolites present within urine (Law Smith et al., 2006). Oestrogen is associated with reproductive health (Dickey, Olar, Taylor, Curole, & Matulich, 1993; Eissa et al., 1986; Roumen, Doesburg, & Rolland, 1982), indicating that facial preferences have functional biological outcomes.

Berscheid and Walster (1974) suggested four possible reasons accounting for why individuals might prioritise attractiveness in a romantic partner: (1) the "social learning" hypothesis, given that cultural norms prioritise physical attractiveness in a romantic partner; (2) the reputational gains and prestige derived from having an attractive partner; (3) people like others who reciprocate their attraction and, as an attractiveness halo effect may lead people to perceive that attractive individuals share similar attitudes with themselves, people may, also, perceive that attractive individuals like them; (4) individuals might prioritise attractiveness in a potential partner given that – as per the "what is

beautiful is good" stereotype (Dion et al., 1972) – attractive individuals are seen to possess other positive traits (see Eagly, Ashmore, Makhijani, & Longo, 1991; Feingold, 1992b; Langlois et al., 2000, for meta-analytical reviews of attractiveness stereotypes). For instance, individuals feel that attractive people have better job prospects (Chiu & Babcock, 2002; Marlowe et al., 1996) and are better romantic partners with better marriages (Dion et al., 1972), relative to less attractive people. Attractiveness has social consequences, with more attractive individuals having better employment prospects (Hosoda et al., 2003), better trial outcomes (MacCoun, 1990), more same-sex contacts and friendships (Cash & Derlega, 1978; Feingold, 1988), and increased popularity for children (Dion, 1972), relative to their less attractive peers. As such, attractive people may obtain different socialisation throughout their lives, compared to less attractive people (Dion, 1972; Penton-Voak, 2011). One limitation is that these arguments are circular, suggesting that "we like attractive people because they are attractive, or because other people find them attractive" (Penton-Voak, 2011, p. 176).

Of note, the research presented here only reveals that partner preferences are dominated by facial attractiveness. Hence, it is not possible to identify decisively the underlying mechanism accounting for this effect, although it is likely due to an interaction of social and evolutionary factors.

8.2.6. Evaluating Faces on Ideal Partner Traits after Minimal Time Exposure

Certain traits might be more easily evaluated in face images. Chapter 6 explored the relative salience of three ideal partner traits using a minimal exposure paradigm: Trustworthiness, status, and attractiveness. Of note, this research focused on first impressions of face images and there was no romantic context specified to participants (i.e., participants did not rate the face images in terms of partner preferences). Findings revealed that attractiveness was more easily perceived in face images, relative to trustworthiness.

As outlined in the previous section, there are numerous potential reasons accounting for why facial attractiveness may be particularly salient. For example, attractive individuals are perceived to have other positive traits (see Eagly et al., 1991; Feingold, 1992b;

Langlois et al., 2000, for meta-analytical reviews of attractiveness stereotypes). Therefore, facial attractiveness may be highly salient as individuals might feel they derive benefits from simply associating with an attractive person, beyond a romantic context. Of note, however, even though facial attractiveness may be particularly salient in a romantic and some non-romantic contexts (as demonstrated in Chapter 6), attractiveness does not dominate all evaluations of faces, regardless of context. Specifically, Chapter 7 revealed that evaluations of face images on occupations did not necessarily prioritise attractiveness, rather, only traits stereotypically related to the chosen occupations were prioritised in the face ratings.

8.3. Interim Summary

To summarise, ambient face images were used to represent ideal partner factors given that these highly variable and naturalistic images retain the facial cues (including non-facial cues, such as accessories) involved in trait impressions. Further, the relationship between the ideal partner face model and the face perception models was examined, revealing that these are correlated but, also, distinct models. It is possible that individuals decide whether to approach potential partners based on first impressions of face images, with implications for online dating, in which users may avoid potential dates unless these present an attractive profile image. This research, additionally, revealed that attractiveness-related traits dominate partner preferences for face images, which can be accounted for by evolutionary and cultural factors. A minimal exposure paradigm was used to reveal that attractiveness is particularly salient, relative to trustworthiness, in non-romantic evaluations of face images. Of note, attractiveness does not dominate face ratings independent of context, for example, attractiveness was not prioritised in face ratings in terms of occupation (Chapter 7). Finally, findings revealed low correspondence between partner preferences measure via face images and a verbal measure, suggesting that these capture different elements of partner preferences.

8.4. Potential Caveats

In this section, four potential limitations are outlined: (1) First impressions of face images may be superficial; (2) the effects revealed in this research may have arisen from the

specific stimuli used rather than representing any effects that generalise to the wider population; (3) the research presented largely is correlational; and (4) social role and/or evolutionary perspectives can equally account for the research findings.

8.4.1. Superficial First Impressions of Faces

In forming impressions of a person... One "knows" more about a person than what seems to be immediately connoted by the acts one has witnessed or the information one has gained about him (Bruner, Shapiro, & Tagiuri, 1958).

A common limitation within the face perception field centres on the findings seeming trivial and obvious. For instance, it is unsurprising that sexiness is linked to attractiveness-related traits and understanding is associated with trustworthiness-related traits. Secord (1958) stated that the fundamental objective of research is to capture and quantify relationships and only some of these may involve novel insights. Hence, identifying relationships between sexiness and other attractiveness-related traits in first impressions of partner preferences is a relevant research objective. In addition, such research often reveals unexpected findings that broaden scientific understanding of these often "common sense" relationships (Secord, 1958). Indeed, it was unexpected that, whilst individuals can perceive traits related to warmth-trustworthiness, status-resources, and vitality-attractiveness in faces, first impressions of partners are dominated by attractiveness-related concerns. This is particularly so, given that verbal measures consistently reveal that individuals prioritise warmth-trustworthiness and related traits (Buss, 1989; Fletcher et al., 2004; Li et al., 2002).

Furthermore, averaged face images revealing the cues representing the ideal partner face factors underscore the point that cues are not always obvious indicators of a specific factor. For instance, smiling was a cue for warmth-trustworthiness (see Chapters 2 and 4) although this is, arguably, perhaps a more reliable cue to happiness instead of being a stable personality trait inference. Indeed, Oosterhof and Todorov (2008) revealed that individuals evaluate a neutral face as being trustworthy when this face image contains just a hint of a smile, due to emotional overgeneralisation. Trait inferences from subtle facial cues can impact on how people respond to a particular individual (Knutson, 1996). For

example, Jane may infer that Peter would be a supportive and trustworthy partner based on her first impressions of Peter's smiling face and, therefore, Jane might consider initiating contact with Peter. In addition, trait inferences from facial cues may have larger consequences relative to inferences of temporary emotional states from these same facial cues. For example, Peter may be particularly appealing to Jane if she perceives him as a supportive and trustworthy individual rather than momentarily happy.

Facial cues are interrelated and holistically result in trait judgements (Santos & Young, 2011), with minor modifications to facial cues resulting in substantial changes in trait judgements (Vernon et al., 2014). As such, even though smiling is given as an example, other facial cues and non-facial cues impact on a myriad of trait judgements (e.g., glasses impact on status perceptions; Chapters 2 and 4) – these findings are neither superficial nor trivial. Trait inferences are relevant, regardless of their accuracy. Research is mixed concerning the accuracy of facial trait inferences (see Rule, Krendl, Ivcevic, & Ambady, 2013; Todorov, Olivola, Dotsch, & Mende-Siedlecki, 2015). Nevertheless, given that trait evaluations from first impressions of faces reveal good inter-rater reliability and significant consequences beyond the laboratory (see Chapter 1 and Olivola, Funk, & Todorov, 2014), facial first impressions provide a compelling research area with far-reaching implications.

8.4.2. The Ambient Face Images Approach

The research presented largely examines first impressions of ambient images derived from the Internet. However, these face images, firstly, contain limited cues relative to video or even real life contexts. Secondly, to the extent that individuals select specific images to convey a certain impression, photographs taken from the Internet are a biased sample (see Hancock & Toma, 2009). For example, research on the accuracy of judgments of sexual orientation has mainly used images from online dating websites (e.g., Rule et al., 2009), therefore, an improved identification of sexual orientation may reflect that users are selecting specific images that convey their orientation. Future research can explore the facial cues prioritised in the photographs that individuals post online and how these cues vary as a function of the impression individuals wish to portray of themselves (e.g., Adam may Tweet: "I have been given a raise in salary" alongside a photograph of himself, wearing glasses and a suit). Research using images derived from alternative sources rather

than the Internet (e.g., stills from video clips) may provide a more naturalistic approach. It is unknown whether the ideal partner face factors involved in facial first impressions of potential partners, as investigated within the research presented, are equally relevant to dynamic faces revealed in video clips ("snapshots" of behaviour; Ambady, Bernieri, & Richeson, 2000; Ambady & Rosenthal, 1992) or real life encounters (e.g., speed-dating; see Eastwick & Finkel, 2008b).

First impressions of face images might be a proxy for real life first impression evaluations. Some research reveals moderate to high correspondence between evaluations of images and videos on attractiveness of the same faces (Kościński, 2013; Lander, 2008; Penton-Voak & Chang, 2008; Rhodes et al., 2011; Roberts et al., 2009; Rubenstein, 2005). Nevertheless, research revealed that, when comparing computer generated dynamic face images to static face images, evaluations of trustworthiness, dominance and attractiveness were based on more intricate emotional cues (Gill, Garrod, Jack, & Schyns, 2014). For instance, trustworthiness evaluations were derived from surprise and happiness cues combined (Gill et al., 2014). The large within-person variability across difference face images of the same individual on evaluations of attractiveness and evaluations of other traits (Jenkins et al., 2011; Todorov & Porter, 2014) further underscores the need to investigate the correspondence of evaluations across different types of stimuli (e.g., static face images, stills from videos, real life encounters).

Nevertheless, regardless of whether first impressions of face images are a good proxy for real life evaluations, examining facial judgements of images is a valid approach for two reasons. Firstly, individuals increasing manage an online profile for pleasure (e.g., Facebook had over one billion monthly active users in 2015; Statista, 2016b), work (e.g., LinkedIn had 414 million members in 2015; Statista, 2016a), and romance (e.g., the online dating site Meetic obtains one million new paid members every week; Meetic Group, 2016) and this often involves posting photographs of themselves. Secondly, social evaluations from face images predict significant real life events, for instance, political elections, online financial lending or court outcomes (Olivola, Funk, et al., 2014).

A final limitation concerns the specific face images used in the research presented. Still, it is unlikely that the findings presented are due to an artefact arising from the stimuli as the

studies reported largely used 500 to 1000 face images. Even so, future research could replicate the findings using alternative samples of face images (static or dynamic). Of note, findings from independent research groups using different samples of face images, have revealed a similar structure underpinning social evaluations that overlaps largely with the ideal partner face factors revealed in the current research using face images. For instance, face perception research has revealed the trustworthiness and dominance factors using computer generated face images (Oosterhof & Todorov, 2008) and research on social attribute evaluations revealed trustworthiness-friendliness, attractiveness-health-extraversion and dominance-masculinity clusters (Wolffhechel et al., 2014). In addition, Fiske et al. (2007) mention that warmth and competence are universal dimensions underlying in social evaluations. Further research can explore whether the tripartite ideal partner face structure for first impressions of potential partners is robust across samples of face images from different groups (e.g., ethnic groups).

8.4.3. Correlation is not Causation

The research presented largely involves correlational relationships. Both strengths and limitations are inherent in correlational research resulting from the ambient image approach. For instance, interacting facial cues that naturally covary can be explored, yet, causal relationships cannot be examined. Controlled, standardised, images are the dominant approach in face perception research, nevertheless, these too are limited as, when specific facial cues are isolated, evaluations of these images are impacted (Chapter 4). Hence, research using a combination of both ambient and standardised images is an advantageous approach, which has been used in the reported studies. For instance, Chapter 4, Study 2, used averaged face stimuli to examine their causal effect on partner preferences.

Of note, given that many facial cues and traits are multicollinear (see Appendix A and Appendix B; see also Vernon et al., 2014), establishing unequivocal causal relationships using manipulated face images would be challenging. With approximately 4,500 words in the English dictionary to describe “pure personality traits” and approximately 18,000 words to describe people (Allport & Odbert, 1936), a direct causal link between a specific facial cue or trait evaluation and an experimental effect is unsurprisingly challenging (see

Todorov, Baron, et al., 2008). For example, research on facial evaluations predicting election outcomes has mixed findings regarding which is the fundamental trait impacting on election outcomes: Competence, attractiveness, or another (e.g. Olivola & Todorov, 2010; Riggio & Riggio, 2010; Verhulst, Lodge, & Lavine, 2010). As such, researchers initially modelled the face perception factors using orthogonal dimensions to shift the emphasis away from specific traits and towards dimensions (Oosterhof & Todorov, 2008; Todorov, Said, Engell, & Oosterhof, 2008). Further research could use principal components analysis to identify dimensions of facial cues and non-facial cues (e.g., accessories, environment) present in ambient images and examine their structure in relation to the ideal partner face model.

A final limitation is that the research presented here largely involved individuals rating opposite-sex face images (excepting Chapter 2 and Chapter 3 Study 1), which could be seen as a quasi-experiment group since random assignment in terms of rating opposite-sex versus same-sex face images was not used. The rationale is that this research examined heterosexual partner preferences only and, therefore, asking individuals to rate same-sex face images would have been superfluous. In 2014, various influential social media sites changed the gender and sexual orientation options available to members, for example, Facebook currently offers 71 gender options to UK users (Facebook Inc., 2015b) and the dating website OkCupid offers 22 gender and 12 sexual orientation options (North, 2014). Hence, a timely direction for future research involves examining partner preferences of individuals with other sexual orientations rather than focusing exclusively on heterosexual men and women (see the Future Directions).

8.4.4. Evolutionary and Social Role Perspectives

The research presented can be accounted for by an interaction of evolutionary and cultural factors. The findings in the reported studies repeatedly revealed that partner preferences for face images were dominated by attractiveness-related concerns and this was true for both sexes. From an evolutionary perspective, people may prioritise attractiveness-related traits since these may function as a "health certificate" (Symons, 1979), broadcasting fertility and resistance to environmental and genetic stressors (Jasienska et al., 2006; Lassek & Gaulin, 2008; Møller, 1999; see Rhodes, 2006, for a review). From a social role

perspective, people may prioritise attractiveness-related traits as these are associated with numerous social consequences (e.g., better career prospects and economic mobility; Chiu & Babcock, 2002; Elder Jr., 1969; Holmes & Hatch, 1938; Marlowe et al., 1996). Despite debate regarding which of these perspectives accounts for partner preferences (e.g., Buss & Schmitt, 1993; Buss, 1989; Eagly & Wood, 1999; Gangestad, Haselton, & Buss, 2006; Schmitt, 2014; Zentner & Mitura, 2012), this research underscores the relevance of both perspectives in interaction to fully comprehend the elements driving partner preferences, which is an approach that is consistent with many relationship researchers (e.g., Eastwick et al., 2014).

Evolutionary and social role perspectives typically emphasise sex differentiated partner preferences. The current research has revealed that sex differentiated preferences were minor relative to the key findings that both sexes prioritised attractiveness-related traits. Based on research indicating sex differentiated partner preferences (Feingold, 1992a; Fletcher et al., 2004; Furnham, 2009; Li et al., 2013, 2002; Schmitt, 2003; Shackelford et al., 2005), the analyses conducted in this research have been separated by participant sex and these are presented in the Appendices. Nevertheless, as the studies reported mostly involved heterosexual participants rating opposite-sex face images in terms of their partner preferences, male and female participants rated different sets of face images and any sex differences revealed may, in part, be due to the differing male and female face images used. Indeed, research examining sex differentiated partner preferences for face images using heterosexual participants is inevitably confounded by this methodological limitation: Is it relevant for heterosexual participants to rate both same-sex and opposite-sex face images on their partner preferences to explore sex differentiated preferences for first impressions of faces? This limitation is not relevant for researchers using verbal measures of partner preferences (e.g., the Ideal Partner Scale; Fletcher et al., 1999). Yet the use of face images in addition to verbal measures can provide a more nuanced account of sex differentiated preferences, given that the research presented has revealed little correspondence between preferences measured using face stimuli and verbal measures (see Future Directions for a broader discussion regarding face stimuli to detect sex differentiated partner preferences).

In addition, this research draws on both accounts related to both bottom-up visual facial cues and top-down processing of partner preferences and stereotypes, which is consistent with the approach followed by researchers in the social evaluations field (N. H. Anderson, 1988; Freeman & Ambady, 2011; Hassin & Trope, 2000; Quinn & Macrae, 2011). Research on face perception examining the interaction between bottom-up and top-down processes is required (Quinn & Macrae, 2011). For instance, within some Middle Eastern and some parts of India countries, the family traditionally has an influential role in selecting a romantic partner for their off-spring, hence, attractiveness-related traits may be less relevant compared to young Western adults who, in this research, overwhelmingly prioritised attractiveness-related traits. It is, also, possible that individuals primed to have concerns regarding the available economic resources (e.g., reading an ostensible news article on the financial crisis impacting on current job losses) prioritise face images high in status-resources as potential partners.

8.5. Future Directions

In this section, three areas for future research are outlined: (1) Heterosexual sex differentiated partner preferences, non-heterosexual partner preferences and polyamorous partner preferences; (2) consumerism; and (3) indirect measures of partner preferences.

8.5.1. Heterosexual, Non-Heterosexual, and Polyamorous Partner Preferences

In this country, first you get the money, then you get the power, then you get the women (de Palma, 1983).

Much research has confirmed the presence of sex differentiated partner preferences for heterosexual individuals, revealing that women prefer traits related to status more than men and men prefer traits related to attractiveness more than women (Buss, 1989; Christensen, 1947; Colwell, 2007; de Sousa Campos, Otta, & de Oliveira Siqueira, 2002; Dunn, Brinton, & Clark, 2010; Eastwick et al., 2014; Feingold, 1990; Finkel & Eastwick, 2009; Hill, 1945; Hitsch et al., 2010; Skopek et al., 2010; Zentner & Mitura, 2012). Buss (1989) attributed sex differentiated partner preferences to evolved mental adaptations, which provide reproductive gains (see Chapter 1 for a brief review). Research has not examined

sex differentiated partner preferences with regards to ambient images. A limitation discussed in the research presented in this thesis is that sex differentiated partner preferences cannot be identified, given that the studies largely focused on heterosexual participants rating opposite-sex face images. In order to examine sex differentiated preferences, participants could be asked to rating opposite-sex images on their own partner preferences and, also, rate same-sex images on a heterosexual opposite-sex individual's partner preferences. This methodology would enable the comparison between ratings of people's own partner preferences versus an opposite-sex individual's preferences on the same face images, yet, it does not directly capture partner preferences towards same-sex images.

Research focusing on partner preferences of individuals with non-heterosexual orientations is less prolific (e.g., Bailey, Kim, Hills, & Linsenmeier, 1997; Boydeon, Carroll, & Maier, 1984; Gobrogge et al., 2007; Konik & Smith, 2013; Moskowitz, Rieger, & Seal, 2009; Zhang, Yang, & Singh, 2000). Given that there are approximately 545,000 homosexual and 220,000 bisexual adults in the UK (Chalabi, 2013), research identifying sex differentiated partner preferences using face images in non-heterosexual samples is a valid approach. Of note, in the UK the age bracket 16 and 24 years has the largest percentage of gay, lesbian or bisexual individuals (almost 3%) and this proportion declines as age increases (Chalabi, 2013). Hence, research examining the malleability of partner preferences as a function of cultural norms is relevant, including identifying interaction effects between biology and culture (see the Potential Caveats).

In January 2016, OkCupid became the first online dating site to officially include a feature for polyamourous individuals (Khazan, 2016). OkCupid reported that 42% of its members would consider dating an individual already in an open or polyamorous relationship, relative to 44% of its members seeking a monogamous relationship (Storey, 2016). Historically, many cultures at some point have allowed polygamy, for example, polygamy was practiced by 20-30% of Latter-day Saint families between 1852 and 1890 (Flake, 2004). Currently, polygamy remains practiced only by a minority of cultures, often serving a specific function. For instance, in the Himalayan Mountains polyandry is linked to the scarcity of land. The brothers of a family marry the same wife to prevent division of the family land, which would occur if each brother married a different woman (N. E. Levine,

1988). Future research examining polyamorous individuals, who have the freedom of choosing their partners, can explore the malleability of partner preferences. For example, if Emily currently has a particularly attractive partner, malleable partner preferences may result in her prioritising other ideal partner factors (e.g., trustworthiness) in additional polyamorous relationships. Nevertheless, if Emily seeks polyamorous relationships with partners who are all high in attractiveness this would suggest relatively inflexible partner preferences. The Health Survey for England took a poll of 14,000 individuals, which revealed that men have approximately nine different partners within their lives, whereas women have approximately five (Beckford, 2011). Hence, research examining how partner preferences evolve as a function of previous (or current) partner history is a relevant direction for future research, particularly in Western cultures where even non-polyamorous individuals typically have various romantic partners in their lifetime.

8.5.2. Consumer-Based Societies

Research indicates that individuals prefer traits that they perceive they themselves possess (Buston & Emlen, 2003; Campbell et al., 2001). Notwithstanding, it is questionable whether salient traits within a society are, additionally, prioritised in individuals' partner preferences, independent of whether individuals perceive themselves as possessing or not this particular trait. For example, adults in consumer-based societies may place greater emphasis on appearance. Indeed, the fashion industry is valued at £26 billion in the UK alone (Fashion United, 2016) and Olay Total Effects anti-ageing cream was used by almost 2 million people in the UK in 2014 (Statista, 2014). As such, this may constitute one of the various reasons accounting for vitality-attractiveness being especially salient in partner preferences for Western participants. Research could explore this question further, identifying whether subgroups of individuals who have a strong (relative to low) focus on consumerism, also, differ in terms of their partner preferences.

8.5.3. Indirect Measures

How much do we really know about the appeal of different personality traits? Do we like our friends better when they are intelligent or fun loving? … Merely asking participants

about such traits in the abstract (e.g., "How much do you like the trait 'fun loving' in a friend?") may not capture the actual appeal of the trait. (Eastwick et al., 2014, p. 647)

There is much debate regarding whether people have introspective access to their partner preferences. Various influential relationship researchers concur that individuals may have limited introspective access (e.g., Eastwick & Finkel, 2008d; Eastwick et al., 2014; Luo & Zhang, 2009; Overbeek, Nelemans, Karremans, & Engels, 2013). Yet, other researchers disagree, given that verbal measures of partner preferences predict relationship judgements (Fletcher et al., 1999), efforts to regulate partners (Overall et al., 2006), relationship dissolution (Eastwick & Neff, 2012; Fletcher et al., 2000a), and are correlated (r = .47) with various objective evaluations of partners (Fletcher & Kerr, 2010). Still, it is likely that different measures can capture distinct elements of partner preferences (e.g., spontaneous responses or propositional beliefs). The research presented in this thesis revealed low correspondence between two direct measures of preferences: Partner preferences for face images and a verbal measure of partner preferences (see Chapters 4 and 5). As such, the complexity of partner preferences may be such that different measures, including indirect measures, provide a complementary approach. Future research can examine the correspondence between direct measures of partner preferences and indirect partner preferences in relation to the ideal partner factors.

8.6. Overall Conclusions

This thesis used ambient face images to represent the ideal partner factors. Partner preferences to face images were dominated by attractiveness-related concerns. Further, attractiveness, relative to trustworthiness, was more salient in first impressions of faces in a non-romantic context using the minimal exposure paradigm. Facial attractiveness may be particularly salient as attractive individuals are perceived to have other positive traits (see Eagly et al., 1991; Feingold, 1992b; Langlois et al., 2000, for meta-analytical reviews of attractiveness stereotypes), providing perceived benefits for those associating with attractive others in both romantic and non-romantic contexts. Yet, alternative perspectives accounting for the emphasis placed on attractiveness abound (see Themes). Of note, attractiveness was not prioritised in face ratings based on occupations, suggesting that an attractiveness halo effect does not account for the previous findings.

Romantic relationship researchers primarily use verbal measures of partner preferences. Yet, the research presented revealed a low correspondence between measures using face images and verbal measures, suggesting that these measures capture different elements of preferences. These findings attest the significance of using face images to complement verbal measures of partner preferences, as used in Chapters 4 and 5.

The research presented focused exclusively on first impressions of heterosexual individuals. As such, future research can examine the malleability of partner preferences across a relationship, exploring other sexual orientations, and even using different measures. Finally, the research presented in this thesis underscores the importance of the ambient image approach given that this provides highly ecological face images, containing many facial and non-facial cues that are relevant in first impressions.

Chapter 9. Appendices

Appendix A: Can Ideal Partner Factors be Represented by Ambient Face Stimuli?

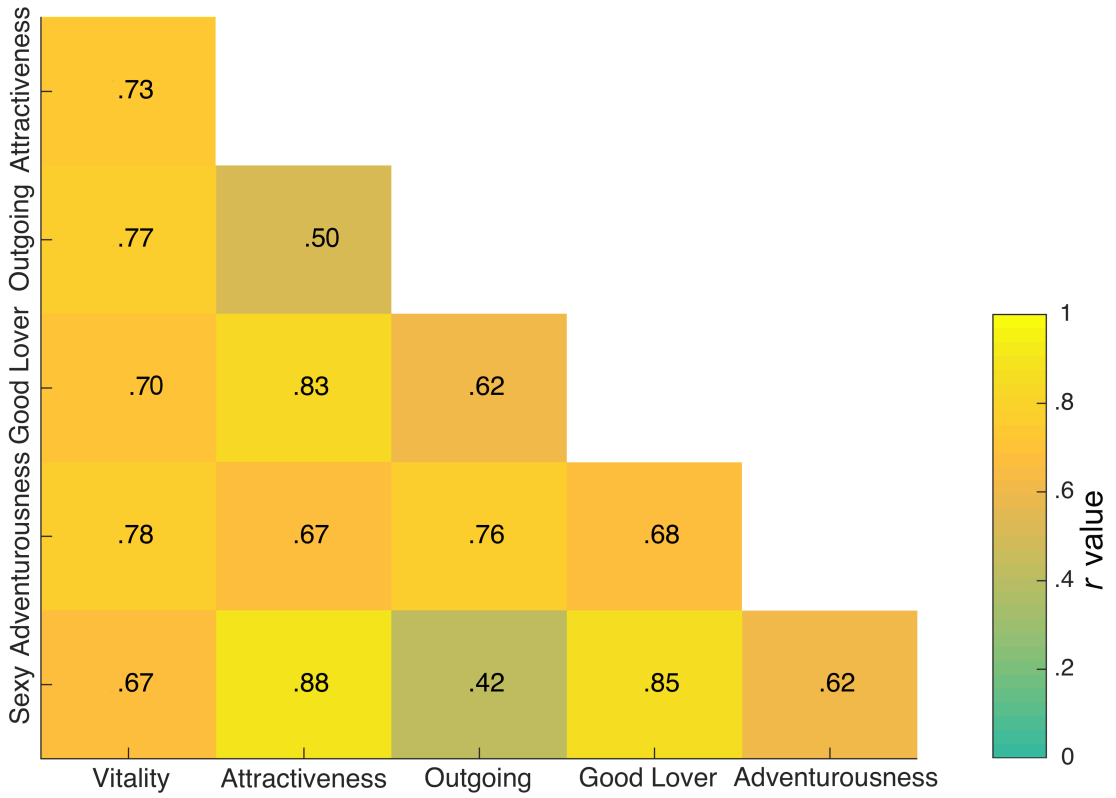


Figure 9.1. Correlations between the traits selected to represent the vitality-attractiveness factor using ambient face images. N = 1000. All correlations obtained $p < .001$.

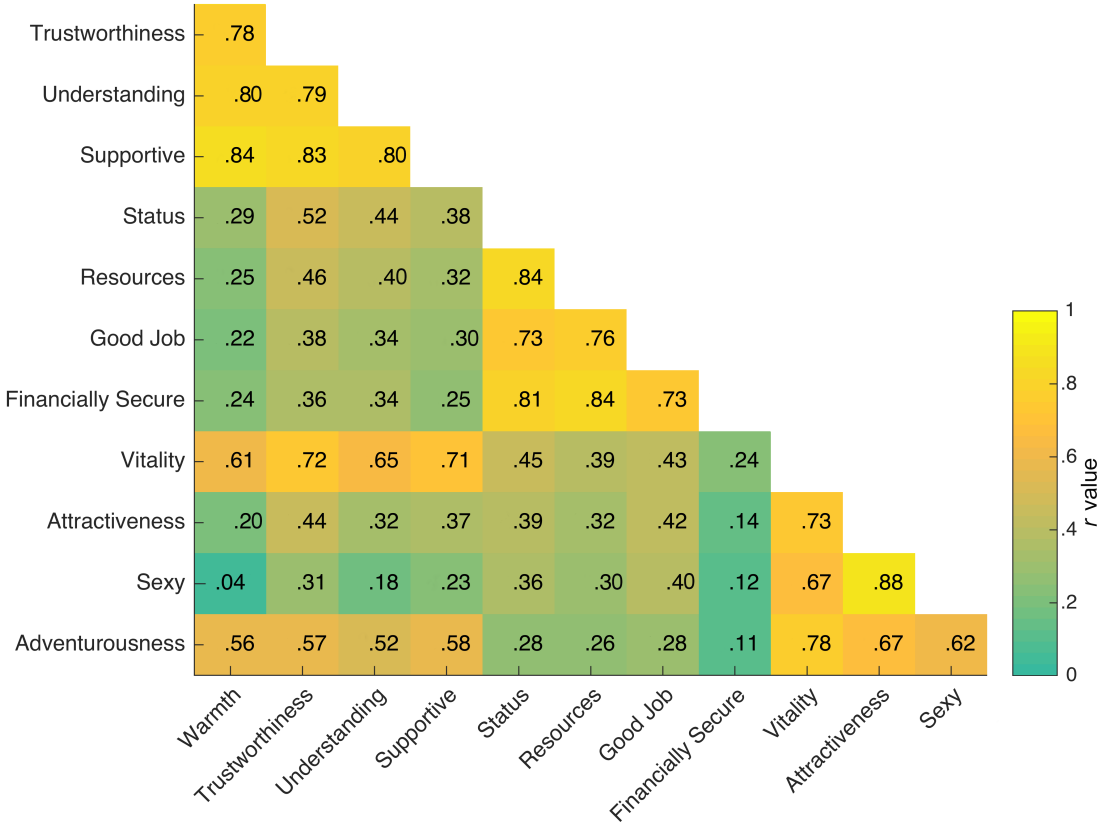


Figure 9.2. Intercorrelations between trait ratings using ambient face images. N = 1000. All correlations obtained $p < .001$, except between warmth and sexy, which was not significant.

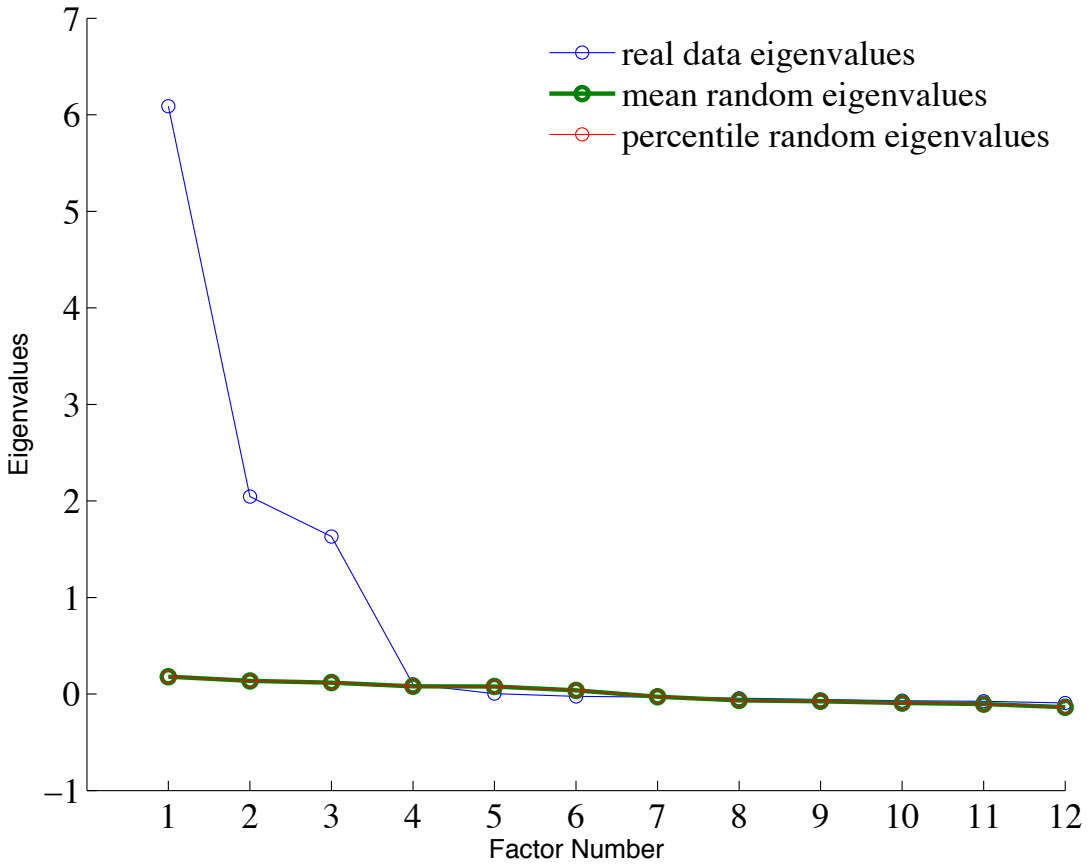


Figure 9.3. Scree plot from a parallel analysis (Horn, 1965) using traits representing the ideal partner factors.

Table 9.1. Principal axis factor analysis: Pattern matrix, structure matrix, and communalities

Trait	Pattern Matrix			Structure Matrix			Communalities (after extraction)
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Warmth	**1.00**	-.05	-.14	**.93**	.25	.19	.89
Supportive	**.90**	.01	.04	**.92**	.33	.36	.84
Trustworthiness	**.79**	.17	.09	**.88**	.46	.42	.80
Understanding	**.84**	.13	-.03	**.87**	.41	.30	.77
Resources	.03	**.91**	.03	.35	**.92**	.30	.85
Financially Secure	.01	**.97**	-.19	.28	**.92**	.09	.88
Status	.08	**.85**	.08	.40	**.90**	.35	.83
Good Job	-.03	**.77**	.18	.30	**.81**	.39	.69
Sexy	-.17	.08	**.99**	.21	.31	**.95**	.93
Attractiveness	.02	.06	**.90**	.36	.33	**.93**	.87
Vitality	**.54**	.04	**.58**	**.75**	.39	**.78**	.87
Adventurous	.46	-.10	**.58**	**.63**	.23	**.71**	.68

Note: Substantial loadings (over .50) are in bold.

Table 9.2. Replication of factor structure. The highest three loadings are shown

Analysis	Rotation	Traits Included	Factor No.	Factor 1	Factor 2	Factor 3
PCA	Varimax	As Main	3	Warmth, Supportive, Understanding	Financially Secure, Resources, Status	Sexy, Attractiveness, Adventurous
Maximum Likelihood	Promax	As Main	3	Warmth, Supportive, Trustworthiness	Resources, Financially Secure, Status	Sexy, Attractiveness, Vitality
Alpha Factoring	Oblimin	As Main	3	Warmth, Supportive, Trustworthiness	Resources, Financially Secure, Status	Sexy, Attractiveness, Vitality
PAF	Oblimin	Split Half	3	Warmth, Supportive, Understanding	Financially Secure, Resources, Status	Sexy, Attractiveness, Vitality

Table 9.3. Structure matrix of a four-factor solution of a principal axis factor analysis with a direct oblimin rotation

Factor	Trait	Factor 1	Factor 2	Factor 3	Factor 4
		52% Variance	19% Variance	15% Variance	3% Variance
Warmth-Trustworthiness	Warmth	**.92**	.26	.20	**.64**
	Supportive	**.92**	.33	.38	.39
	Trustworthiness	**.91**	.46	.43	.22
	Understanding	**.87**	.40	.31	.35
Vitality-Attractiveness	Sexy	.22	.30	**.95**	-.08
	Attractiveness	.38	.32	**.93**	-.01
	Vitality	**.75**	.39	**.78**	.30
	Adventurous	**.62**	.23	**.73**	.46
Status-Resources	Financially Secure	.31	**.93**	.11	-.05
	Resources	.38	**.92**	.31	-.10
	Status	.44	**.90**	.37	-.15
	Good Job	.33	**.82**	.40	-.06

High loadings (over .50) are in bold.

9.1.1. Goodness of Fit

To assess which model fits better, a confirmatory factor analysis was conducted (AMOS version 22; IBM software). To maximise objectivity, the data was randomly split (each n = 500, balanced for face image sex). The three-factor solution was replicated in one half of the data (see Table 9.2) and the confirmatory analysis was conducted on the other half. As multivariate normality was adequate, the maximum likelihood method (Brown, 2006) was used and only loadings over .50 were considered (see Figure 9.4 and Figure 9.5).

Appendix A: Ambient Face Stimuli

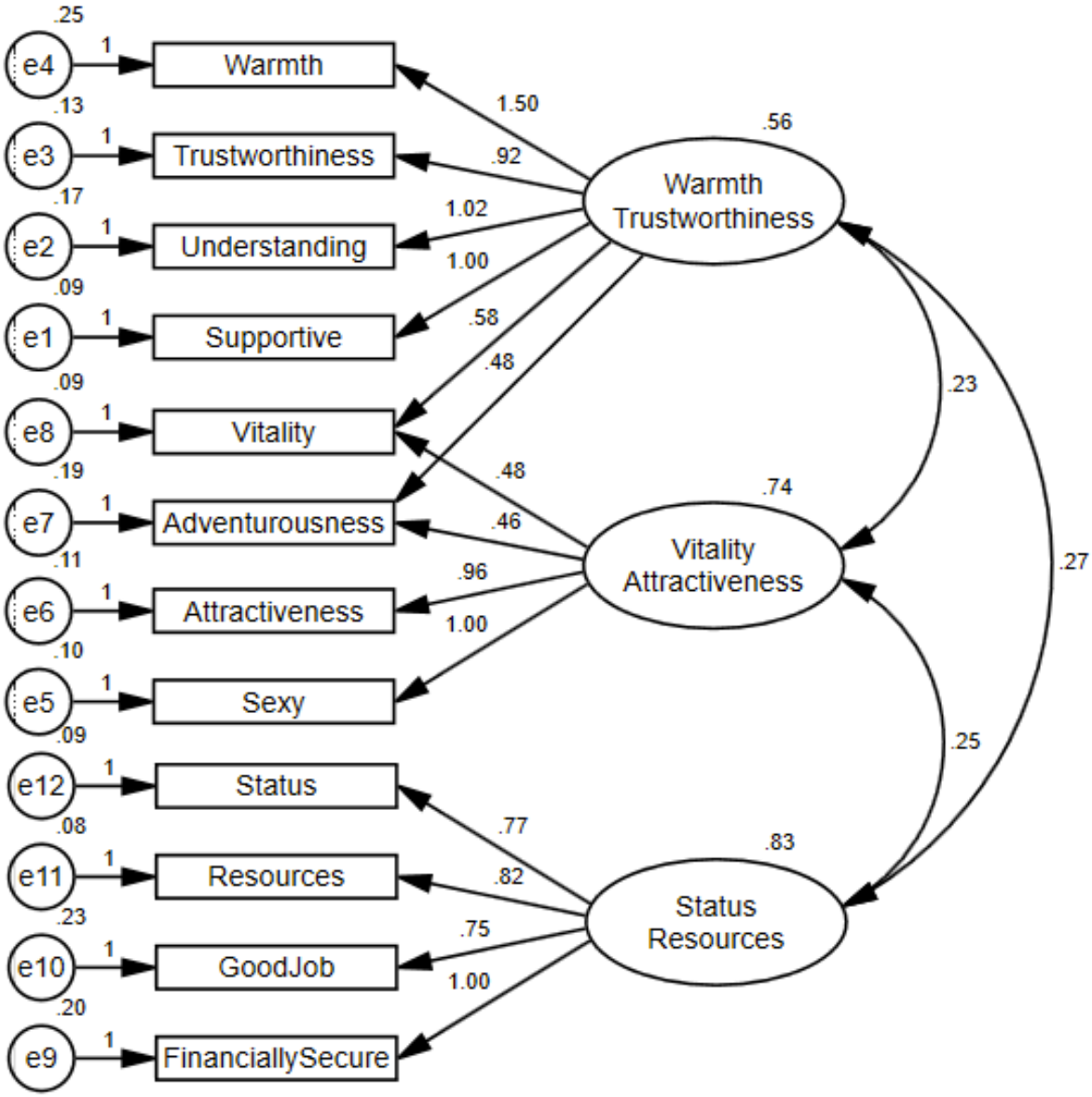


Figure 9.4. Confirmatory factor analysis: Oblique model.

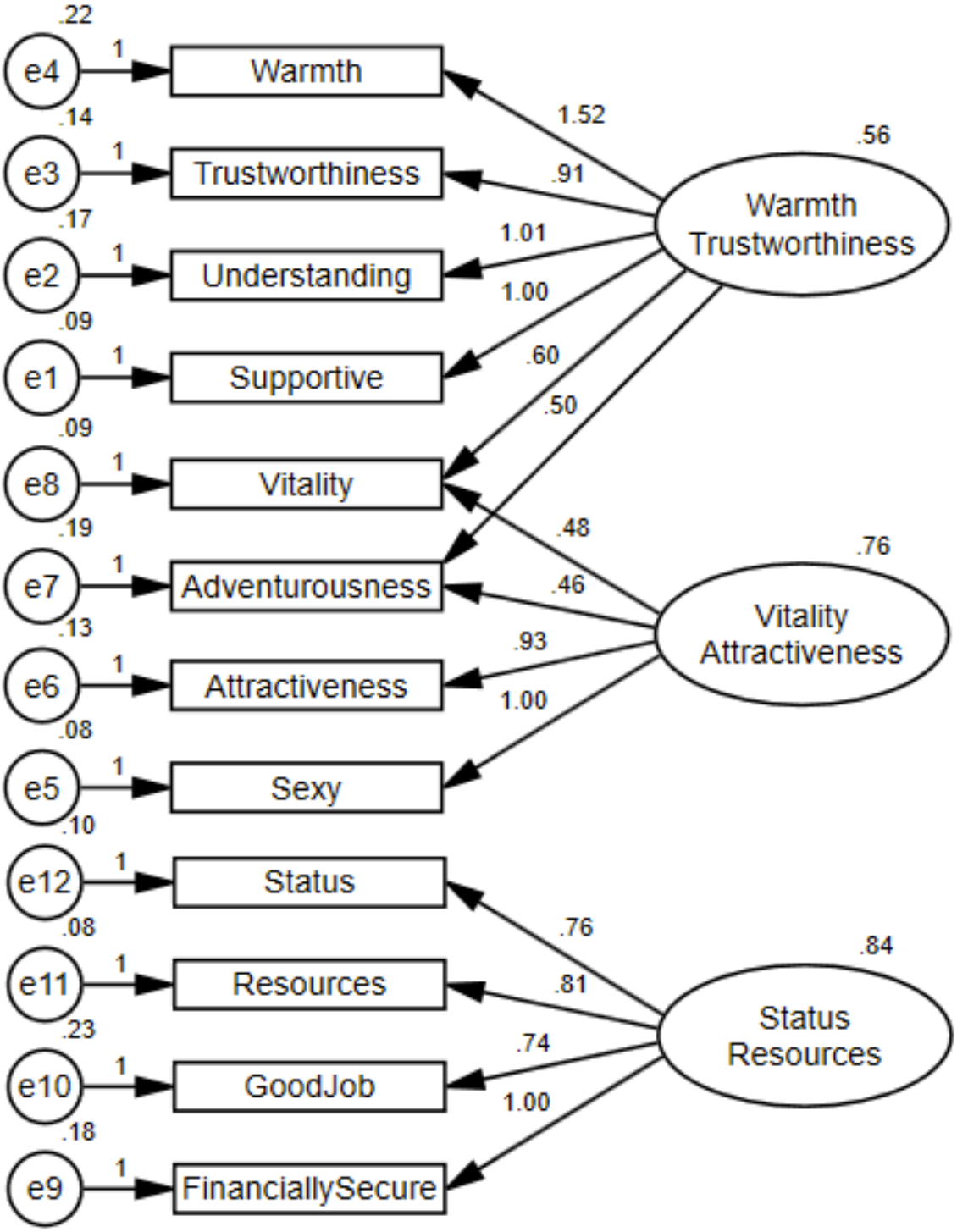


Figure 9.5. Confirmatory factor analysis: Orthogonal model.

The χ^2 index is sensitive to sample size (Harrington, 2008) and, therefore, four additional indices of fit were used to compare orthogonal and oblique models: The root mean square error of approximation (RMSEA), a comparative fit index (CFI), χ^2 divided by its degrees of freedom, and a predictive fit index (Akaike's information criterion, AIC). The oblique model had a slightly better fit relative to the orthogonal model (see Table 9.4).

Table 9.4. Goodness of fit indices comparing orthogonal and oblique models

Model	χ^2	df	χ^2/df	RMSEA	CFI	AIC
Orthogonal	748.22***	52	14.39	.16***	.89	800.22
Oblique	595.94***	49	12.16	.15***	.92	653.94

***. p < .001
Note: RMSEA = root mean square error of approximation, CFI = comparative fit index, AIC = Akaike's information criterion.

9.1.2. Face Averages

Five face averages were used to represent high and low levels of each factor, separately: Five high and five low warmth-trustworthiness images, five high and five low status-resources images, and five high and five low vitality-attractiveness images. In total, there were 30 images. The images were created as follows:

1. The study used an ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults (see Chapter 2 for more information).
2. Factor scores representing each factor of the ideal partner face model were computed for all 1000 photographs using the regression method. Based on the regression scores for each ideal partner factor, the images were ordered from high to low on each ideal partner face factor. Only the highest and lowest 50 images representing each factor were selected. These groups of 50 images were divided into five groups of 10 images.
3. 179 fiducial points were manually positioned on each image using PsychoMorph (Tiddeman et al., 2001) to mark the outlines and positions of internal and external features of each face. Two experimenters verified this delineation.

4. Averaged images for each of the five groups of 10 images for high and, also, for low levels of each ideal partner face factor were created using PsychoMorph (Tiddeman et al., 2001).
5. An overall average image for all of the male and female faces was created using PsychoMorph (Tiddeman et al., 2001) and the eyes and mouths of the averaged images were aligned with this overall average image using PsychoMorph (Tiddeman et al., 2001). This ensured that the eyes and mouths of all images were in the same location on the computer screen.
6. The resulting images were 300 pixels in height and were cropped to reveal only the individuals' head and shoulders (see Figure 9.6).

Appendix A: Ambient Face Stimuli

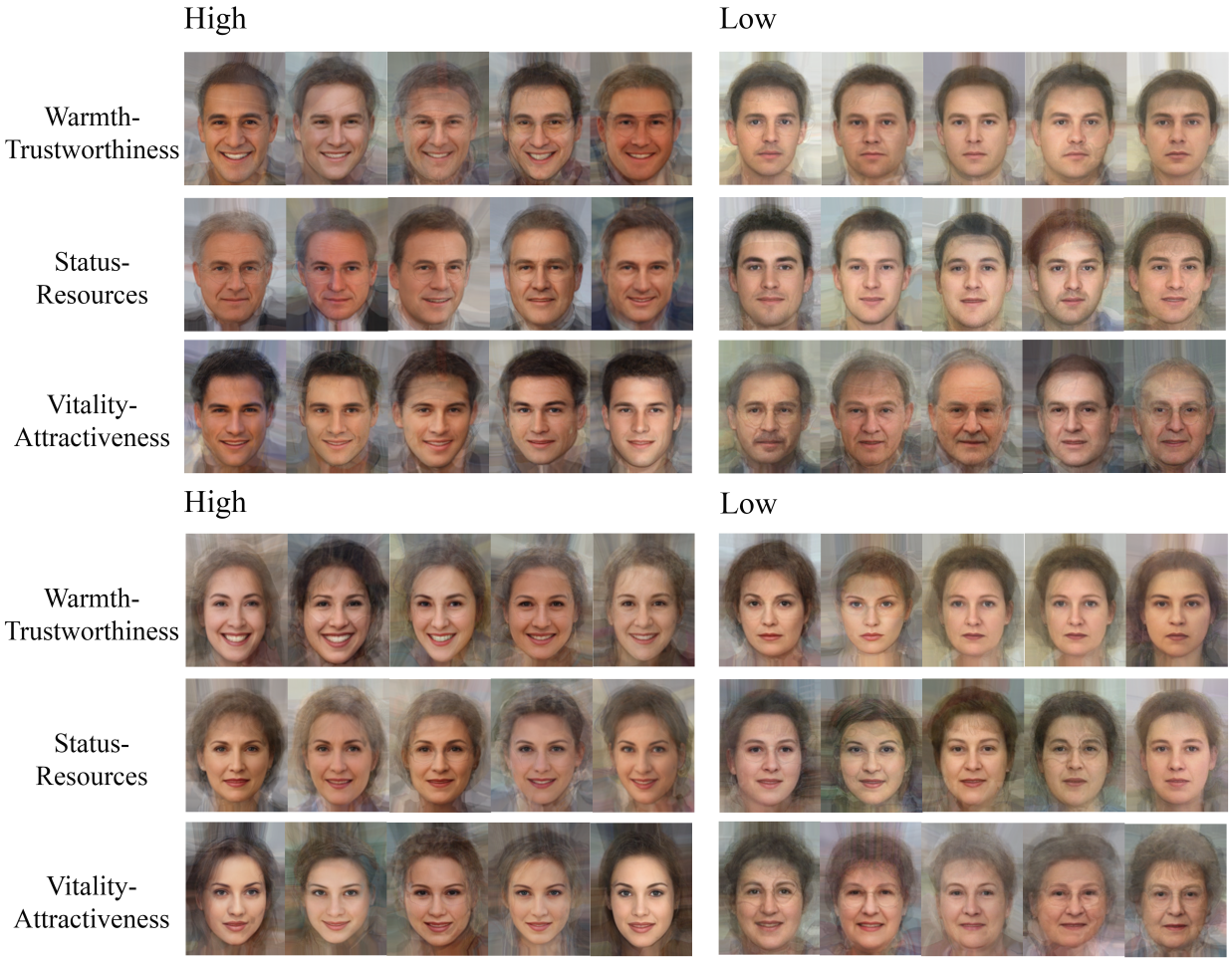


Figure 9.6. Averaged face images representing high (left) and low (right) levels of warmth-trustworthiness (top row), status-resources (middle row), and vitality-attractiveness (bottom row) using male images (top) and female images (bottom).

Appendix B: Ideal Partner and Face Perception Models: Related but Separate Underlying Structures

Appendix B: Face Perception Model

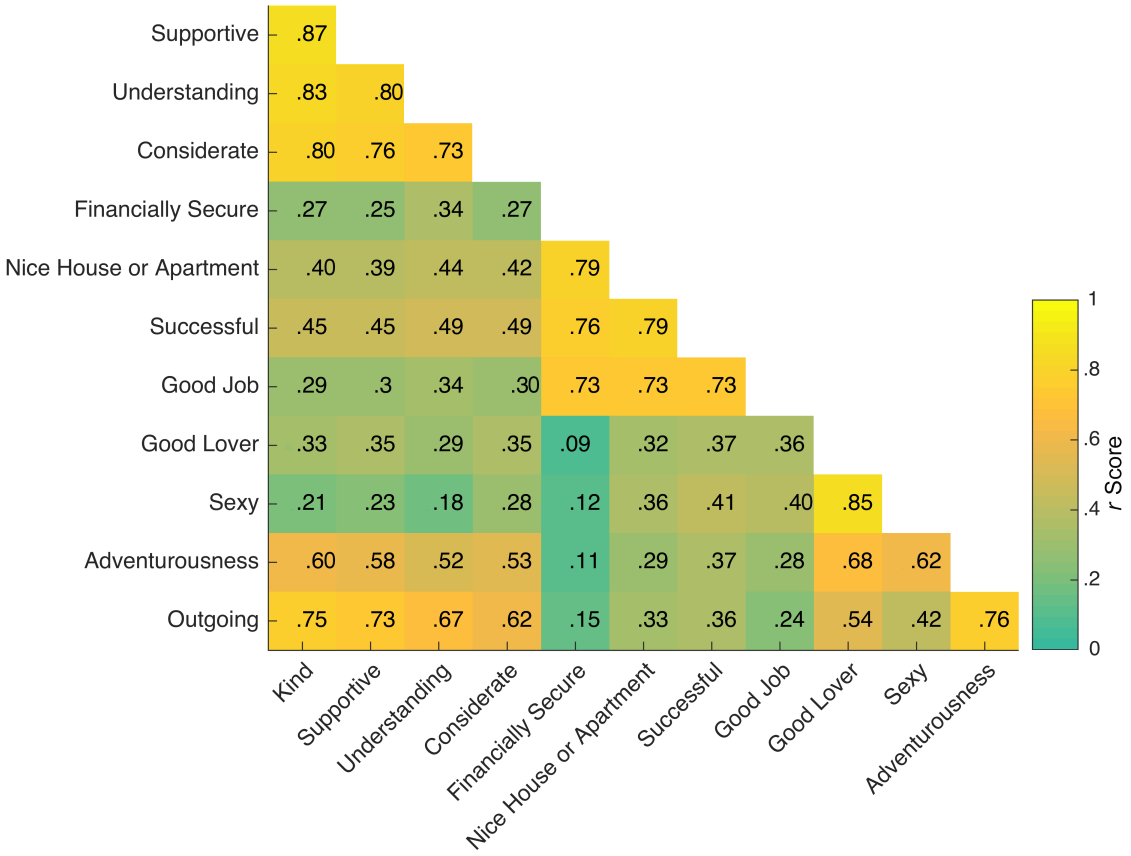


Figure 9.7. Intercorrelations between ideal partner trait ratings that do not overlap with face perception traits, using ambient face images. N = 1000. All correlations obtained $p < .01$.

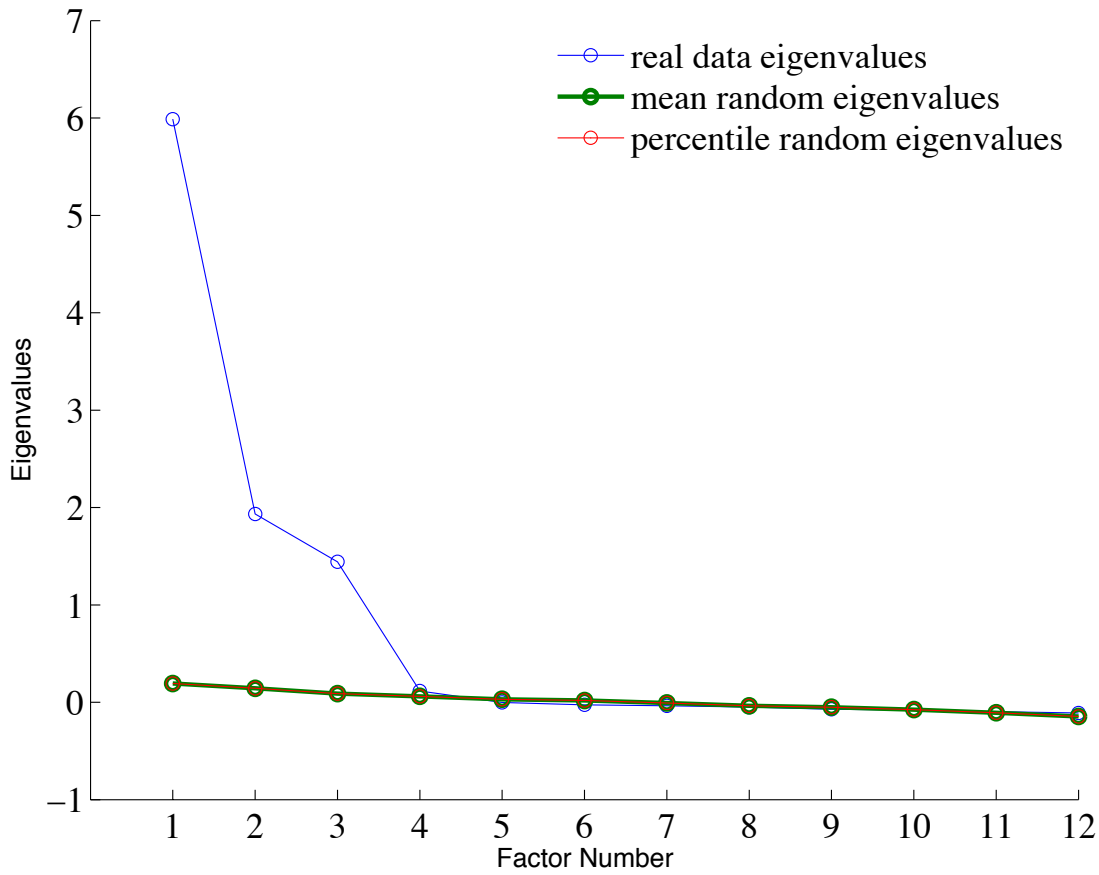


Figure 9.8. Scree plot from a parallel analysis (Horn, 1965) using traits representing the ideal partner face factors but which do not overlap with traits representing the face perception factors.

Table 9.5. Principal axis factor analysis for traits representing the ideal partner face model that are non-overlapping with the face perception model: Pattern matrix, structure matrix, and communalities

Trait	Pattern Matrix			Structure Matrix			Communalities (after extraction)
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	
Kind	**.98**	.01	-.08	**.96**	.36	.29	.92
Supportive	**.92**	.02	-.03	**.91**	.35	.32	.84
Understanding	**.86**	.13	-.11	**.87**	.42	.25	.77
Considerate	**.79**	.09	.01	**.82**	.38	.33	.68
Financially Secure	-.02	**.96**	-.18	.27	**.91**	.05	.86
Nice House or Apartment	.09	**.83**	.07	.42	**.88**	.30	.79
Successful	.15	**.79**	.11	.49	**.87**	.36	.80
Good Job	-.05	**.80**	.17	.31	**.82**	.34	.70
Good Lover	.06	.04	**.89**	.40	.27	**.92**	.84
Sexy	-.12	.14	**.92**	.28	.32	**.91**	.85
Adventurous	.49	-.08	**.56**	**.67**	.24	**.73**	.72
Outgoing	**.73**	-.09	.31	**.81**	.25	**.56**	.74

Note: Substantial loadings (over .50) are in bold.

Table 9.6. Structure matrix of a principal axis factor analysis with a direct oblimin rotation, separated by participant sex

Factor	Trait	Male Participants			Female Participants		
		Factor 1 43% Variance	Factor 2 17% Variance	Factor 3 12% Variance	Factor 1 46% Variance	Factor 2 17% Variance	Factor 3 14% Variance
Warmth-Trustworthiness	Kind	**.87**	.25	.42	**.93**	.41	.13
	Supportive	**.78**	.27	.31	**.88**	.35	.25
	Understanding	**.76**	.29	.23	**.81**	.44	.20
	Considerate	**.67**	.31	.10	**.78**	.35	.43
Status-Resources	Financially Secure	.21	**.85**	.10	.28	**.89**	-.05
	Nice House or Apartment	.41	**.83**	.19	.36	**.78**	.32
	Successful	.47	**.79**	.33	.38	**.80**	.29
	Good Job	.16	**.71**	.36	.35	**.77**	.24
Vitality-Attractiveness	Sexy	.28	.32	**.80**	.23	.25	**.87**
	Good Lover	.37	.24	**.79**	.33	.24	**.86**
	Adventurous	**.59**	.15	**.56**	**.60**	.25	**.73**
	Outgoing	**.73**	.23	**.58**	**.73**	.20	.44

Note: Substantial loadings (over .50) are in bold.

Table 9.7. Replication of factor structure for traits representing the ideal partner face model that are non-overlapping with the face perception model. The highest three loadings are shown

Analysis	Rotation	Traits Included	Factor No.	Factor 1	Factor 2	Factor 3
PCA	Varimax	As Main	3	Kind, Supportive, Understanding	Financially Secure, Nice House or Apartment, Good Job	Sexy, Good Lover, Adventurous
Maximum Likelihood	Promax	As Main	3	Kind, Supportive, Understanding	Financially Secure, Nice House or Apartment, Successful	Sexy, Good Lover, Adventurous
Alpha Factoring	Oblimin	As Main	3	Kind, Supportive, Understanding	Financially Secure, Nice House or Apartment, Successful	Sexy, Good Lover, Adventurous
PAF	Oblimin	Split Half	3	Kind, Supportive, Understanding	Financially Secure, Nice House or Apartment, Successful	Sexy, Good Lover, Adventurous

Table 9.8. Structure matrix of a four-factor solution of a principal axis factor analysis with a direct oblimin rotation for traits representing the ideal partner face model that are non-overlapping with the face perception model

Factor	Trait	Factor 1	Factor 2	Factor 3	Factor 4
		52% Variance	18% Variance	14% Variance	3% Variance
Warmth-Trustworthiness	Kind	**.95**	.36	.30	**.62**
	Supportive	**.91**	.35	.32	**.59**
	Understanding	**.87**	.42	.26	**.53**
	Considerate	**.85**	.38	.35	.42
Status-Resources	Financially Secure	.30	**.93**	.09	.01
	Nice House or Apartment	.45	**.88**	.34	.11
	Successful	**.52**	**.87**	.41	.12
	Good Job	.34	**.82**	.38	.05
Vitality- Attractiveness	Good Lover	.38	.27	**.90**	.38
	Sexy	.27	.32	**.95**	.20
	Adventurous	**.62**	.25	**.71**	**.67**
	Outgoing	**.77**	.26	**.53**	**.84**

High loadings (over .50) are in bold.

Appendix B: Face Perception Model

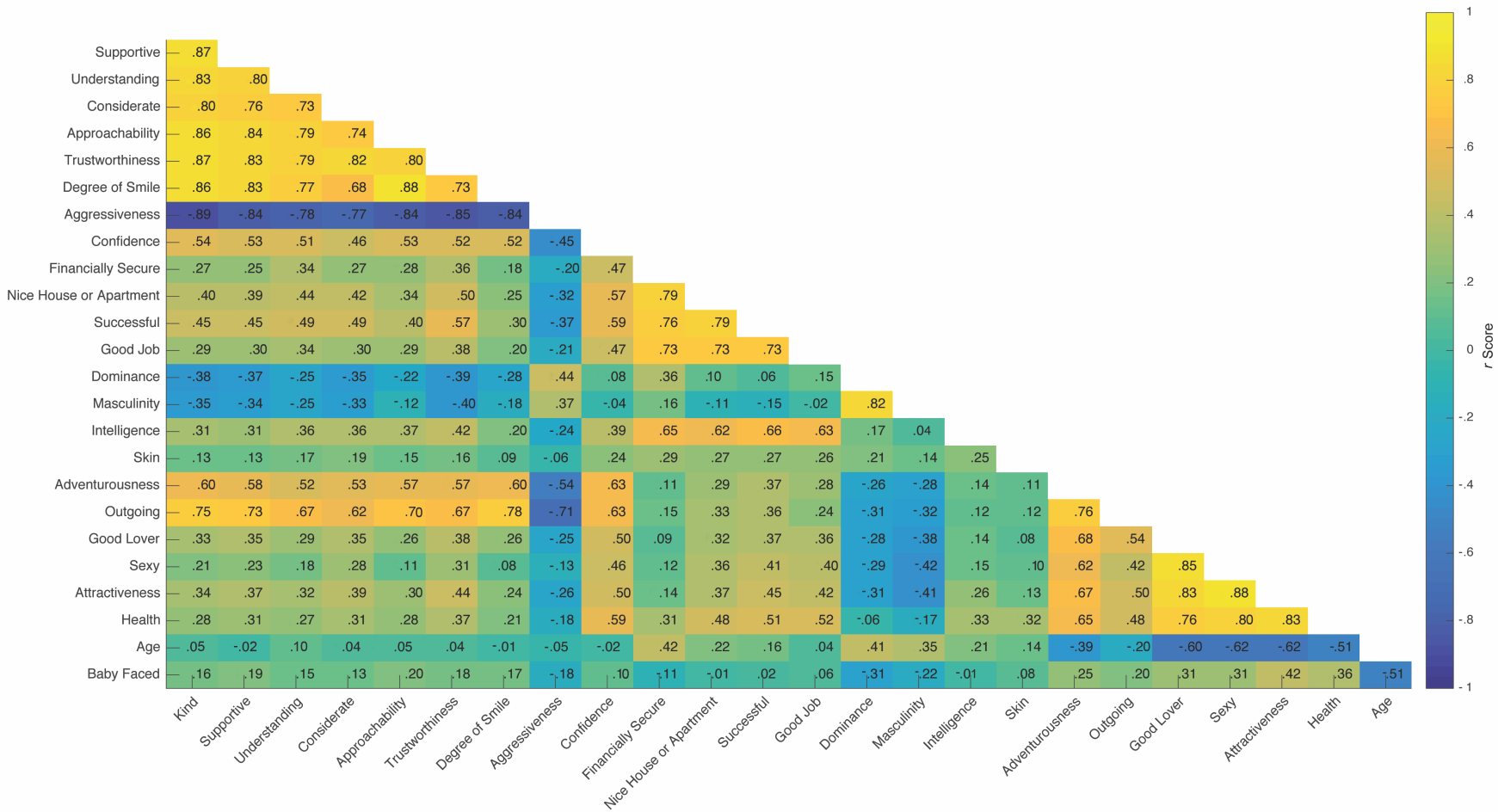


Figure 9.9. Intercorrelations between trait ratings representing the ideal partner face model and the face perception model, using ambient face images. N = 1000.

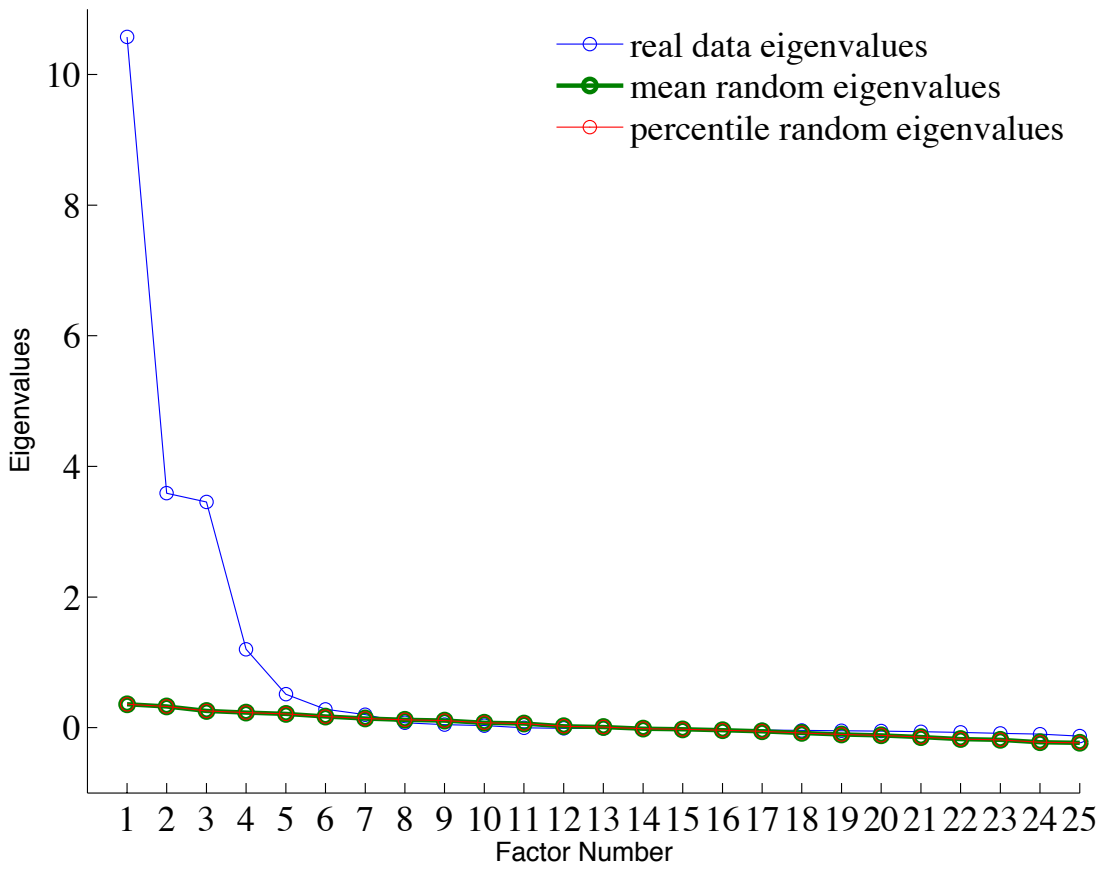


Figure 9.10. Scree plot from a parallel analysis (Horn, 1965) using traits representing the ideal partner face factors and the face perception factors.

Table 9.9. Principal axis factor analysis for traits representing the ideal partner face model and the face perception model: Pattern matrix, structure matrix, and communalities

	Pattern Matrix				Structure Matrix				Communalities (after extraction)
Trait	Factor 1	Factor 2	Factor 3	Factor 4	Factor 1	Factor 2	Factor 3	Factor 4	
Kind	**.92**	.08	-.05	-.12	**.95**	.37	.25	-.22	.91
Supportive	**.87**	.07	.01	-.10	**.91**	.35	.28	-.21	.84
Understanding	**.81**	.17	-.06	-.05	**.86**	.43	.21	-.12	.76
Considerate	**.72**	.20	.00	-.17	**.81**	.41	.27	-.23	.71
Approachability	**.95**	-.01	-.04	.12	**.92**	.34	.21	-.02	.86
Trustworthiness	**.75**	.29	-.01	-.23	**.88**	.50	.30	-.28	.87
Degree of Smile	**1.01**	-.17	-.03	.12	**.93**	.20	.21	-.05	.89
Aggressiveness	**-.93**	.00	.12	.18	**-.92**	-.27	-.17	.29	.89
Confidence	.43	.28	.36	.28	**.59**	**.56**	.49	.23	.65
Financially Secure	.02	**.89**	-.15	.14	.27	**.90**	.00	.34	.85
Nice House or Apartment	.06	**.86**	.06	-.06	.39	**.88**	.24	.10	.79
Successful	.11	**.85**	.10	-.08	.45	**.89**	.30	.06	.83
Good Job	-.03	**.78**	.19	.02	.29	**.80**	.31	.16	.68
Dominance	-.24	.17	-.12	**.83**	-.34	.23	-.29	**.92**	.92
Masculinity	-.08	-.11	-.19	**.82**	-.29	.00	-.36	**.84**	.78
Intelligence	.08	**.72**	-.05	.02	.31	**.74**	.10	.16	.55
Skin	.07	.25	.08	.21	.14	.33	.11	.24	.15
Adventurous	**.54**	-.08	**.59**	.12	**.66**	.24	**.71**	-.07	.75
Outgoing	**.76**	-.10	.34	.08	**.81**	.24	**.52**	-.11	.76
Good Lover	.07	.10	**.83**	-.07	.36	.27	**.88**	-.19	.79
Sexy	-.15	.25	**.88**	-.17	.21	.32	**.91**	-.23	.89
Attractiveness	.04	.32	**.80**	-.02	.38	.47	**.87**	-.09	.87
Health	.00	.29	**.84**	.14	.32	.48	**.87**	.07	.87
Age	.15	.37	**-.83**	.14	.02	.30	**-.74**	.33	.78
Babyfaced	.10	-.14	.40	-.10	.18	-.05	.42	-.20	.21

Note: Substantial loadings (over .50) are in bold.

Table 9.10. Replication of factor structure for traits representing the ideal partner face model and the face perception model. The highest three loadings are shown

Analysis	Rotation	Traits Included	Factor No.	Factor 1	Factor 2	Factor 3	Factor 4
PCA	Varimax	As Main	4	Degree of Smile, Kind, Aggressiveness	Sexy, Good Lover, Health	Financially Secure, Nice House or Apartment, Successful	Masculinity, Dominance, Skin
Maximum Likelihood	Promax	As Main	4	Kind, Approachability, Aggressiveness	Sexy, Attractiveness, Good Lover	Successful, Financially Secure, Nice House or Apartment	Dominance, Masculinity, Aggressiveness
Alpha Factoring	Oblimin	As Main	4	Kind, Degree of Smile, Aggressiveness	Successful, Financially Secure, Nice House or Apartment	Health, Sexy, Attractiveness	Dominance, Masculinity, Age
PAF	Oblimin	Split Half	4	Kind, Degree of Smile, Aggressiveness	Financially Secure, Successful, Nice House or Apartment	Sexy, Health, Attractiveness	Dominance, Masculinity, Financially Secure

Table 9.11. Structure matrix of a three-factor solution of a principal axis factor analysis with a direct oblimin rotation

Model	Factor	Items	Factor 1	Factor 2	Factor 3
			43% Variance	15% Variance	15% Variance
Ideal Partner Face Model	Warmth-Trustworthiness	Kind	**.96**	-.28	.27
		Supportive	**.92**	-.31	.26
		Understanding	**.85**	-.22	.35
		Considerate	**.83**	-.30	.31
Face Perception Model	Trustworthiness/Valence	Approachability	**.89**	-.21	.30
		Trustworthiness	**.90**	-.34	.37
		Degree of Smile	**.89**	-.22	.16
		Aggressiveness	**-.94**	.22	-.15
		Confidence	**.55**	-.42	**.57**
Ideal Partner Face Model	Status-Resources	Financially Secure	.23	.06	**.91**
		Nice House or Apartment	.38	-.22	**.82**
		Successful	.45	-.28	**.82**
		Good Job	.28	-.27	**.78**
Face Perception Model	Dominance	Dominance	-.43	.42	.40
		Masculinity	-.38	.46	.18
		Intelligence	.29	-.07	**.71**
		Skin	.11	-.06	.37
Ideal Partner Face Model	Vitality-Attractiveness	Adventurous	**.65**	**-.69**	.21
		Outgoing	**.80**	**-.52**	.20
		Good Lover	.38	**-.88**	.21
		Sexy	.25	**-.92**	.25
Face Perception Model	Youthful-Attractiveness	Attractiveness	.39	**-.86**	.43
		Health	.31	**-.81**	.47
		Age	-.02	**.77**	.34
		Babyfacedness	.20	-.44	-.09

High loadings (over .50) are in bold.

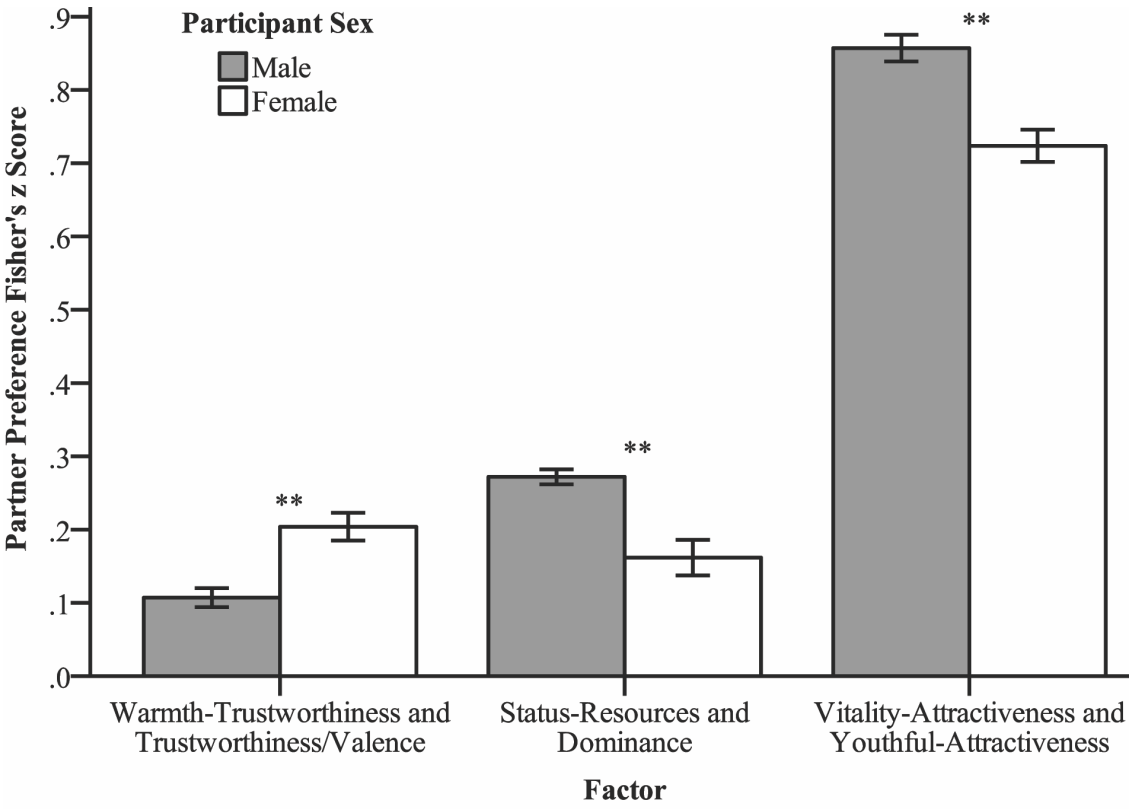
9.1.3. Ideal Partner Face Model and Face Perception Model

To determine how the ideal partner face factor structure was related to the face perception model (Oosterhof & Todorov, 2008; Sutherland et al., 2013), firstly, factor scores representing each factor of the ideal partner face model were computed for all 1000 photographs using the regression method (derived from Study 1). Regression factor scores representing each factor of the face perception model for the same 1000 photographs were computed by Sutherland et al. (2013). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and the face perception model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the participant partner preference Fisher's z scores were subjected to a mixed 2 x 3 x 2 ANOVA between models (ideal partner face model and face perception model), factors (warmth-trustworthiness and trustworthiness/valence, status-resources and dominance, and vitality-attractiveness and youthful-attractiveness) and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between models and factors and participant sex $\left(F(1.39, 66.86) = 69.83, MSE = 0.09, p < .001, \eta_p^2 = .59\right)$, a significant interaction effect between models and factors $\left(F(1.39, 66.86) = 194.04, MSE = 0.24, p < .001, \eta_p^2 = .80\right)$, a significant interaction effect between factors and participant sex $\left(F(1.43, 68.51) = 16.95, MSE = 0.50, p < .001, \eta_p^2 = .26\right)$, but no significant interaction effect between models and participant sex $\left(F(1.00, 48.00) = 3.35, MSE = 0.00, p = .074, \eta_p^2 = .07\right)$. Furthermore, there was a significant effect for factors $\left(F(1.43, 68.51) = 560.79, MSE = 16.38, p < .001, \eta_p^2 = .92\right)$ and for models $\left(F(1.00, 48.00) = 18.86, MSE = 0.03, p < .001, \eta_p^2 = .28\right)$.

Pairwise comparisons using Bonferroni's adjustment revealed that revealed that participants prioritised the vitality-attractiveness and the youthful-attractiveness factors relative to the warmth-trustworthiness and the trustworthiness/valence and the status-resources and the dominance factors in the ideal partner face model and the face perception

model, with significant sex differentiated preferences within each factor (*p*s < .01; see Figure 9.11). Moreover, the key findings were significant differences between each of the factors as a function of model (*p*s < .001). For example, there was a significant difference between the warmth-trustworthiness ideal partner face factor and the trustworthiness/valence face perception factor face perception models. Therefore, despite the ideal partner and face perception models exhibiting similar patterns in terms of their relationship to partner preference face ratings, these models are distinct, which is in accordance with the hypotheses.



Bonferroni adjustment for pairwise comparisons: **. p < .01
Error bars: +/- 1 SE

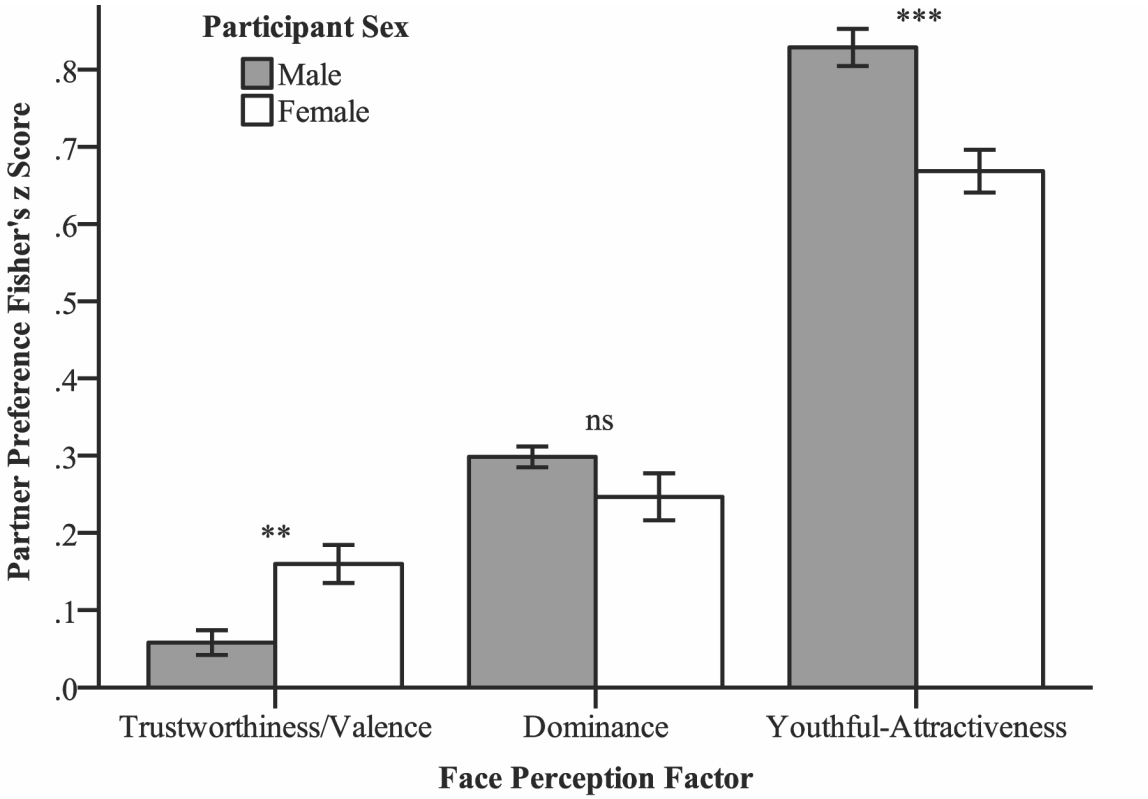
Figure 9.11. Partner preferences for ambient face stimuli as a function of the ideal partner face model and the face perception model, separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

9.1.4. Face Perception Model

To explore which face perception factors were prioritised in participants' partner preference face ratings there were three steps in the analysis. Firstly, the regression factor scores representing each factor of the face perception model for the 1000 photographs were computed by Sutherland et al. (2013). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the face perception model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the participant partner preference Fisher's z scores were subjected to a mixed 3 x 2 ANOVA between the face perception factors (trustworthiness/valence, dominance, and youthful-attractiveness) and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Appendix B: Face Perception Model

Findings revealed a significant interaction effect between the face perception factors and participant sex $\left(F(1.47, 70.76) = 17.83, MSE = 0.29, p < .001, \eta_p^2 = .27\right)$ and a significant effect for factors $\left(F(1.47, 70.76) = 454.10, MSE = 7.49, p < .001, \eta_p^2 = .90\right)$, but no significant effect for participant sex $\left(F(1, 48) = 2.96, MSE = 0.02, p = .092, \eta_p^2 = .06\right)$. Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that women significantly preferred trustworthiness/valence (p = .001) more and youthful-attractiveness less (p < .001) than men, with no sex differentiated preferences for dominance (p = .125; see Figure 9.12). The principal finding is that both sexes prioritised the youthful-attractiveness factor relative to the trustworthiness/valence and the dominance factors, which is in accordance with the hypotheses.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, ns. significant
Error bars: +/- 1 SE

Figure 9.12. Partner preferences for ambient face stimuli as a function of the face perception model, separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

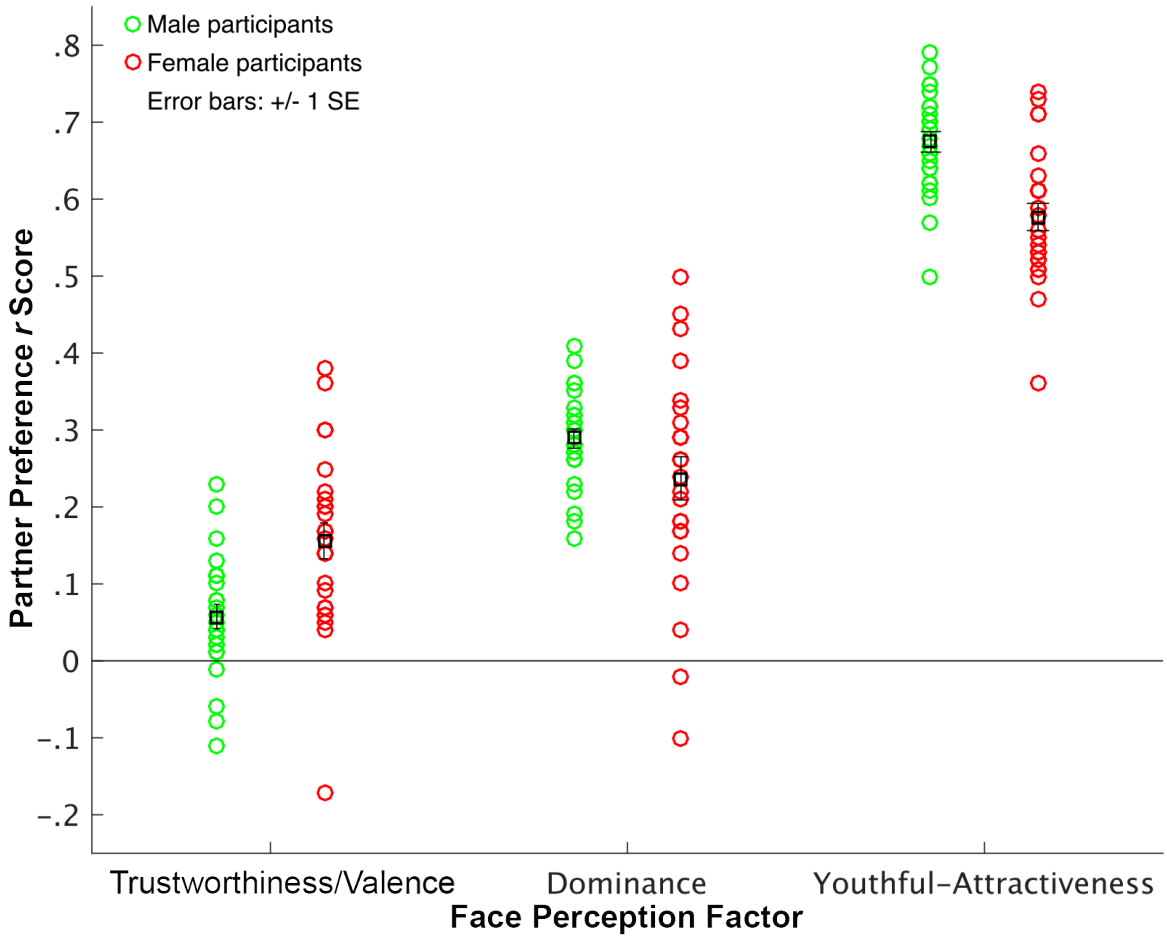


Figure 9.13. Individual participant partner preference face ratings correlated with the face perception factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

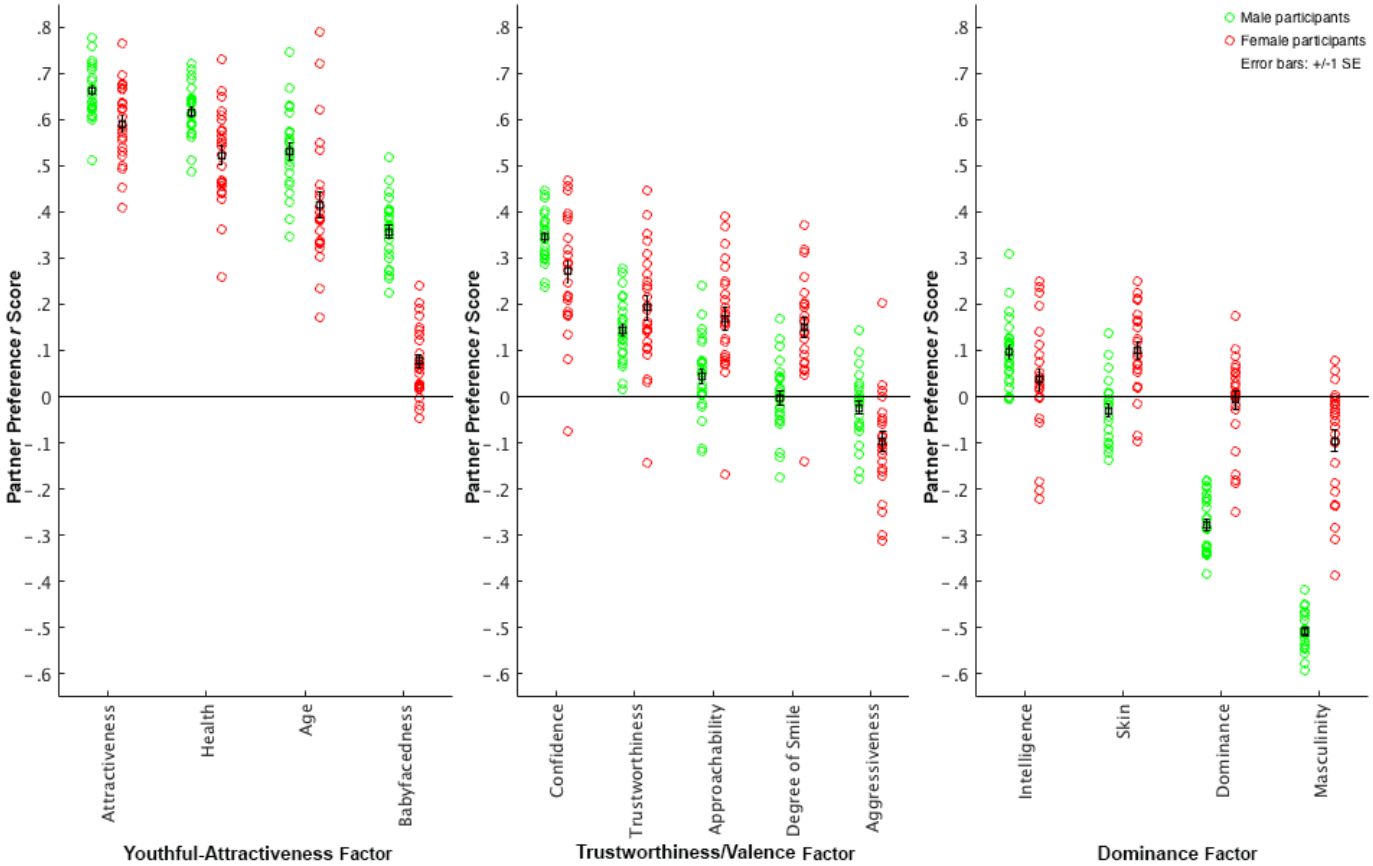


Figure 9.14. Individual participant partner preference face ratings correlated with trait ratings for the youthful-attractiveness (left), trustworthiness/valence (middle), and dominance (right) factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

Appendix B: Face Perception Model

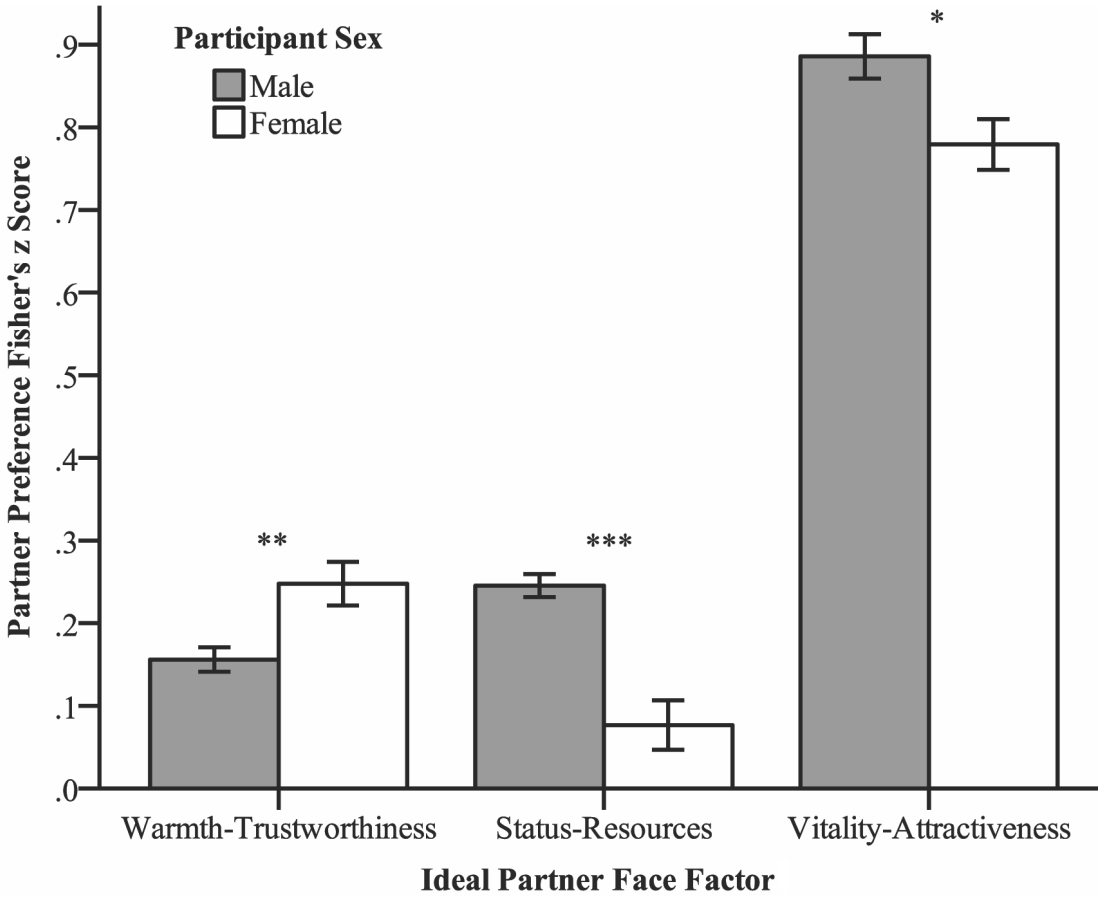
Appendix C: Correspondence between Measures of Partner Preferences: Face Images and a Verbal Measure

9.2. Study 1

9.2.1. Face Images

Chapter 3 Study 2 examined which of Sutherland et al.'s (2013) face perception factors were prioritised in each participant's partner preferences of face ratings. In the current study, data from Chapter 3 Study 2 was reanalysed to explore which ideal partner face factors were prioritised in participants' partner preference face ratings. There were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant partner preference Fisher's z scores were subjected to a mixed 3 x 2 ANOVA between the ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between ideal partner face factors and participant sex $\left(F(1.46, 69.89) = 23.05, MSE = 0.32, p < .001, \eta_p^2 = .32\right)$, a significant main effect of factors $\left(F(1.46, 69.89) = 706.20, MSE = 9.73, p < .001, \eta_p^2 = .94\right)$, and a significant main effect of participant sex $\left(F(1, 48) = 5.46, MSE = 0.05, p = .024, \eta_p^2 = .10\right)$. Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that both sexes prioritised Fletcher et al.'s (1999) vitality-attractiveness factor relative to the warmth-trustworthiness and status-resources factors, which is in accordance with the predictions. Moreover, there were significant differences ($p < .001$) between each of the ideal partner face factors for both sexes. Men preferred the vitality-attractiveness and status-resources factors to a greater extent than women and, in contrast, women preferred the warmth-trustworthiness factor to a greater extent than men (see Figure 9.15). It is relevant to note that both sexes rated opposite-sex faces and, hence, sex differentiated partner preferences cannot be examined.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, *. p < .05
Error bars: +/- 1 SE

Figure 9.15. Partner preferences for ambient face stimuli as a function of the ideal partner face model, separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

These findings are in accordance with the hypotheses and with findings from Chapter 3 revealing that all participants prioritised the youthful-attractiveness factor in partner preference face ratings. These findings are, further, consistent with a meta-analysis on romantic preferences that revealed a stronger preference for attractiveness relative to earning potential for both sexes (Eastwick et al., 2014).

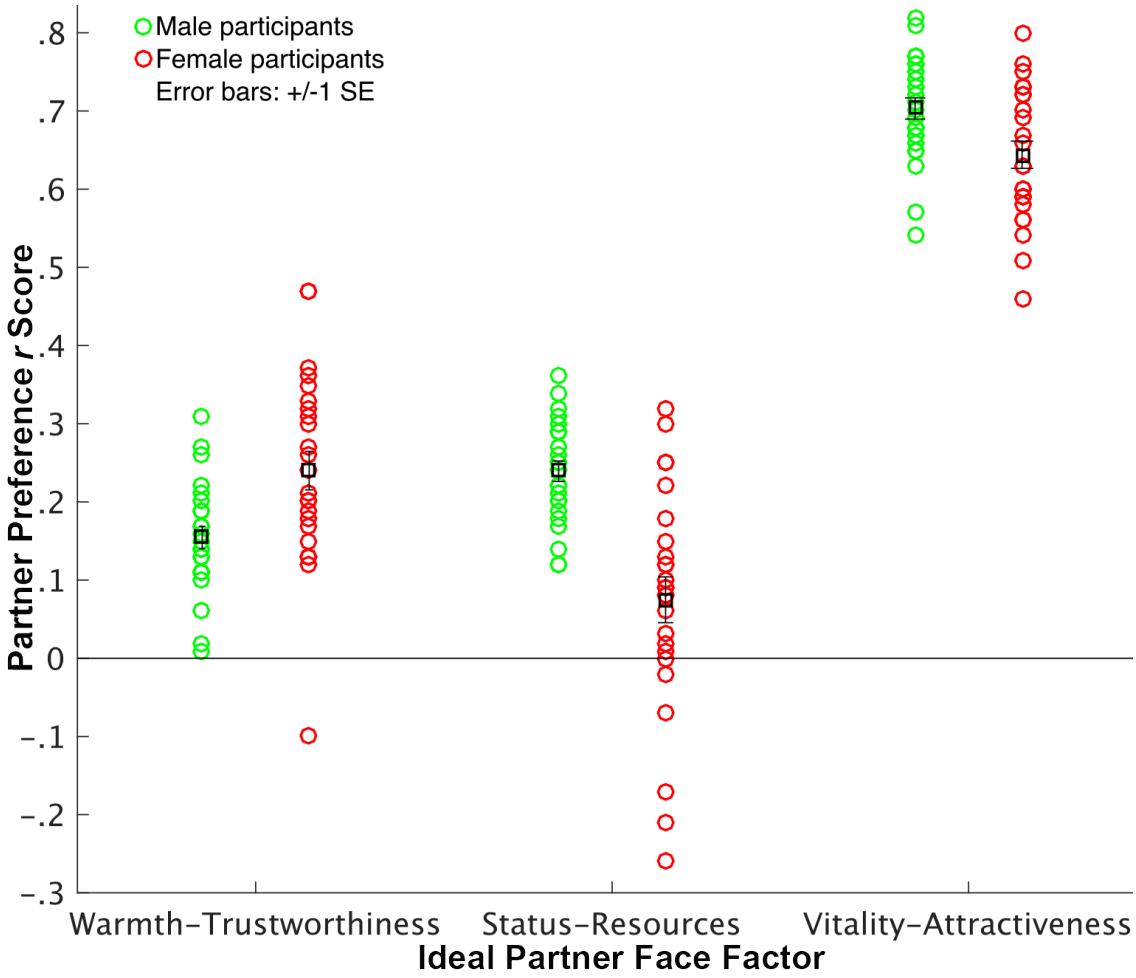


Figure 9.16. Individual participant partner preference face ratings correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

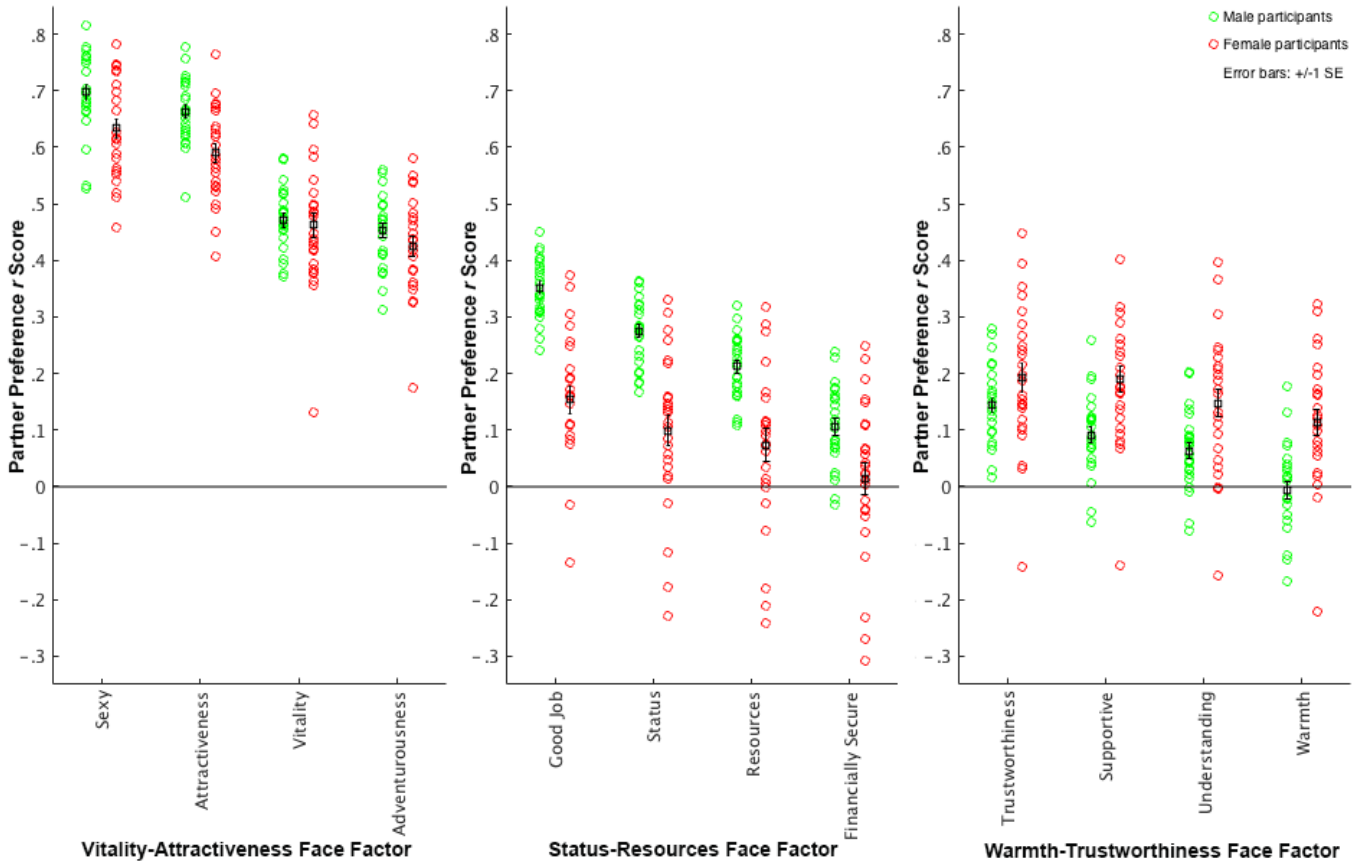
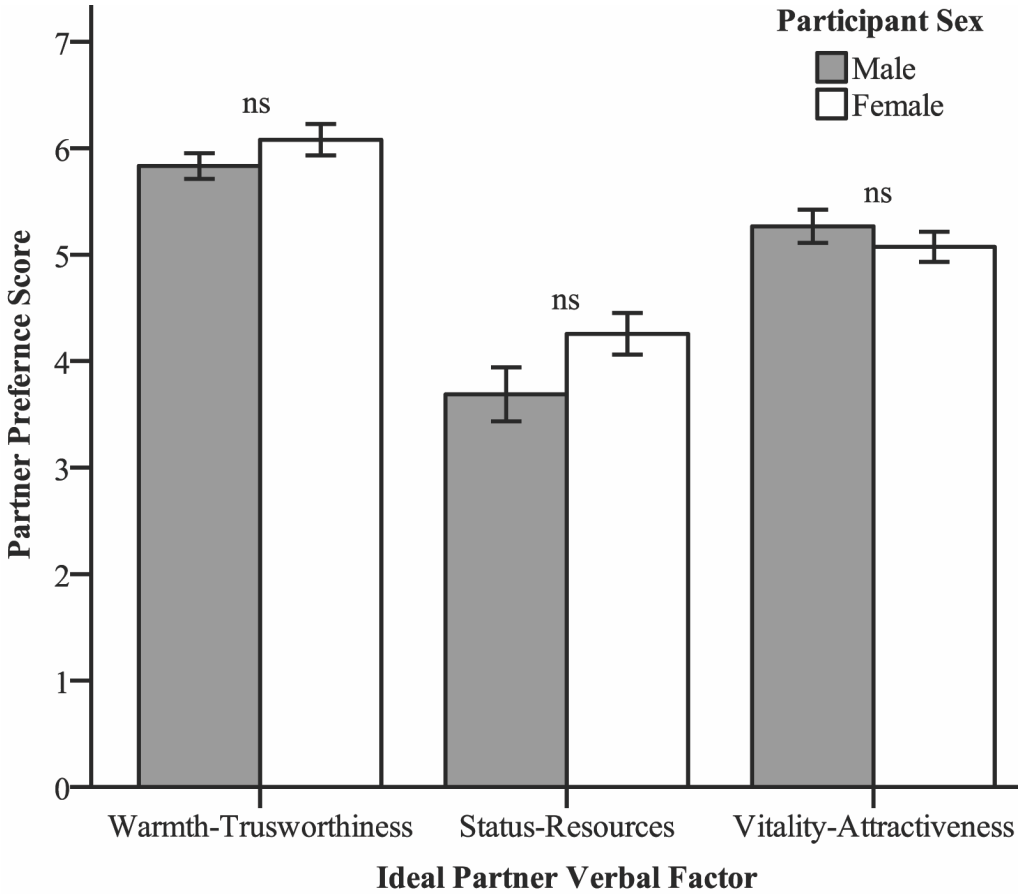


Figure 9.1. Individual participant partner preference face ratings correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

9.2.2. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor was subjected to a mixed 3 x 2 ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and participant sex. The model did not violate sphericity.

Findings revealed a borderline significant interaction effect between ideal partner verbal factors and participant sex $\left(F(2,96) = 2.87, MSE = 1.77, p = .061, \eta_p^2 = .06\right)$ and there was a significant main effect of factors $\left(F(2,96) = 85.79, MSE = 52.90, p < .001, \eta_p^2 = .64\right)$ in which participants prioritised the warmth-trustworthiness factor, followed by the vitality-attractiveness factor (see Figure 9.2). There was no significant effect for participant sex $\left(F(1,48) = 0.68, MSE = 0.21, p = .414, \eta_p^2 = .01\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that both sexes prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least important (see Figure 9.2). There were significant differences (*p*s < .001) between each of the three ideal partner verbal factors and there were no significant differences between the sexes for the warmth-trustworthiness, status-resources, or vitality-attractiveness factors.



Bonferroni adjustment for pairwise comparisons: ns. not significant
Error bars: +/- 1 SE

Figure 9.2. Verbal partner preferences separated by participant sex. Larger partner preference scores reveal a greater preference for a particular factor.

The findings are in accordance with the hypotheses and with a meta-analysis on romantic preferences revealing stronger preferences for attractiveness relative to earning potential and no sex differentiated preferences (Eastwick et al., 2014). Moreover, research reveals that both sexes prioritise traits related to warmth-trustworthiness in a romantic partner (e.g., Buss, 1989; Fletcher et al., 1999; Li et al., 2002).

9.2.3. Face Images and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. A dissociation between preferences measured using face stimuli and a verbal measure was expected, with face images

predicted to reveal that participants prioritised vitality-attractiveness and the verbal measure predicted to reveal that participants prioritised warmth-trustworthiness.

Concerning preferences for face images, there were two steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors. The participant partner preference Fisher's z scores for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A mixed 3 x 2 x 2 ANOVA was conducted between the ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), stimuli (face stimuli, verbal measure), and participant sex. The model did not violate sphericity.

Findings revealed a significant interaction effect between the ideal partner factor, stimuli, and participant sex $\left(F(2,96) = 4.18, MSE = 1.29, p = .018, \eta_p^2 = .08\right)$ and a significant interaction effect between factors and stimuli $\left(F(2,96) = 84.71, MSE = 26.13, p < .001, \eta_p^2 = .64\right)$. There were no significant interaction effects between the factors and participant sex$\left(F(2,96) = 2.16, MSE = 0.68, p = .121, \eta_p^2 = .04\right)$ or between stimuli and participant sex $\left(F(1,48) = 1.31, MSE = 0.58, p = .258, \eta_p^2 = .03\right)$. There was a significant main effect of factors $\left(F(2,96) = 98.40, MSE = 30.90, p < .001, \eta_p^2 = .67\right)$ in which participants prioritised the warmth-trustworthiness factor, followed closely by the vitality-attractiveness factor. In addition, there was a significant main effect of stimuli $\left(F(1,48) = 3807.63, MSE = 1677.41, p < .001, \eta_p^2 = .99\right)$ but no significant effect for participant sex $\left(F(1,48) = 0.26, MSE = 0.02, p = .613, \eta_p^2 = .01\right)$. These findings are in accordance with the hypotheses and with previous research (e.g., Buss, 1989; Fletcher et al., 2004; Li et al., 2002).

Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed significant differences between each of the ideal partner face factors for men and women: Women preferred warmth-trustworthiness more than men ($p < .01$) and men preferred vitality-attractiveness ($p < .001$) and status-resources ($p < .05$) more than women. No significant sex differentiated partner preferences were revealed in the verbal measure. Further, there were significant differences between each of the ideal partner face factors (ps < .01) and vitality-attractiveness was prioritised, followed by warmth-trustworthiness, with status-resources ranking last. There were significant differences between each of the ideal partner verbal factors (ps < .001) and warmth-trustworthiness was prioritised, followed by vitality-attractiveness, with status-resources ranking last.

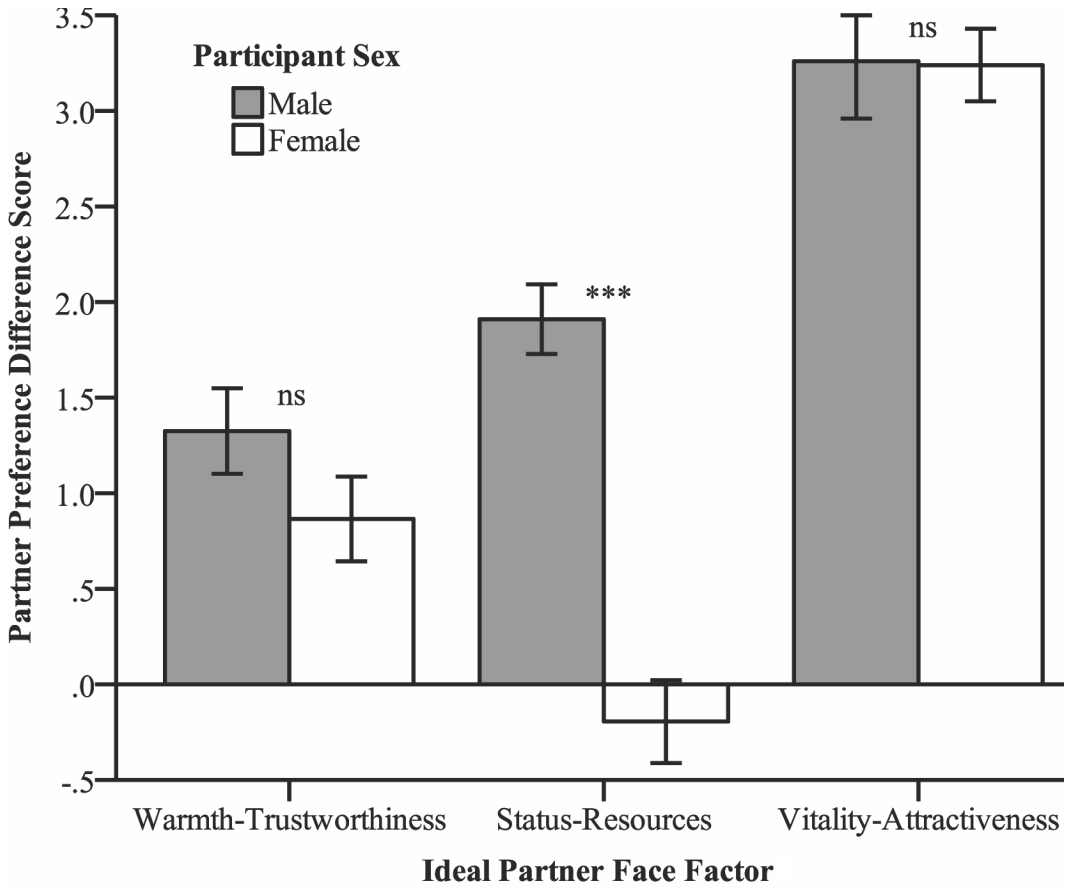
9.3. Study 2

9.3.1. Face Images

The current study examined which ideal partner face factors were prioritised in participants' partner preference face ratings. A difference score relating to the three ideal partner face factors was calculated. For example, for the warmth-trustworthiness images, the mean score for the low level images was subtracted from the mean score for the high level images. This mean difference score was calculated separately for the warmth-trustworthiness, status-resources, and vitality-attractiveness factors and for each participant. The individual participants' mean difference scores relating to the three ideal partner face factors were submitted to a mixed 3 x 2 ANOVA between ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and participant sex. The model did not violate sphericity.

Findings revealed a significant interaction effect between the ideal partner face factors and participant sex $\left(F(2,76) = 16.28, MSE = 12.08, p < .001, \eta_p^2 = .30\right)$, a significant main effect of factors $\left(F(2,76) = 93.69, MSE = 69.50, p < .001, \eta_p^2 = .71\right)$ and, furthermore, there was a significant main effect of participant sex $\left(F(1,38) =\right.$

$14.16, MSE = 22.27, p = .001, \eta_p^2 = .27$). Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that men significantly ($p < .001$) favoured status-resources relative to women, with no other sex difference present within the ideal partner face factors (see Figure 9.19). Furthermore, participants prioritised vitality-attractiveness relative to warmth-trustworthiness ($p < .001$) and status-resources ($p < .001$), with no significant difference between the warmth-trustworthiness and status-resources face factors ($p = .477$). Of note, both sexes rated opposite-sex faces and, hence, sex differentiated partner preferences cannot be examined.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 9.19. Partner preferences for youthful adult face stimuli created with averaging techniques, separated by participant sex. Larger difference scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

These findings are in accordance with the hypotheses and with findings from the two studies described in Chapter 3 revealing that all participants prioritised the youthful-

attractiveness factor in the partner preference face ratings. These findings are, further, consistent with a meta-analysis on romantic preferences that revealed a stronger preference for attractiveness relative to earning potential for both sexes (Eastwick et al., 2014).

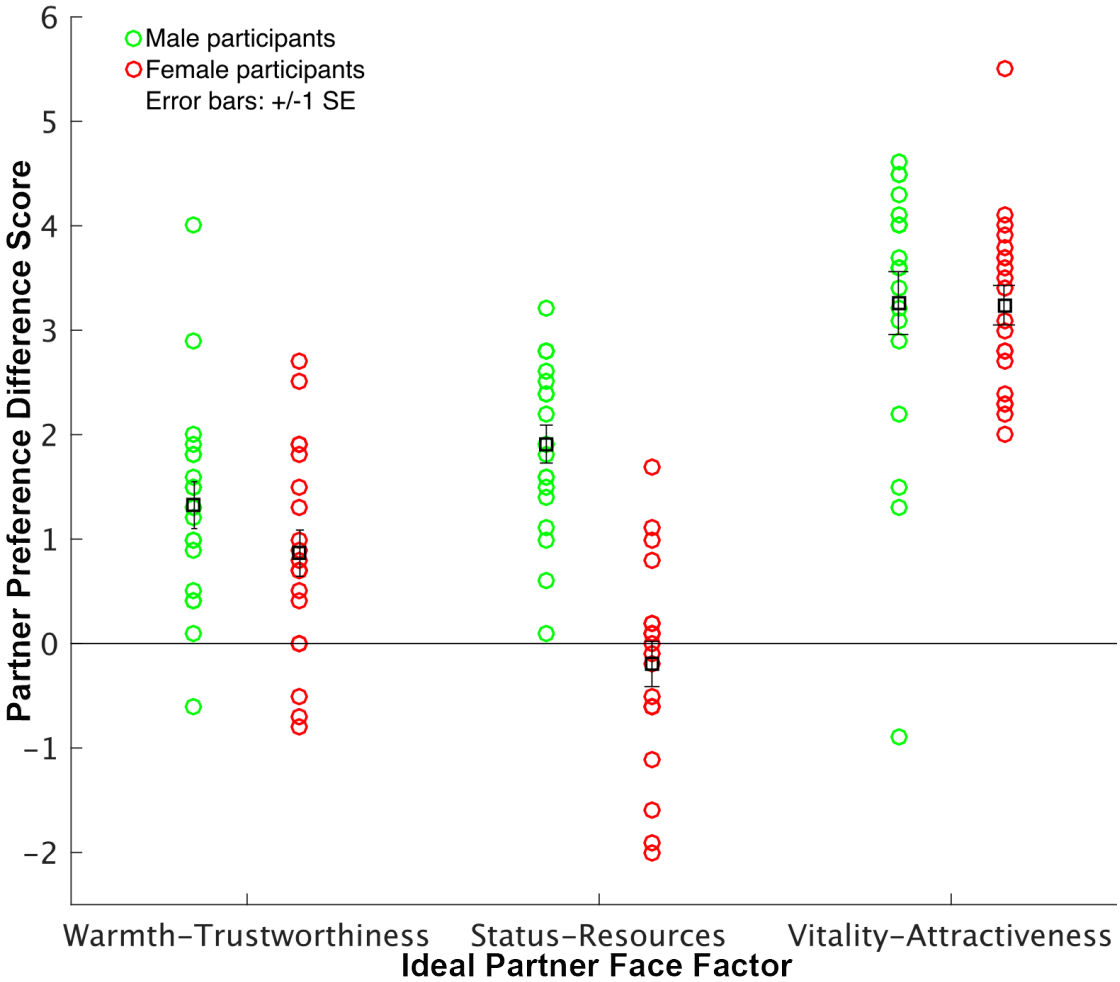


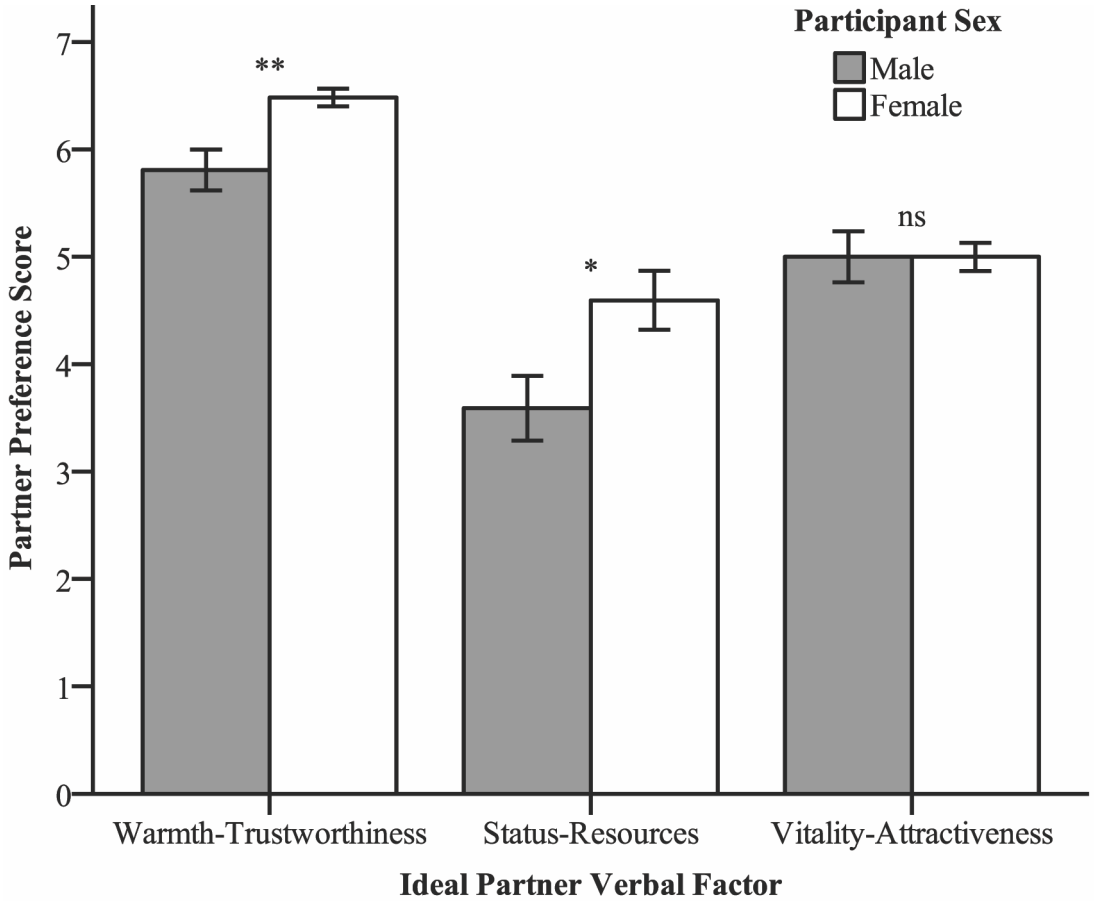
Figure 9.20. Individual participant partner preference difference scores for youthful-looking adult face images created with averaging techniques. Larger participant difference scores for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean difference scores.

9.3.2. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences with the aim of further exploring the findings from Study 1. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as

outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor was subjected to a mixed 3 x 2 ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and participant sex. The model did not violate sphericity.

Findings revealed no significant interaction effect between factors and participant sex $\left(F(2,76) = 2.78, MSE = 2.62, p = .068, \eta_p^2 = .07\right)$. Findings, further, revealed a significant main effect of factors $\left(F(2,76) = 44.89, MSE = 42.35, p < .001, \eta_p^2 = .54\right)$ in which participants prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least in importance (see Figure 9.21). Moreover, there was a significant main effect of participant sex $\left(F(1,38) = 10.03, MSE = 9.41, p = .003, \eta_p^2 = .21\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that both sexes prioritised warmth-trustworthiness, followed by vitality-attractiveness, with status-resources ranked least important. There were significant differences (*p*s < .01) between each of the three ideal partner verbal factors. In addition, women significantly preferred warmth-trustworthiness ($p = .002$) and status-resources ($p = .018$), relative to men, with no significant difference between both sexes in preference for vitality-attractiveness ($p = 1.00$). These results are consistent with the hypotheses and with much research revealing that men and women prioritise traits related to warmth-trustworthiness in a romantic partner (e.g., Buss, 1989; Fletcher et al., 1999; Li et al., 2002).



Bonferroni adjustment for pairwise comparisons: **. p < .01, *. p < 05, ns. not significant
Error bars: +/- 1 SE

Figure 9.21. Verbal partner preferences separated by participant sex. Larger partner preference scores reveal a greater preference for a particular factor.

9.3.3. Face Images and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. A dissociation between preferences measured using face stimuli and a verbal measure was expected, with face images predicted to reveal that participants prioritised vitality-attractiveness and the verbal measure predicted to reveal that participants prioritised warmth-trustworthiness.

Concerning preferences for face images, the individual participants' mean difference scores relating to the three ideal partner face factors was calculated. With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-

resources, and vitality-attractiveness verbal factors. The individual participants' mean difference scores for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A mixed 3 x 2 x 2 ANOVA was conducted between the ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), stimuli (face stimuli, verbal measure), and participant sex. The model did not violate sphericity.

Findings revealed a significant interaction effect between the ideal partner factors, stimuli, and participant sex $\left(F(2,76) = 13.64, MSE = 12.24, p < .001, \eta_p^2 = .26\right)$ and a significant interaction effect between factors and stimuli $\left(F(2,76) = 60.91, MSE = 54.66, p < .001, \eta_p^2 = .62\right)$. There was a significant interaction effect between stimuli and participant sex $\left(F(1,38) = 22.76, MSE = 30.32, p < .001, \eta_p^2 = .38\right)$ but no significant interaction effects between factors and participant sex $\left(F(2,76) = 3.12, MSE = 2.46, p = .050, \eta_p^2 = .08\right)$. There was a significant main effect of factors $\left(F(2,76) = 72.59, MSE = 57.19, p < .001, \eta_p^2 = .66\right)$ in which participants prioritised the vitality-attractiveness factor, followed closely by the warmth-trustworthiness factor. Moreover, there was a significant main effect of stimuli $\left(F(1,38) = 504.09, MSE = 671.45, p < .001, \eta_p^2 = .93\right)$ but no significant effect for participant sex $\left(F(1,38) = 1.16, MSE = 1.37, p = .289, \eta_p^2 = .03\right)$. These findings are in accordance with the hypotheses and with previous research revealing dissociation between preferences measured using word and face stimuli (e.g., Eastwick et al., 2008, 2011; Eastwick et al., 2014; Gawronski, Geschke, & Banse, 2003; Fletcher et al., 2004; Li et al., 2002; Buss, 1989).

Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that, when evaluating face images, men preferred status-resources more than women ($p < .001$), with no significant sex differentiated preferences for warmth-trustworthiness or vitality-attractiveness. The verbal measure revealed that women preferred warmth-trustworthiness ($p < .01$) and status-resources ($p < .05$) more than men, with no significant sex differentiated preferences for vitality-attractiveness. Further, regarding the ideal partner face factors, vitality-attractiveness was prioritised relative to

warmth-trustworthiness and status-resources (ps < .001), with no significant differences between warmth-trustworthiness and status-resources. There were significant differences between each of the ideal partner verbal factors (ps < .01) and warmth-trustworthiness was prioritised, followed by vitality-attractiveness, with status-resources ranking last.

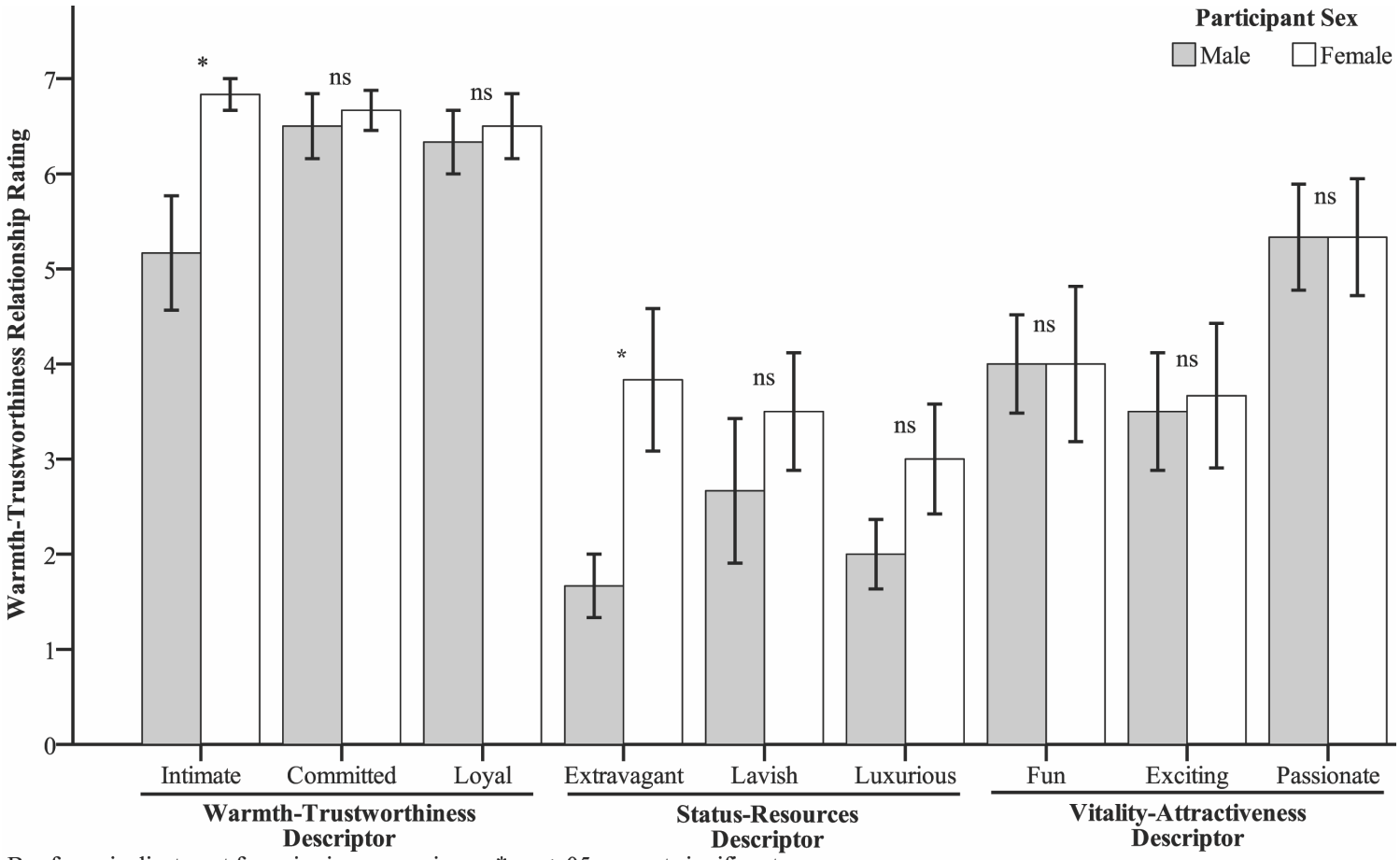
Appendix D: Potential Partner Preferences to Faces are Dominated by Physical Attractiveness

9.4. Study: Part 1

To determine which relationship descriptors were most suitable for a warmth-trustworthiness, status-resources, and vitality-attractiveness relationship, a mixed 3 x 9 x 2 ANOVA was conducted between type of relationship (warmth-trustworthiness, status-resources, and vitality-attractiveness), descriptor (intimate, committed, loyal, extravagant, lavish, luxurious, fun, exciting, and passionate), and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

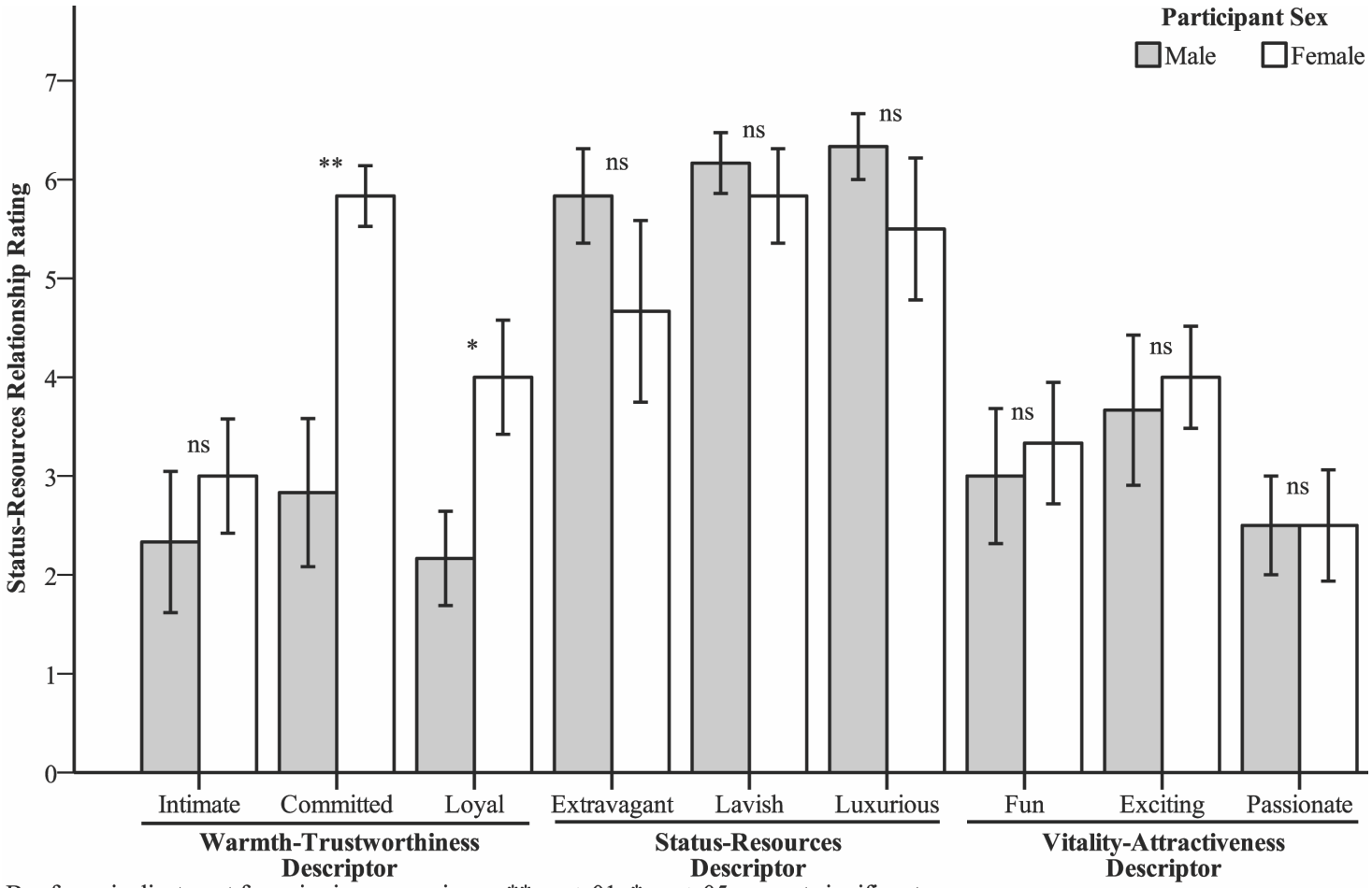
Findings revealed a significant interaction effect between type of relationship, descriptor, and participant sex $\left(F(5.87, 58.74) = 2.33, MSE = 9.02, p = .045, \eta_p^2 = .19\right)$ and a significant interaction effect between type of relationship and descriptor $\left(F(5.87, 58.74) = 20.83, MSE = 80.53, p < .001, \eta_p^2 = .68\right)$. There was no significant interaction effect between type of relationship and participant sex $\left(F(1.68, 16.81) = 1.14, MSE = 7.02, p = .334, \eta_p^2 = .10\right)$ or between descriptor and participant sex $\left(F(3.65, 36.48) = 0.88, MSE = 2.86, p = .477, \eta_p^2 = .08\right)$. Furthermore, findings revealed a significant main effect for descriptor $\left(F(3.65, 36.48) = 4.12, MSE = 13.39, p = .009, \eta_p^2 = .29\right)$, with no significant main effect for type of relationship $\left(F(1.68, 16.81) = 2.28, MSE = 14.04, p = .139, \eta_p^2 = .19\right)$.

Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed mostly no significant sex differences in the descriptors (see Figure 9.22, Figure 9.23, and Figure 9.24). The three selected descriptors were loyal for a warmth-trustworthiness relationship, lavish for a status-resources relationship, and exciting for a vitality-attractiveness relationship. These descriptors revealed no sex differences when rated on a warmth-trustworthiness relationship, a status-resources relationship, or a vitality-attractiveness relationship, with the exception of loyal regarding a status-resources relationship. Hence, considering the absence of sex differences in the descriptor ratings on the specific type of relationships that they were selected to represent, these three descriptors were suitable for both sexes when representing their specific relationship type.



Bonferroni adjustment for pairwise comaprisons: *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.22. Ratings of the descriptors selected to represent warmth-trustworthiness, status-resources, and vitality-attractiveness on a warmth-trustworthiness relationship, separated by participant sex. Higher ratings reveal that a particular descriptor is better suited to represent a warmth-trustworthiness relationship.



Bonferroni adjustment for pairwise comparisons: **. p < .01, *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.23. Ratings of the descriptors selected to represent warmth-trustworthiness, status-resources, and vitality-attractiveness on a status-resources relationship, separated by participant sex. Higher ratings reveal that a particular descriptor is better suited to represent a status-resources relationship.

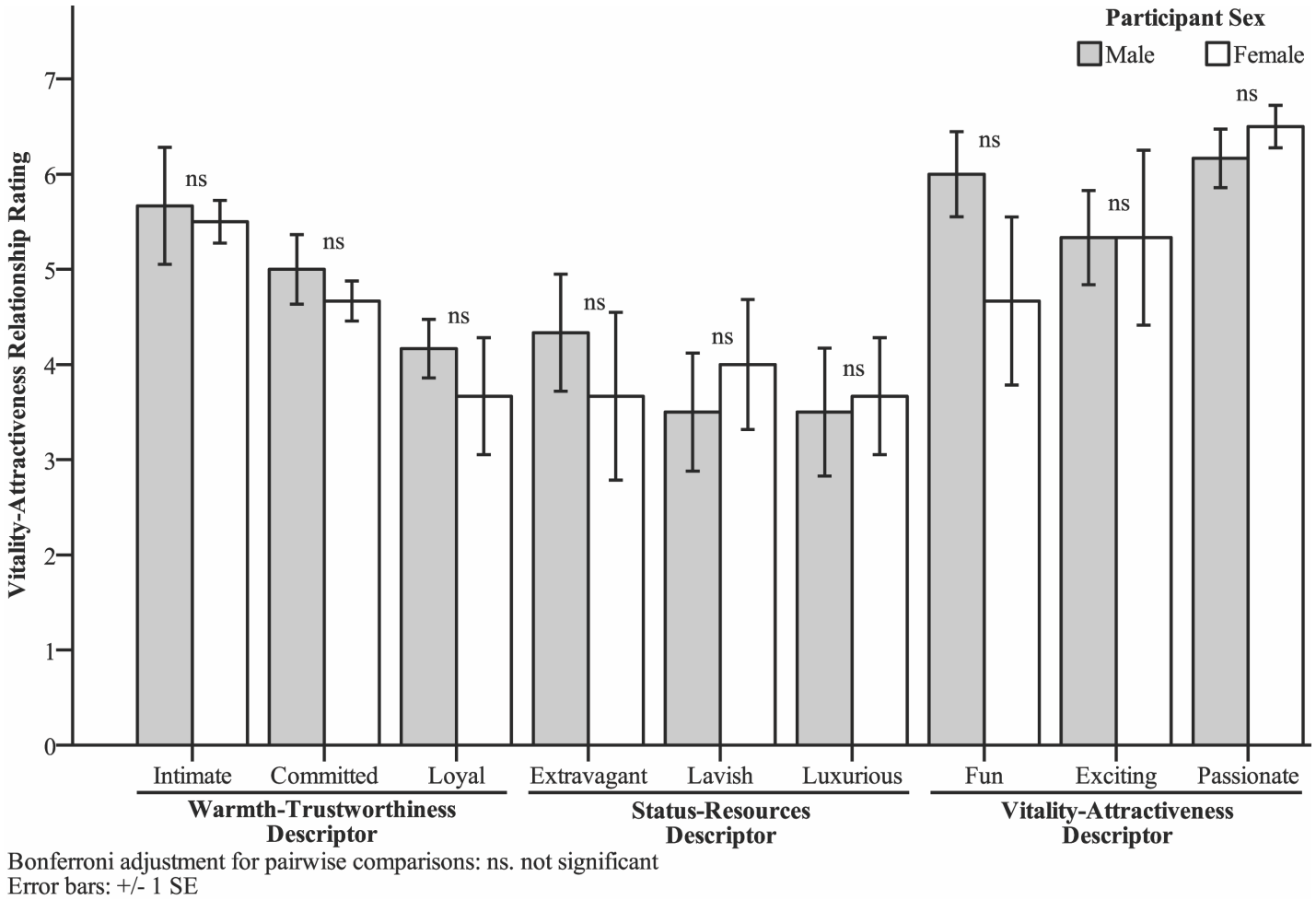
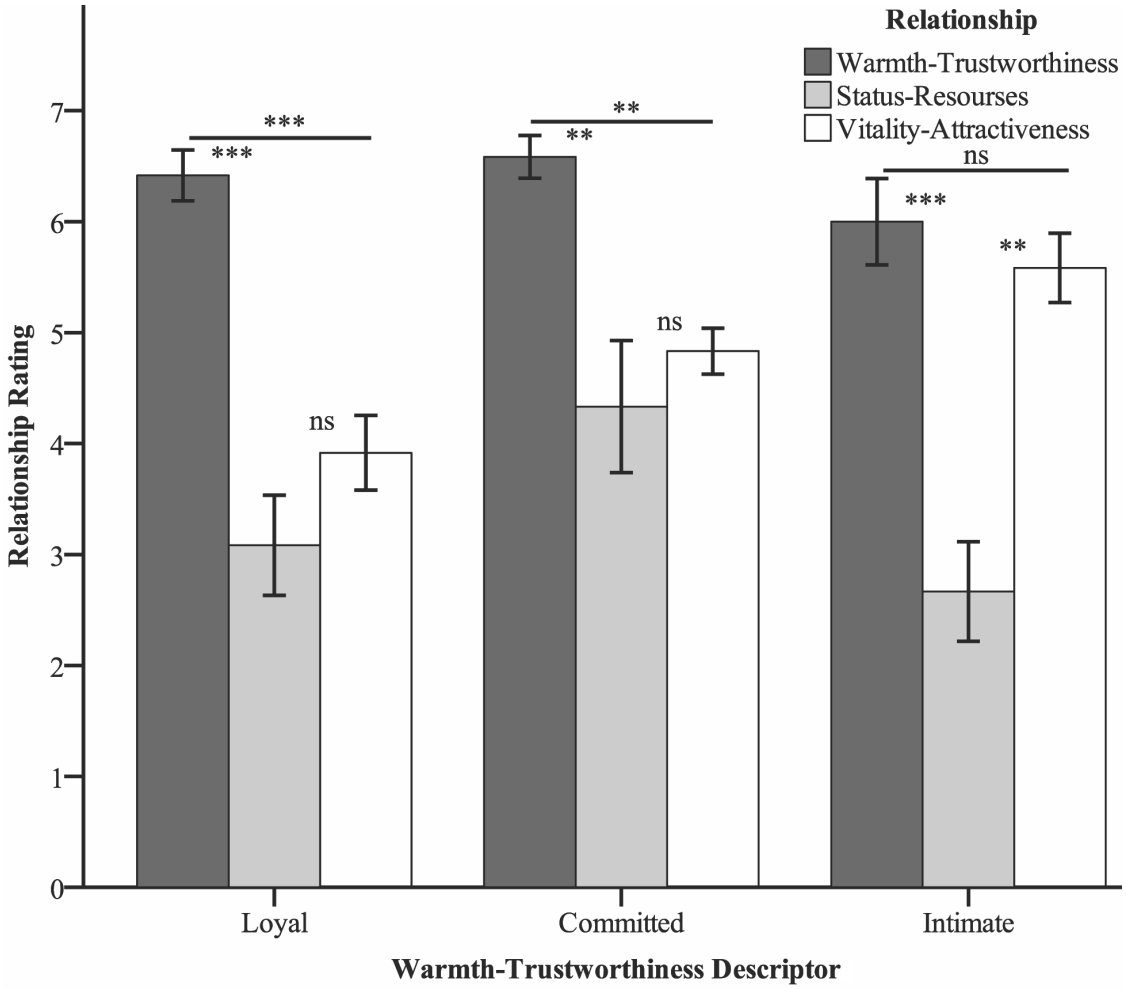
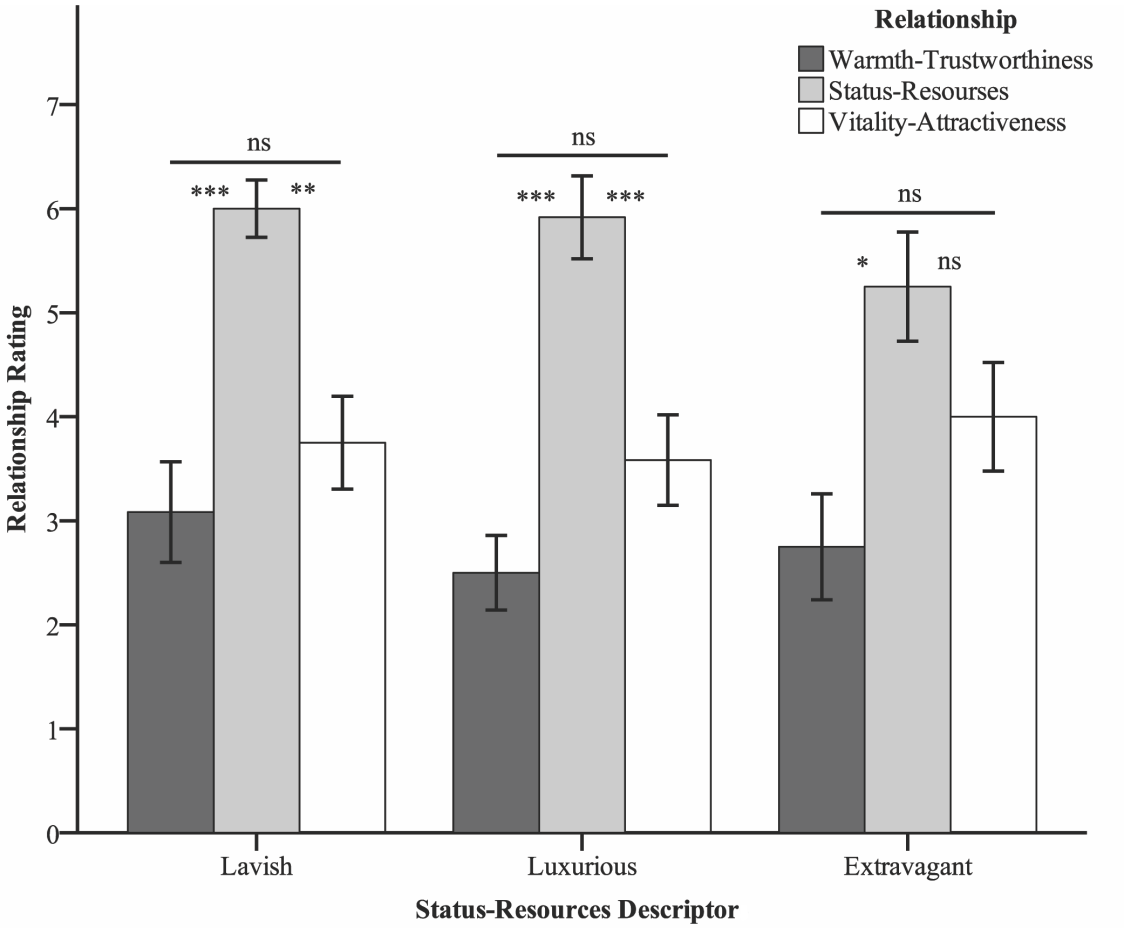


Figure 9.24. Ratings of the descriptors selected to represent warmth-trustworthiness, status-resources, and vitality-attractiveness on a vitality-attractiveness relationship, separated by participant sex. Higher ratings reveal that a particular descriptor is better suited to represent a vitality-attractiveness relationship.



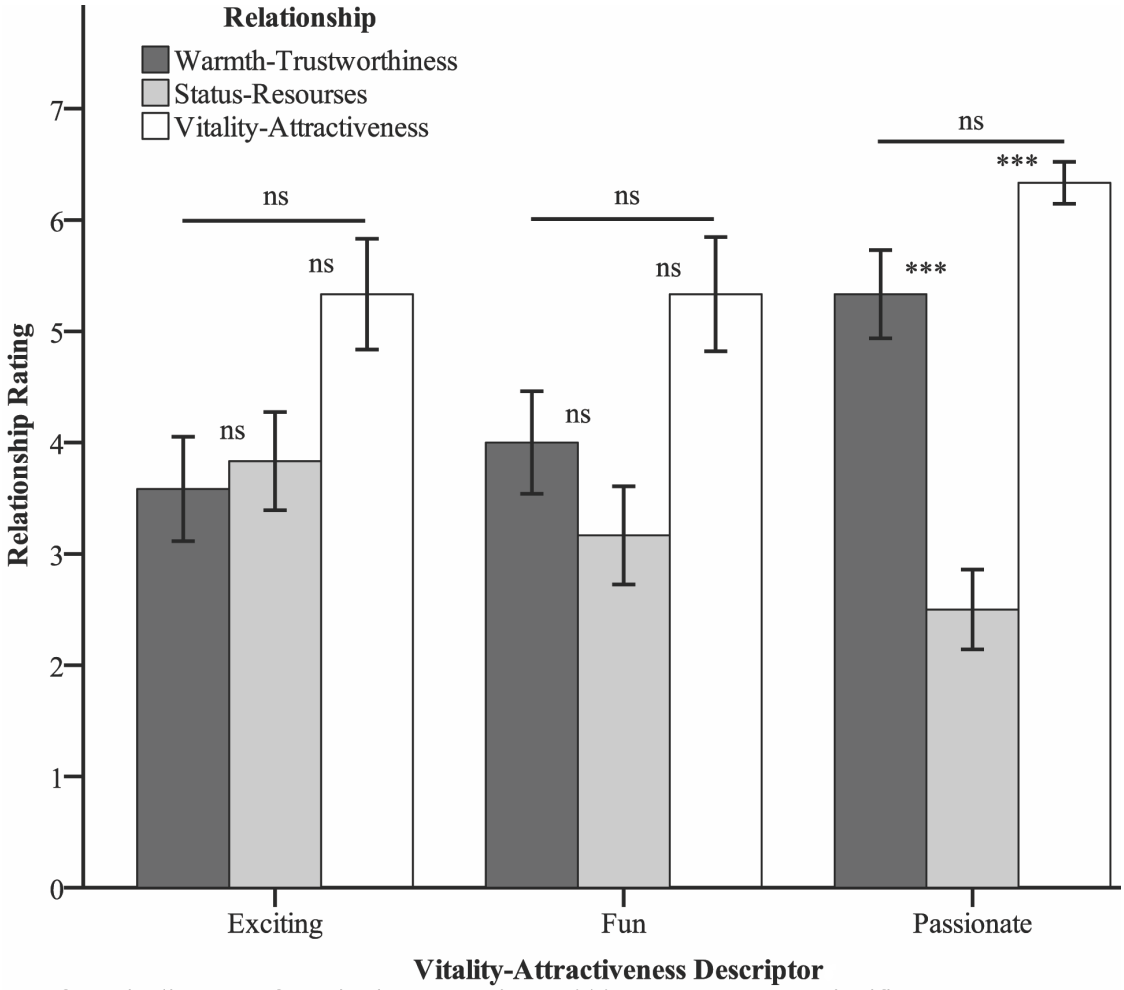
Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 9.25. Ratings of the warmth-trustworthiness descriptors on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship. Higher ratings reveal that a particular descriptor is better suited to represent a specific type of relationship.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.26. Ratings of the status-resources descriptors on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship. Higher ratings reveal that a particular descriptor is better suited to represent a specific type of relationship.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 9.27. Ratings of the status-resources descriptors on a warmth-trustworthiness relationship, a status-resources relationship, and a vitality-attractiveness relationship. Higher ratings reveal that a particular descriptor is better suited to represent a specific type of relationship.

9.5. Study: Part 2

9.5.1. Relationship Type: Face Images

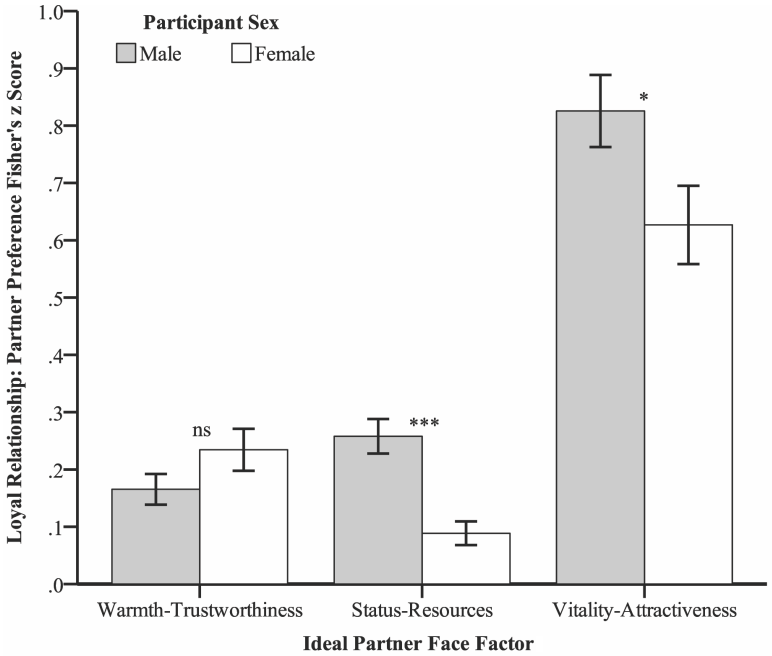
To determine whether there was a significant difference between the factors that are prioritised in partner face ratings as a function of type of relationship (loyal, lavish, and exciting), there were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference face ratings were correlated with the regression factor scores for the ideal partner face

model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant partner preference Fisher's z scores were subjected to a mixed 3 x 3 x 2 ANOVA was conducted between type of relationship (loyal, lavish, and exciting), ideal partner face factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

There was no significant interaction effect between type of relationship, factor, and sex $\left(F(2.52, 67.97) = 0.15, MSE = 0.01, p = .901, \eta_p^2 = .01\right)$ or between type of relationship and participant sex $\left(F(2, 54) = 0.26, MSE = 0.01, p = .770, \eta_p^2 = .01\right)$, or between type of relationship and factor $\left(F(2.52, 67.97) = 2.42, MSE = 0.08, p = .084, \eta_p^2 = .08\right)$. Findings revealed a significant interaction effect between factor and participant sex $\left(F(1.26, 67.97) = 13.81, MSE = 0.47, p < .001, \eta_p^2 = .20\right)$ and a significant main effect for factor $\left(F(1.26, 67.97) = 336.02, MSE = 11.38, p < .001, \eta_p^2 = .86\right)$ and participant sex $\left(F(1, 54) = 8.37, MSE = 0.24, p = .005, \eta_p^2 = .13\right)$, with no significant main effect for type of relationship $\left(F(2, 54) = 1.21, MSE = 0.04, p = .306, \eta_p^2 = .04\right)$.

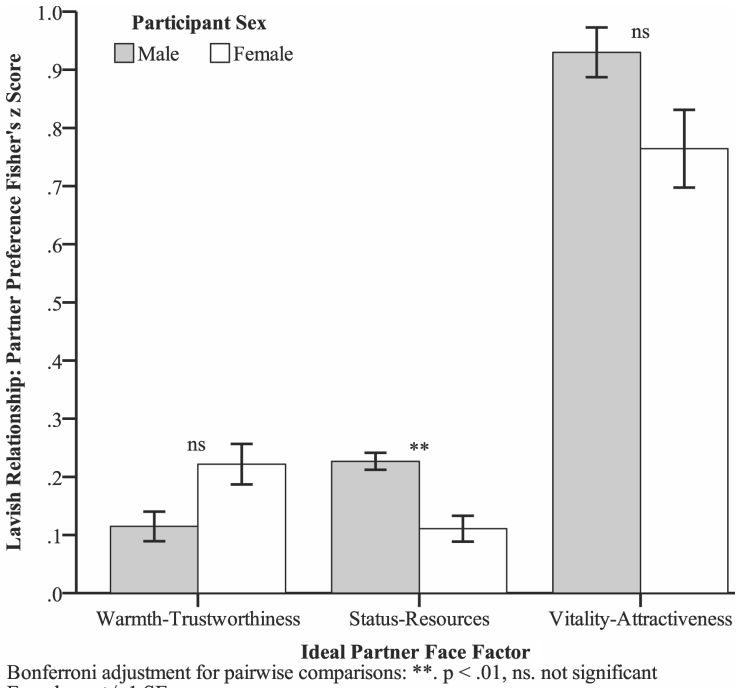
Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that men and women prioritised the vitality-attractiveness factor relative to the warmth-trustworthiness and the status-resources factors. See Figure 9.28, Figure 9.29, and Figure 9.30 for partner preferences for ambient face stimuli for a loyal, lavish, and exciting relationship. There were significant differences between each of the ideal partner face factors for both men and women (warmth-trustworthiness: $p = .026$, status-resources: $p < .001$, and vitality-attractiveness: $p = .003$). Men preferred vitality-attractiveness and status-resources to a greater extent than women and, in contrast, women preferred warmth-trustworthiness to a greater extent than men. Of note, firstly, that any sex differentiated preferences are minor in comparison the main effect that both sexes prioritised vitality-attractiveness, independent of relationship type. These findings are consistent with previous research (Chapters 3 and 4) revealing that individuals prioritise vitality-attractiveness, including attractiveness-related traits. Secondly, both sexes rated

different sets of faces (opposite-sex faces) and, hence, sex differentiated preferences cannot be determined.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, *. p < .05, ns. not significant.
Error bars: +/- 1 SE

Figure 9.28. Partner preferences for ambient face stimuli for a loyal relationship, as a function of the ideal partner face model and separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.



Bonferroni adjustment for pairwise comparisons: **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 9.29. Partner preferences for ambient face stimuli for a lavish relationship, as a function of the ideal partner face model and separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

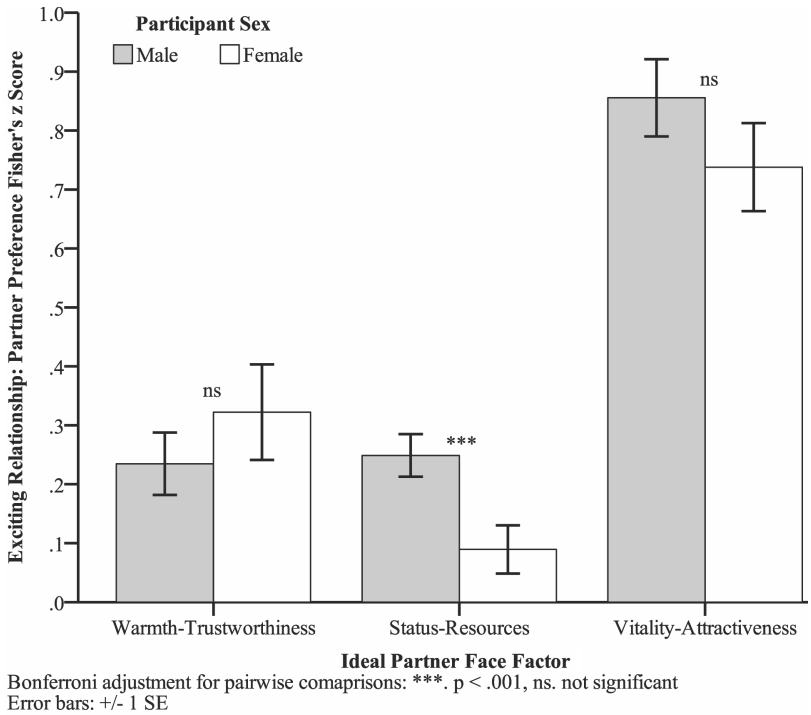


Figure 9.30. Partner preferences for ambient face stimuli for an exciting relationship, as a function of the ideal partner face model and separated by participant sex. Larger Fisher's z scores reveal a greater preference for a particular factor reflected in the partner preference face ratings.

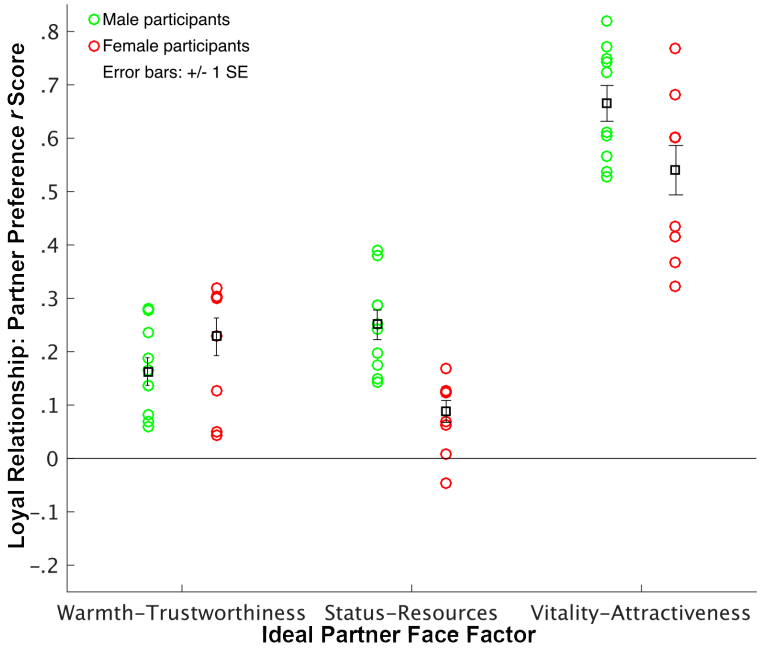


Figure 9.31. Individual participant partner preference face ratings for a loyal relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

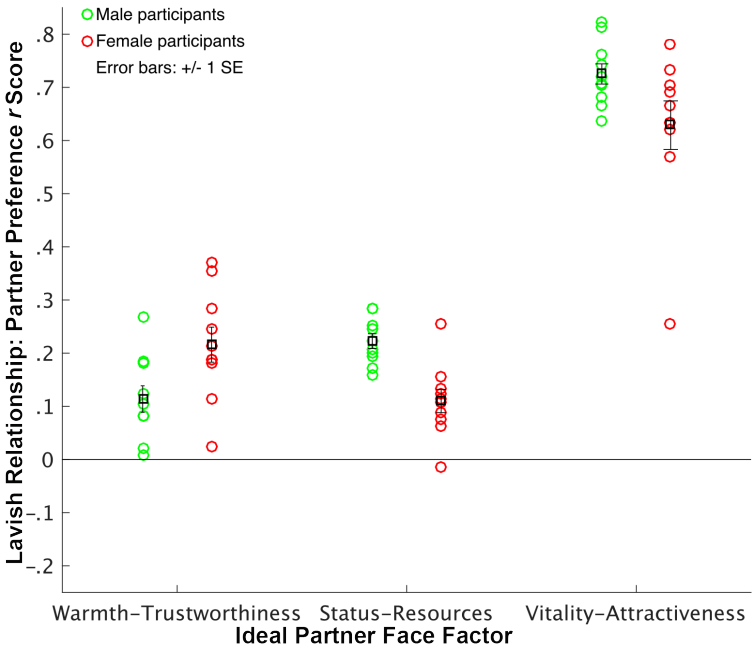


Figure 9.32. Individual participant partner preference face ratings for a lavish relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

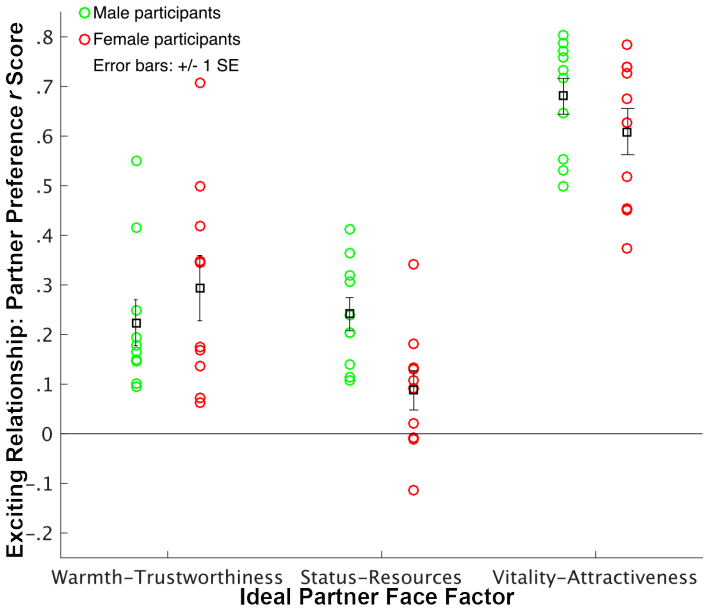


Figure 9.33. Individual participant partner preference face ratings for an exciting relationship correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

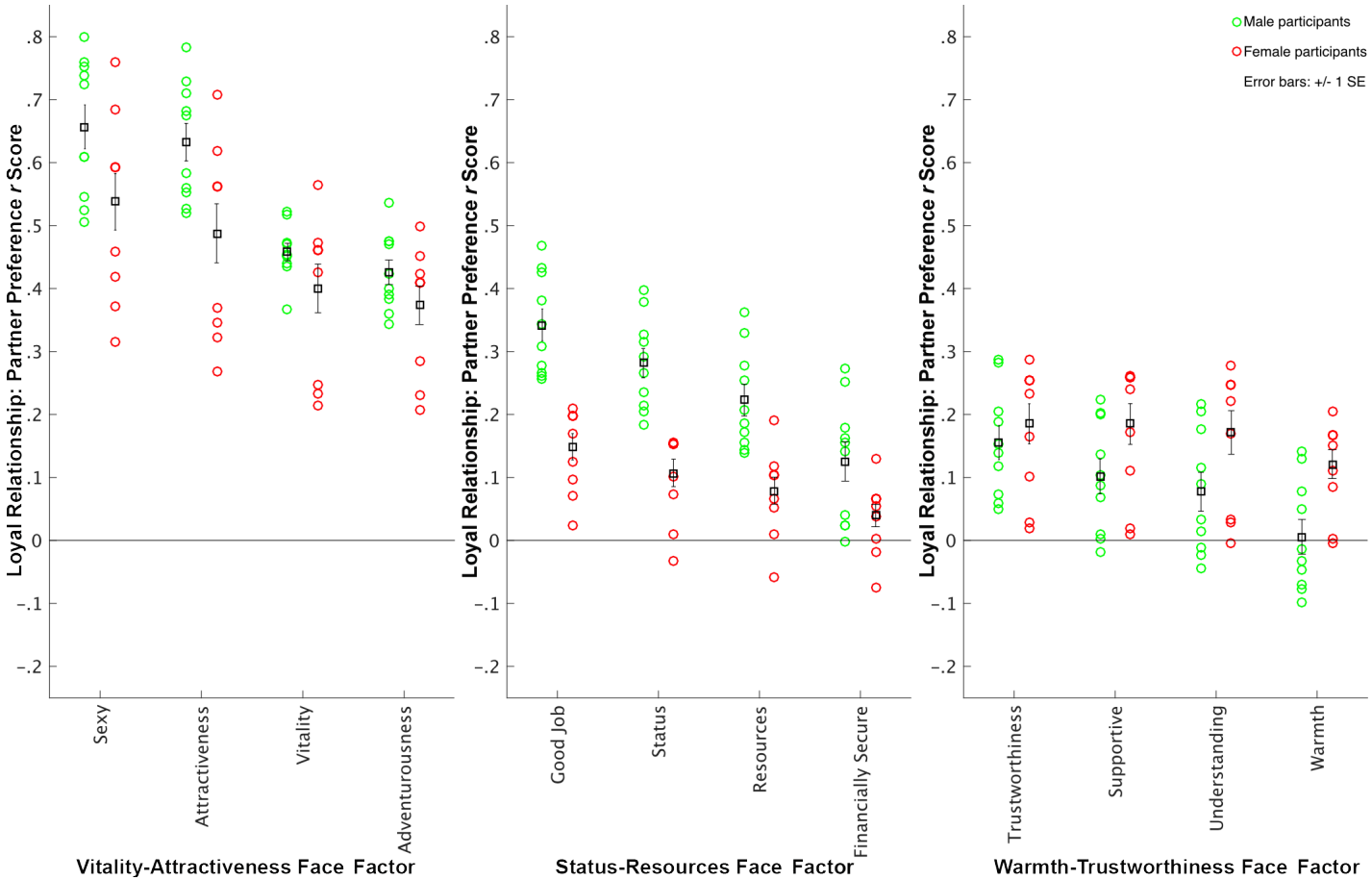


Figure 9.34. Individual participant partner preference face ratings for a loyal relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

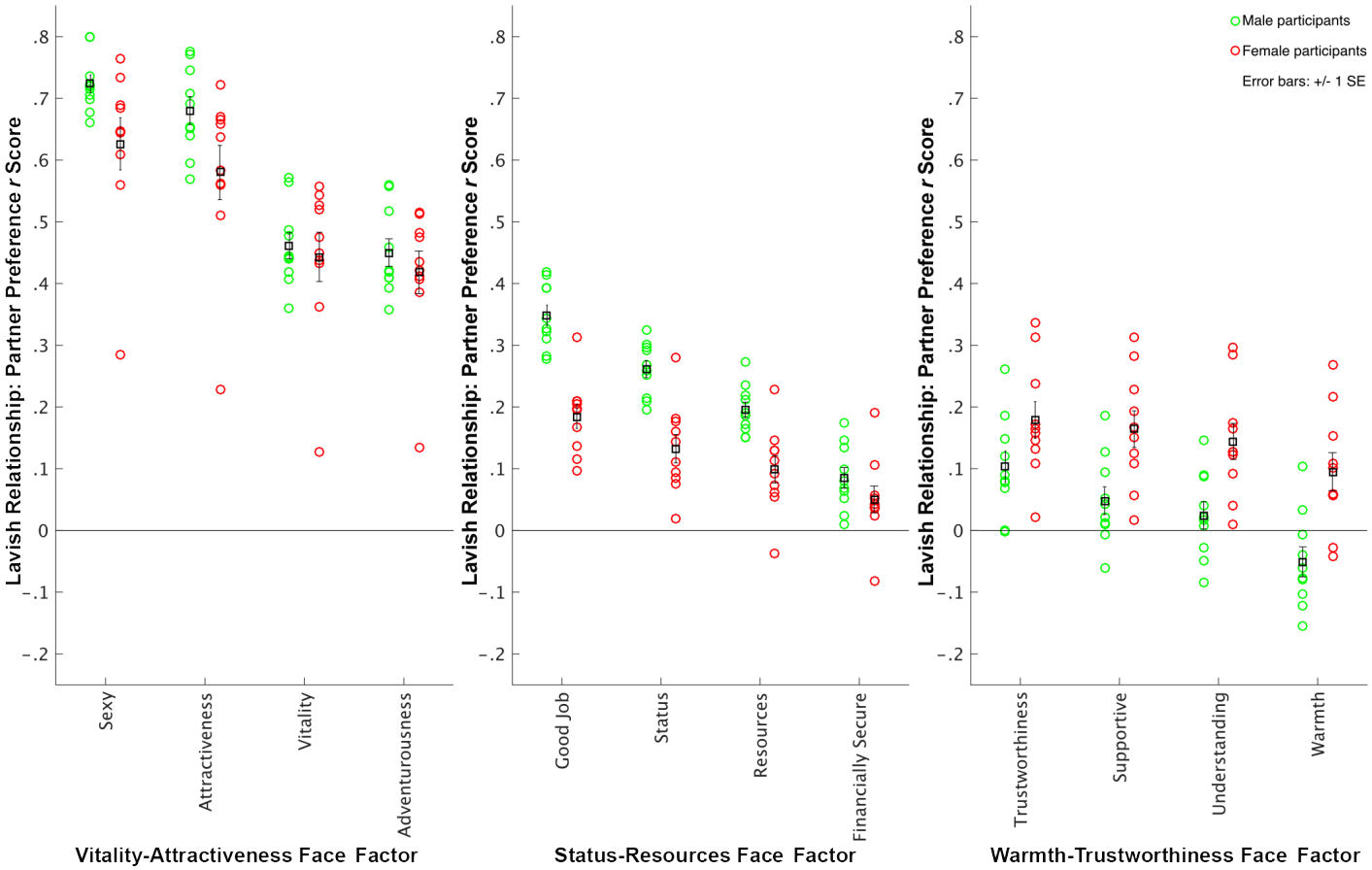


Figure 9.35. Individual participant partner preference face ratings for a lavish relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

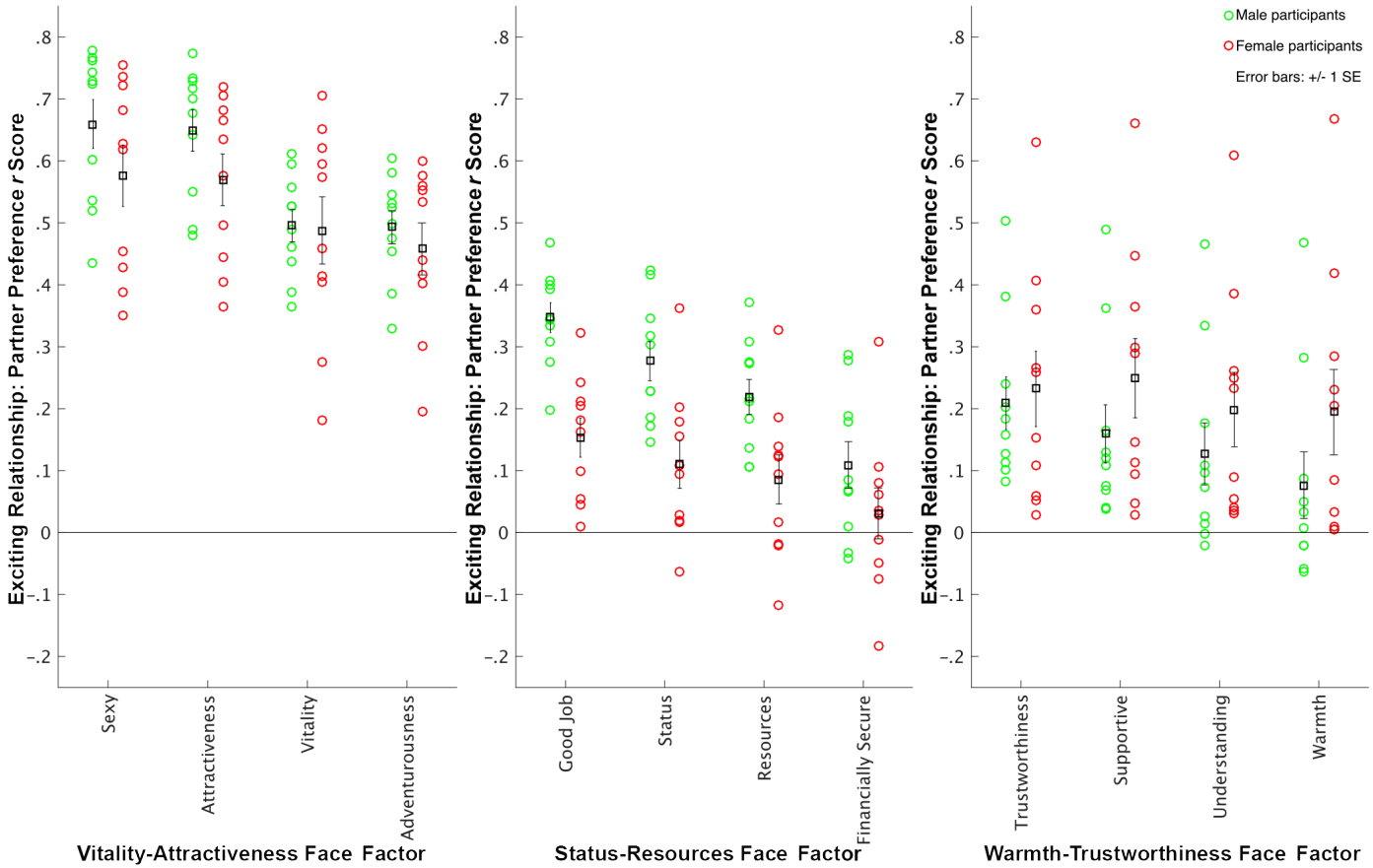
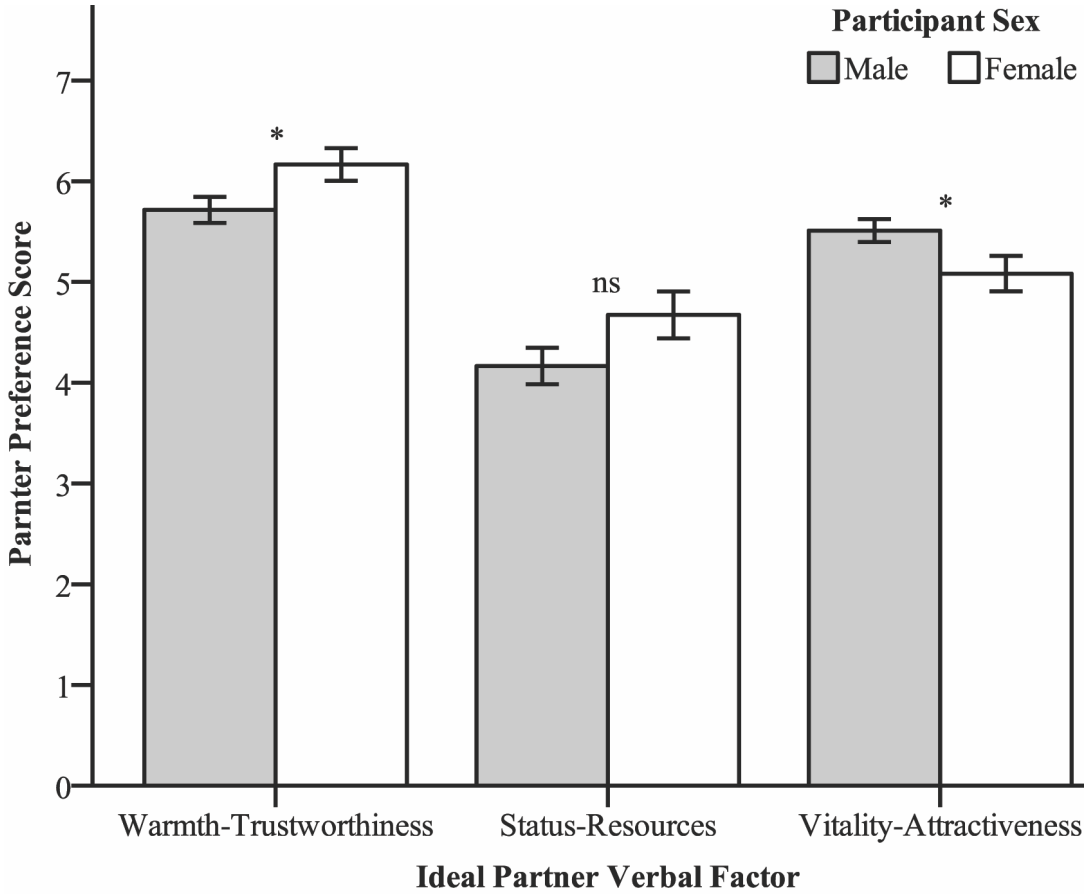


Figure 9.36. Individual participant partner preference face ratings for an exciting relationship correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' partner preferences. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

9.5.2. Verbal Measure

The ideal partner verbal factors were examined using a verbal measure of partner preferences. Firstly, each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors (as outlined in Fletcher et al., 1999). Secondly, the individual participant mean scores relating to each ideal partner verbal factor was subjected to a mixed 3 x 2 ANOVA between the ideal partner verbal factors (warmth-trustworthiness, status-resources, and vitality-attractiveness) and participant sex. The model did not violate sphericity.

Findings revealed a significant interaction effect between factors and participant sex $\left(F(2,116) = 5.58, MSE = 4.12, p = .005, \eta_p^2 = .09\right)$ and a significant a main effect of factors $\left(F(2,116) = 47.40, MSE = 35.00, p < .001, \eta_p^2 = .45\right)$. There was no main effect for participant sex $\left(F(1,58) = 1.25, MSE = 1.40, p = .269, \eta_p^2 = .02\right)$. Pairwise comparisons using Bonferroni's adjustment revealed that men preferred vitality-attractiveness to a greater extent than women, whereas women preferred warmth-trustworthiness more than men. Women prioritised warmth-trustworthiness, followed by vitality-attractiveness and, lastly, status-resources. Men prioritised warmth-trustworthiness and vitality-attractiveness with no significant difference between these factors (p = .901) and status-resources ranked least in importance (see Figure 9.37). There were no sex differentiated preferences concerning status-resources.



Bonferroni adjustment for paritwise comparisons: *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.37. Verbal partner preferences separated by participant sex. Larger partner preference scores reveal a greater preference for a particular factor.

The findings are in accordance with the hypotheses and with a meta-analysis on romantic preferences revealing stronger preferences for attractiveness relative to earning potential (Eastwick et al., 2014). In addition, much research reveals that participants prioritise traits related to warmth-trustworthiness in a romantic partner when using verbal measures (e.g., Chapter 4, Buss, 1989; Fletcher et al., 1999; Li et al., 2002).

9.5.3. Relationship Type, Face Images and the Verbal Measure

The correspondence between partner preferences for face images and a verbal measure of partner preferences was examined using an ANOVA. Concerning preferences for face images, there were two steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant partner preference

face ratings for each type of relationship were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). With regards to verbal preferences, as outlined in Fletcher et al. (1999), each participant's mean score derived from the Ideal Partner Scale was calculated for the warmth-trustworthiness, status-resources, and vitality-attractiveness verbal factors. The participant partner preference Fisher's z scores for each relationship type for face images and the verbal mean scores derived from the Ideal Partner Scale were subjected to an ANOVA. A mixed 3 x 3 x 2 x 2 ANOVA was conducted between type of relationship (loyal, lavish, and exciting), ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), stimuli (face stimuli, verbal measure), and participant sex. The model did not violate sphericity.

Findings revealed no significant interaction effect between relationship type, ideal partner factors, stimuli, and participant sex $\left(F(4,108) = 0.12, MSE = 0.05, p = .975, \eta_p^2 = .00\right)$, no significant interaction effect between relationship type, ideal partner factors, and stimuli $\left(F(4,108) = 1.05, MSE = 0.45, p = .383, \eta_p^2 = .04\right)$, no significant interaction effect between relationship type, ideal partner factors, and participant sex $\left(F(4,108) = 0.12, MSE = 0.05, p = .975, \eta_p^2 = .00\right)$, no significant interaction effect between relationship type, stimuli, and participant sex $\left(F(2,54) = 1.16, MSE = 0.65, p = .322, \eta_p^2 = .04\right)$, no significant interaction effect between ideal partner factors, stimuli, and participant sex $\left(F(2,108) = 0.06, MSE = 0.03, p = .940, \eta_p^2 = .00\right)$, no significant interaction effect between relationship type and ideal partner factors $\left(F(4,108) = 1.06, MSE = 0.45, p = .378, \eta_p^2 = .04\right)$, no significant interaction effect between ideal partner factors and participant sex $\left(F(2,108) = 1.98, MSE = 0.84, p = .143, \eta_p^2 = .04\right)$, no significant interaction effect between relationship type and stimuli $\left(F(2,54) = 0.88, MSE = 0.49, p = .422, \eta_p^2 = .03\right)$, no significant interaction effect between relationship type and participant sex $\left(F(2,54) = 0.79, MSE = 0.48, p = .457, \eta_p^2 = .03\right)$, and no significant interaction effect between stimuli and participant sex $\left(F(1,54) = 1.64, MSE = 0.92, p = .205, \eta_p^2 = .03\right)$.

Further, findings revealed a significant interaction effect between ideal partner factors and stimuli $\left(F(2,108) = 44.16, MSE = 18.66, p < .001, \eta_p^2 = .45\right)$. There was a significant main effect of factors $\left(F(2,108) = 55.60, MSE = 23.50, p < .001, \eta_p^2 = .51\right)$ and a significant main effect of stimuli $\left(F(1,54) = 3733.27, MSE = 2097.53, p < .001, \eta_p^2 = .99\right)$, but no significant main effect of relationship type $\left(F(2,54) = 0.79, MSE = 0.48, p = .458, \eta_p^2 = .03\right)$ and no significant main effect of participant sex $\left(F(1,54) = 0.11, MSE = 0.07, p = .738, \eta_p^2 = .00\right)$.

Pairwise comparisons using Bonferroni's adjustment revealed that participants prioritised the warmth-trustworthiness and the vitality-attractiveness factors relative to the status-resources factor (*p*s < .001), with no significant difference between the warmth-trustworthiness and the vitality-attractiveness factors (*p* = 1.000). Partner preferences assessed using face stimuli revealed that participants prioritised the vitality-attractiveness face factor, relative to the warmth-trustworthiness and the status-resources face factors (*p*s < .001), with significant differences between each of these face factors (*p*s < .01). Preferences assessed using a verbal measure revealed that participants prioritised the warmth-trustworthiness verbal factor, followed by vitality-attractiveness, with status-resources ranking last. There were significant differences between each of these verbal factors (*p*s < .001). These findings are in accordance with the hypotheses and with Chapter 4, which revealed a dissociation between verbal measures and preferences measured using face stimuli (e.g., Chapter 4).

Appendix E: Evaluating Faces on Ideal Partner Traits after Minimal Time Exposure

Table 9.12. Ratings of face stimuli sets on trustworthiness, status, and attractiveness

Stimuli Sex	Stimuli Set	Trustworthiness[1]		Status		Attractiveness[2]	
		M	*SD*	*M*	*SD*	*M*	*SD*
Male	1: Practice	4.39	0.64	4.37	0.55	4.22	0.82
	2	3.70	0.78	3.79	0.80	3.25	0.84
	3	3.83	0.60	3.93	0.74	3.35	0.73
	4	3.74	0.81	3.96	0.75	3.32	0.80
	5	3.69	0.74	3.73	0.89	3.33	0.83
	6	3.82	0.72	3.79	0.75	3.35	0.74
	7	3.72	0.67	3.74	0.89	3.23	0.79
	8	3.78	0.61	3.87	0.74	3.45	0.82
	9	3.71	0.78	3.66	0.82	3.37	0.88
	10	3.83	0.86	3.89	0.97	3.32	0.76
Female	1: Practice	3.98	0.79	3.76	0.87	3.34	0.86
	2	4.48	0.64	4.13	0.73	3.85	0.98
	3	4.46	0.57	4.07	0.53	4.10	0.81
	4	4.49	0.50	3.92	0.69	3.82	0.82
	5	4.44	0.71	4.09	0.71	4.00	0.91
	6	4.25	0.71	3.97	0.71	3.83	0.79
	7	4.39	0.78	4.08	0.63	3.54	0.85
	8	4.37	0.68	3.97	0.61	3.84	0.78
	9	4.42	0.60	4.01	0.64	4.35	0.78
	10	4.31	0.59	3.84	0.61	3.82	0.87

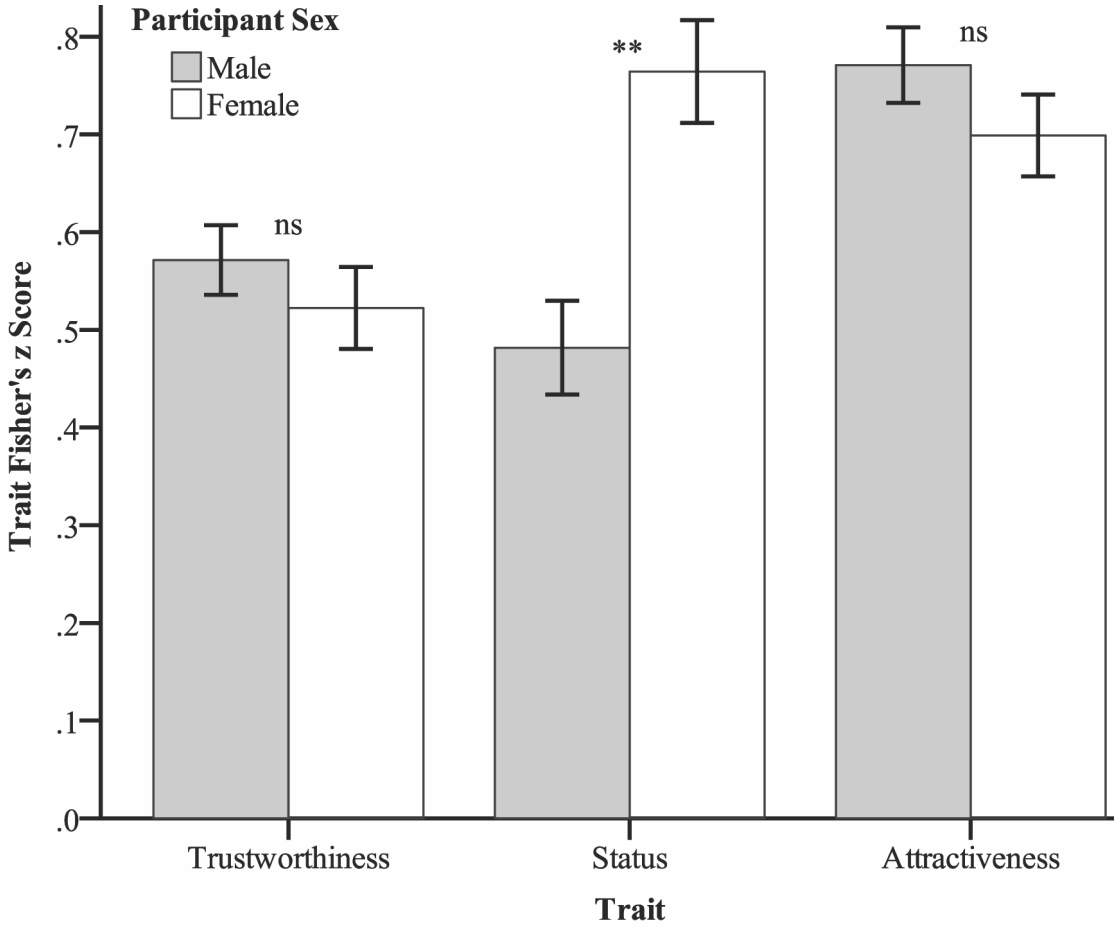
[1] Ratings collected by Santos and Young (2005, 2008, 2011) and Sutherland et al. (2013). Trustworthiness n = 20.
[2] Ratings by six participants were collected by Santos and Young (2005, 2008, 2011) and ratings by four participants were collected in this study.

9.6. ANOVA

To determine whether there was a significant difference between the trait ratings at differing exposure times, the trait ratings for each ambient face image made with minimal exposure times were correlated with the time unconstrained trait ratings for the same face images derived from Chapter 2 and these correlations were transformed using Fisher's z (Fisher, 1915, 1925). The individual participant Fisher's z scores were subjected to an ANOVA. A mixed 3 x 3 x 2 ANOVA was conducted between traits (trustworthiness, status, and attractiveness), exposure times (33 ms, 100 ms, and 500 ms), and participant sex. The model did not violate sphericity.

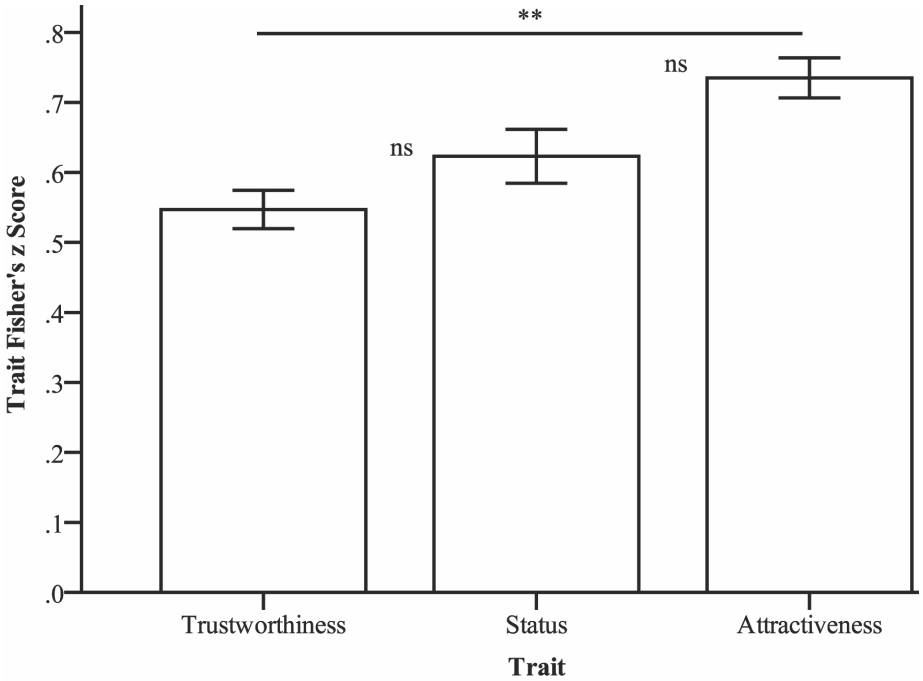
Findings revealed no significant interaction effect between exposure times, traits, and participant sex $\left(F(4,112) = 1.12, MSE = 0.06, p = .351, \eta_p^2 = .04\right)$, no significant interaction effect between exposure times and traits $\left(F(4,112) = 1.29, MSE = 0.07, p = .280, \eta_p^2 = .04\right)$, and no significant interaction effect between exposure times and participant sex $\left(F(2,56) = 0.76, MSE = 0.03, p = .473, \eta_p^2 = .03\right)$. There was a significant interaction effect between traits and participant sex $\left(F(2,56) = 9.92, MSE = 0.89, p < .001, \eta_p^2 = .26\right)$, a significant main effect for traits $\left(F(2,56) = 9.01, MSE = 0.81, p < .001, \eta_p^2 = .24\right)$, and a significant main effect for exposure times $\left(F(2,56) = 10.86, MSE = 0.42, p < .001, \eta_p^2 = .28\right)$.

Examination of the interaction effect between traits and participant sex using Bonferroni's adjustment for multiple pairwise comparisons revealed that women obtained significantly higher Fisher's z scores for status relative to men (p = .005), with no sex differences within the Fisher's z scores for trustworthiness or attractiveness (ps > .05; see Figure 9.38). In addition, the trustworthiness Fisher's z scores were significantly lower than the attractiveness Fisher's z scores (p = .001) and the status Fisher's z scores were significantly lower than the attractiveness Fisher's z scores (p = .037). There were no significant differences between the Fisher's z scores for trustworthiness or status (p = .325). Therefore, relative to trustworthiness and to status, attractiveness is easier to detect from face images presented at 33 ms, 100 ms, and 500 ms exposure times.



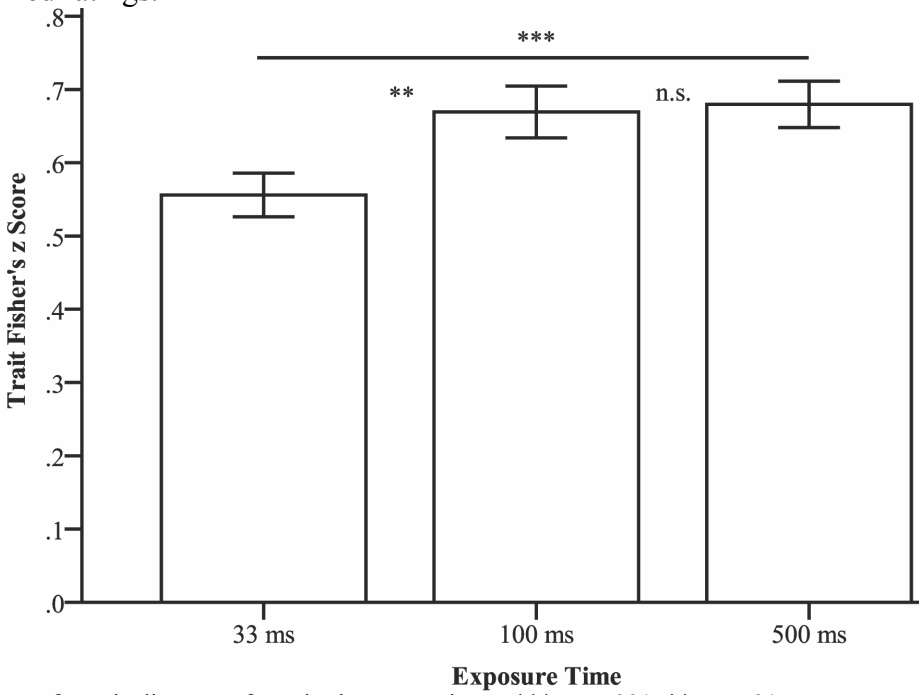
Bonferroni adjustment for pairwise comparisons: **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 9.38. Trustworthiness, status, and attractiveness Fisher's z scores for face stimuli presented for between 33 ms and 500 ms, separated by participant sex. Larger Fisher's z scores reveal a greater correspondence between ratings made with minimal exposure times and with time unconstrained ratings.



Bonferroni adjustment for pairwise comparisons: **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 9.39. Trustworthiness, status, and attractiveness Fisher's z scores for face stimuli presented for between 33 ms and 500 ms. Larger Fisher's z scores reveal a greater correspondence between ratings made with minimal exposure times and with time unconstrained ratings.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01
Error bars: +/- 1 SE

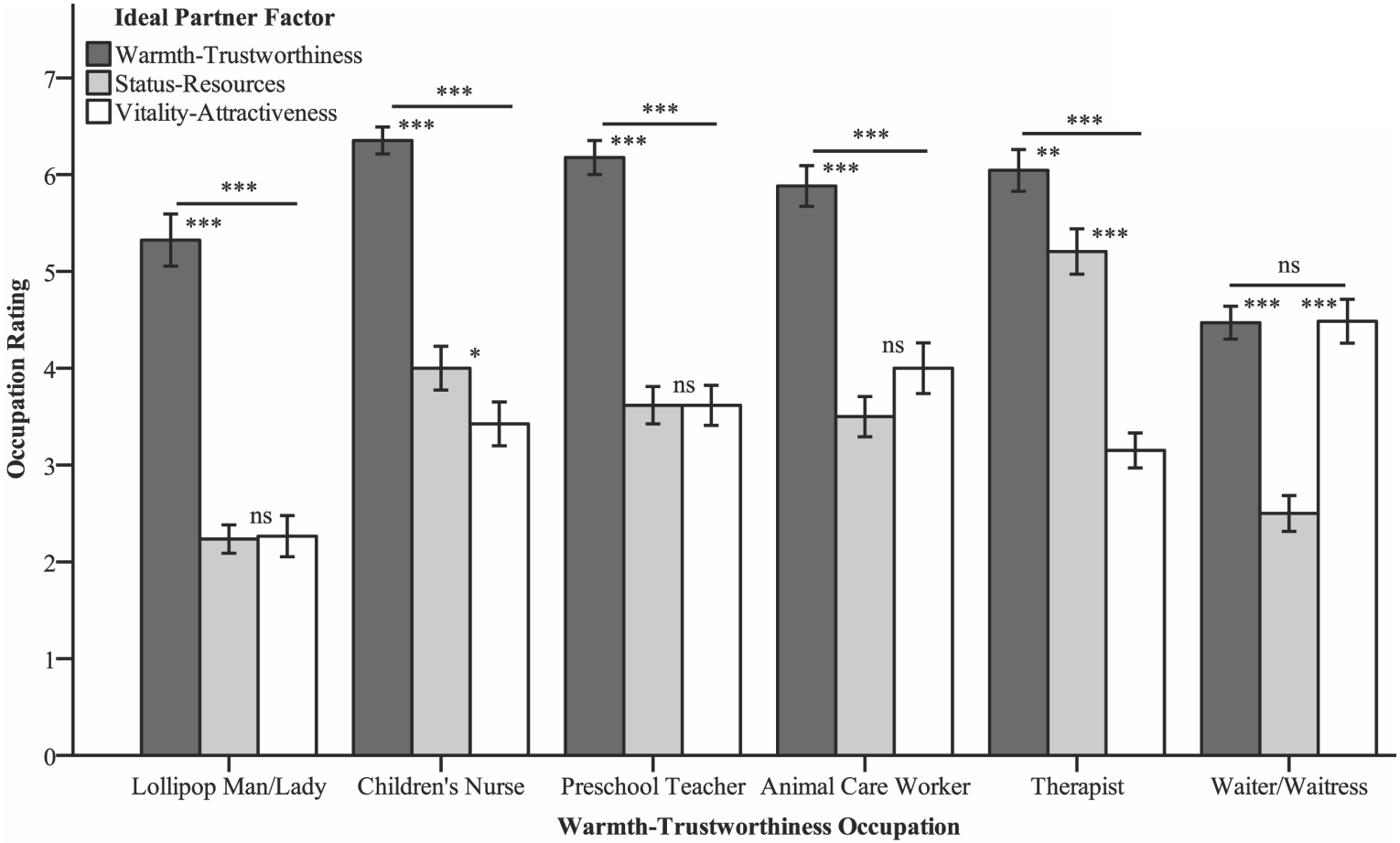
Figure 9.40. Trait Fisher's z scores for face stimuli presented at 33 ms, 100 ms, and 500 ms. Larger Fisher's z scores reveal a greater correspondence between ratings made with these minimal exposure times and with time unconstrained ratings.

Appendix F: Facial Judgements of Occupations are not Dominated by Attractiveness

Appendix F: Occupation Judgements

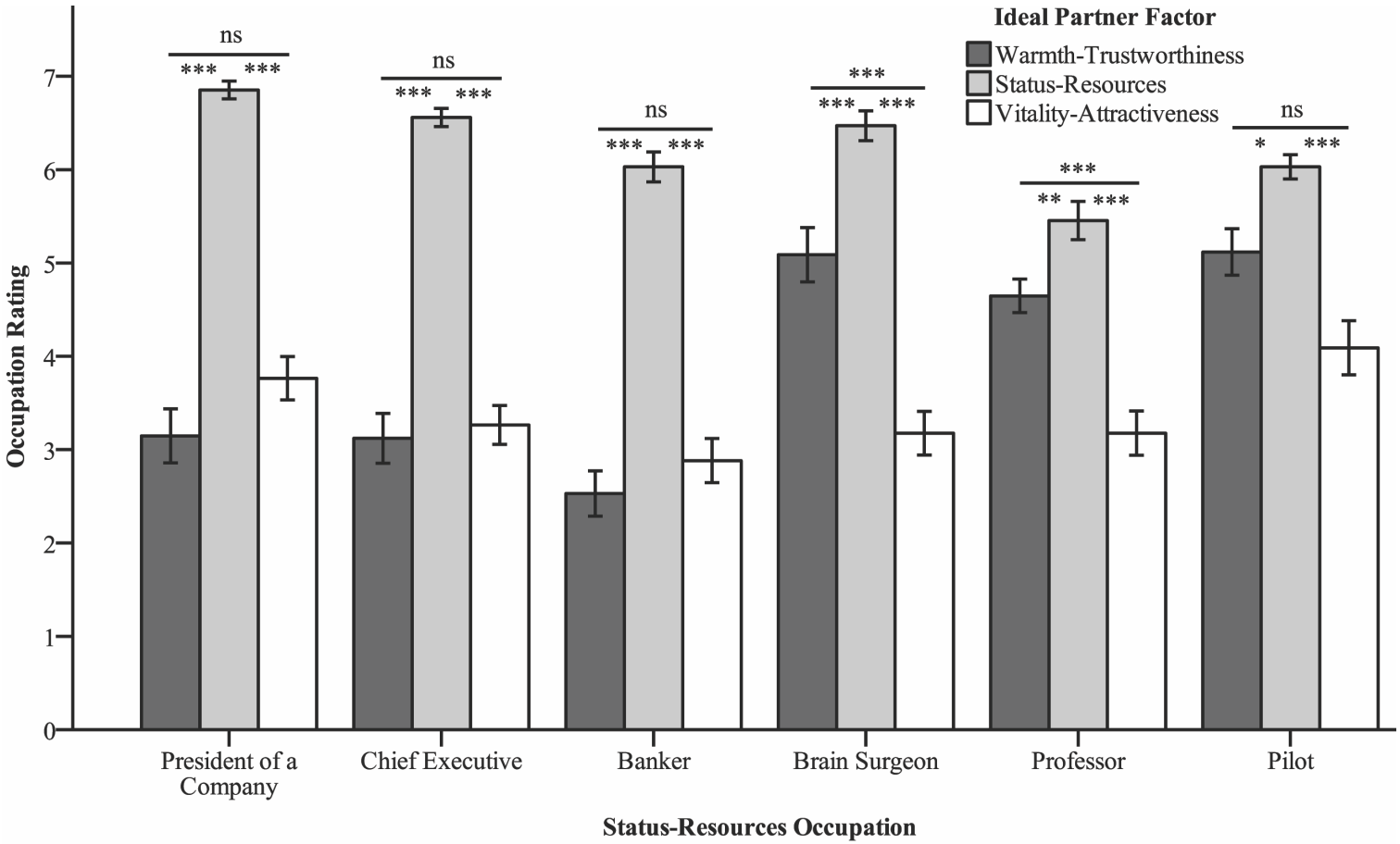
Table 9.13. Mean difference scores relating to each ideal partner factor for occupations selected to represent these factors

Factor	Occupation	Warmth-Trustworthiness	Status-Resources	Vitality-Attractiveness
Warmth-Trustworthiness	Lollipop Man/Lady	3.07	-1.56	-1.51
	Children's Nurse	2.64	-0.89	-1.75
	Preschool Teacher	2.56	-1.28	-1.28
	Animal Care Worker	2.13	-1.44	-0.69
	Therapist	1.87	0.61	-2.47
	Waiter/Waitress	0.98	-1.98	1.00
Status-Resources	President of a Company	-2.16	3.40	-1.24
	Chief Executive	-1.79	3.37	-1.58
	Banker	-1.93	3.32	-1.40
	Brain Surgeon	0.26	2.34	-2.60
	Professor	0.33	1.54	-1.87
	Pilot	0.06	1.43	-1.48
Vitality-Attractiveness	Dancer	-1.50	-0.71	2.21
	Fashion Model	-2.87	0.17	2.70
	Actor/Actress	-2.28	0.68	1.60
	Television Program Presenter	-1.56	0.96	0.60
	Secretary	0.31	-0.84	0.53
	Sales Person	-0.57	0.31	0.26



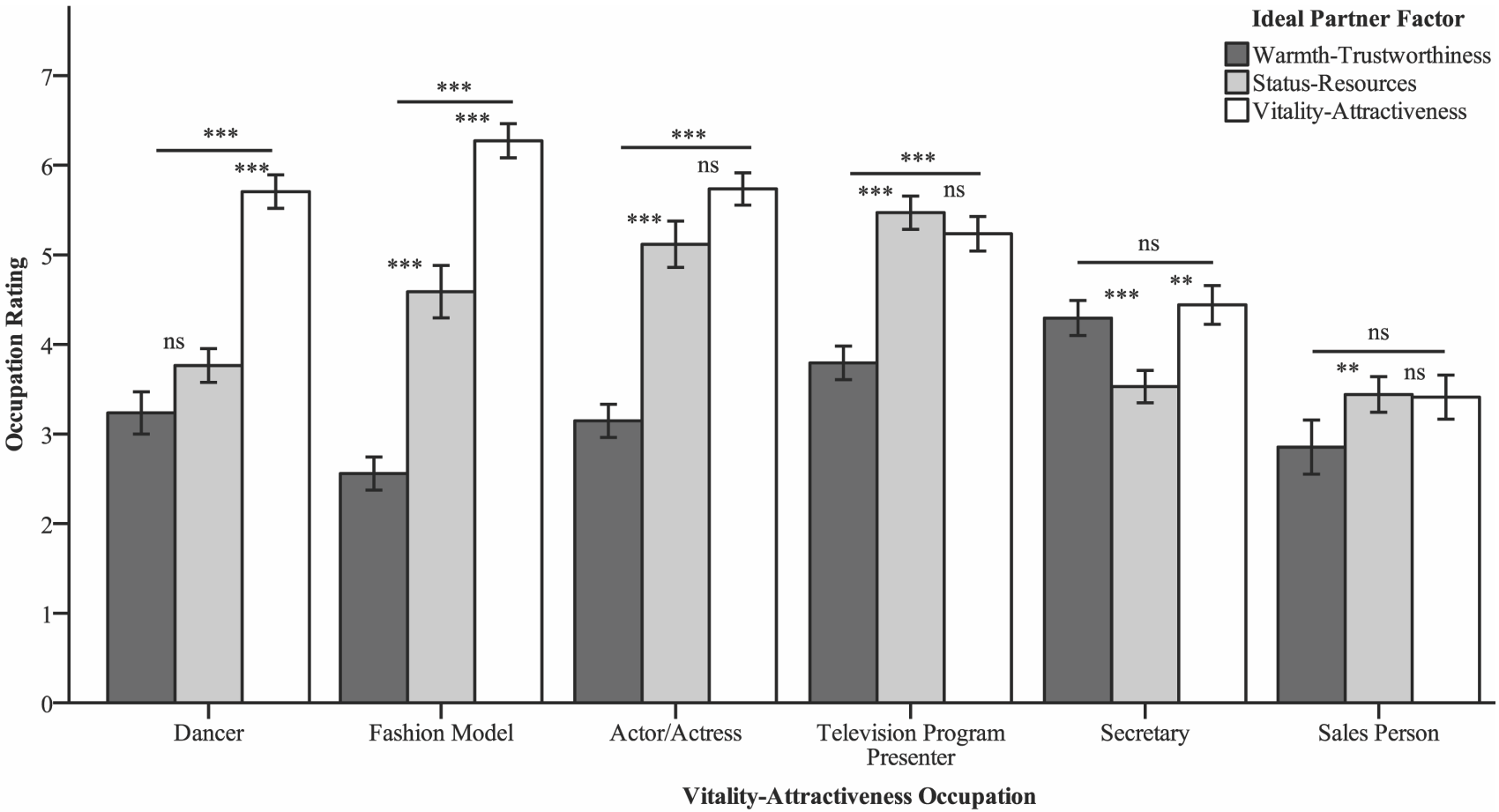
Bonferroni adjustment for pairwise comaprisons: ***. p < .001, **. p < .01, *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.3. Occupations selected to represent high warmth-trustworthiness, rated on warmth-trustworthiness, status-resources, and vitality-attractiveness.



Bonferroni adjustment for pairwise comparisons: ***. p < .001, **. p < .01, *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.4. Occupations selected to represent high status-resources, rated on warmth-trustworthiness, status-resources, and vitality-attractiveness.



Bonferroni adjustment for pairwise comparisons: ***. $p < .001$, **. $p < .01$, ns. not significant
Error bars: +/- 1 SE

Figure 9.5. Occupations selected to represent high vitality-attractiveness, rated on warmth-trustworthiness, status-resources, and vitality-attractiveness.

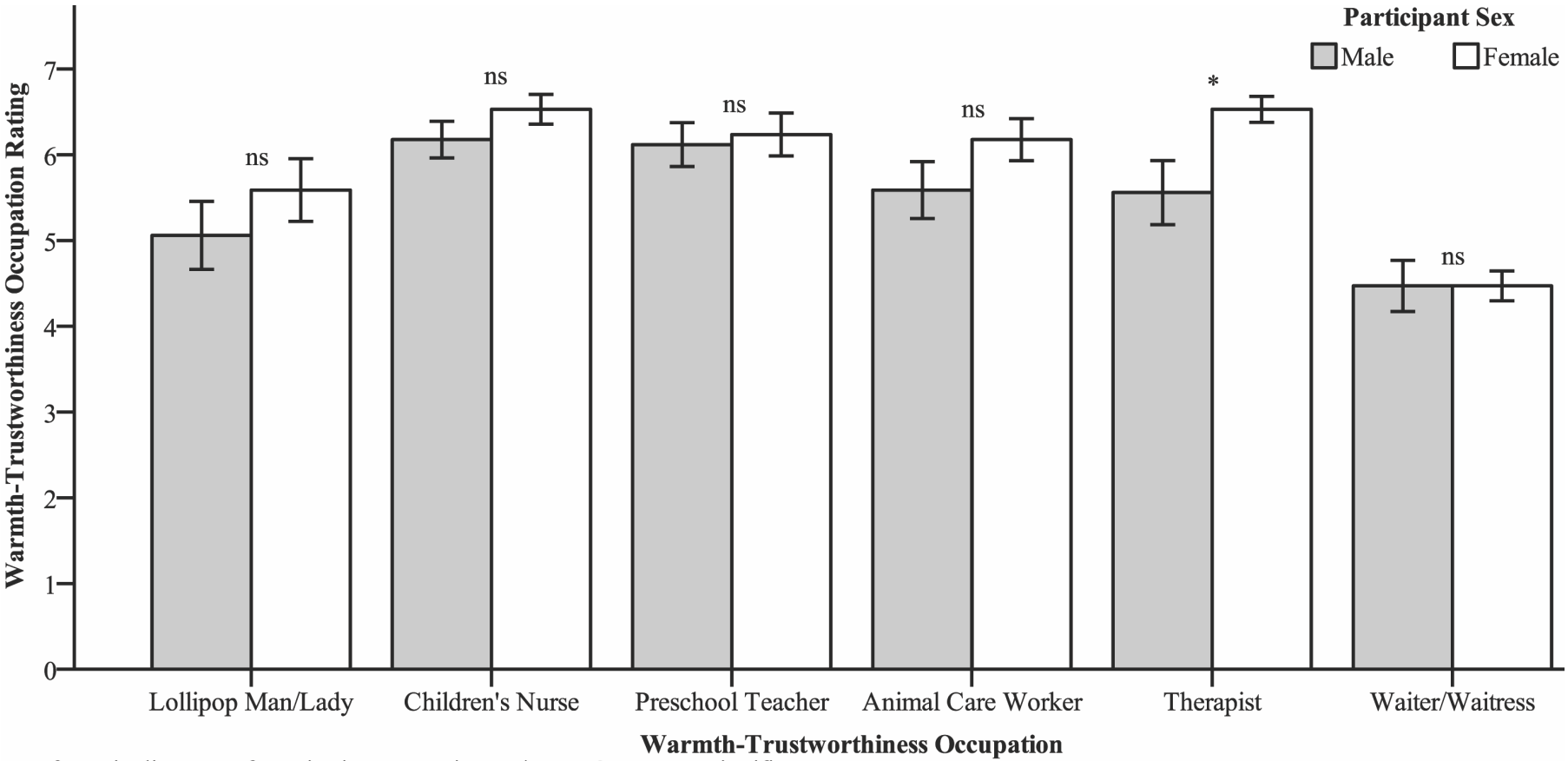
9.7. Study: Part 1

To determine which occupations represented high levels of warmth-trustworthiness, status-resources, and vitality-attractiveness, an ANOVA was conducted using the individual participant ratings of the occupations in terms of ideal partner factor. A mixed 3 x 18 x 2 ANOVA was conducted between ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), occupations (children's nurse, preschool teacher, animal care worker, waiter/waitress, therapist, lollipop lady/man, president of a company, banker, chief executive officer, brain surgeon, professor, pilot, dancer, fashion model, actor/actress, television presenter, secretary, and sales person), and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed no significant interaction effect between ideal partner factors, occupations, and participant sex $\left(F(10.34, 268.91) = 1.52, MSE = 5.45, p = .130, \eta_p^2 = .06\right)$. There was a significant interaction effect between factors and occupations $\left(F(10.34, 268.91) = 53.93, MSE = 193.45, p < .001, \eta_p^2 = .68\right)$ and between occupations and participant sex $\left(F(6.82, 177.18) = 2.19, MSE = 8.54, p = .039, \eta_p^2 = .08\right)$, with no significant interaction effect between factors and participant sex $\left(F(1.73, 44.90) = 0.01, MSE = 0.04, p = .977, \eta_p^2 = .00\right)$. Furthermore, findings revealed a significant main effect for factors $\left(F(1.73, 44.90) = 20.69, MSE = 65.13, p < .001, \eta_p^2 = .44\right)$, for occupations $\left(F(6.82, 177.18) = 16.25, MSE = 63.45, p < .001, \eta_p^2 = .39\right)$ and for participant sex $\left(F(1, 26) = 6.79, MSE = 56.32, p = .015, \eta_p^2 = .21\right)$.

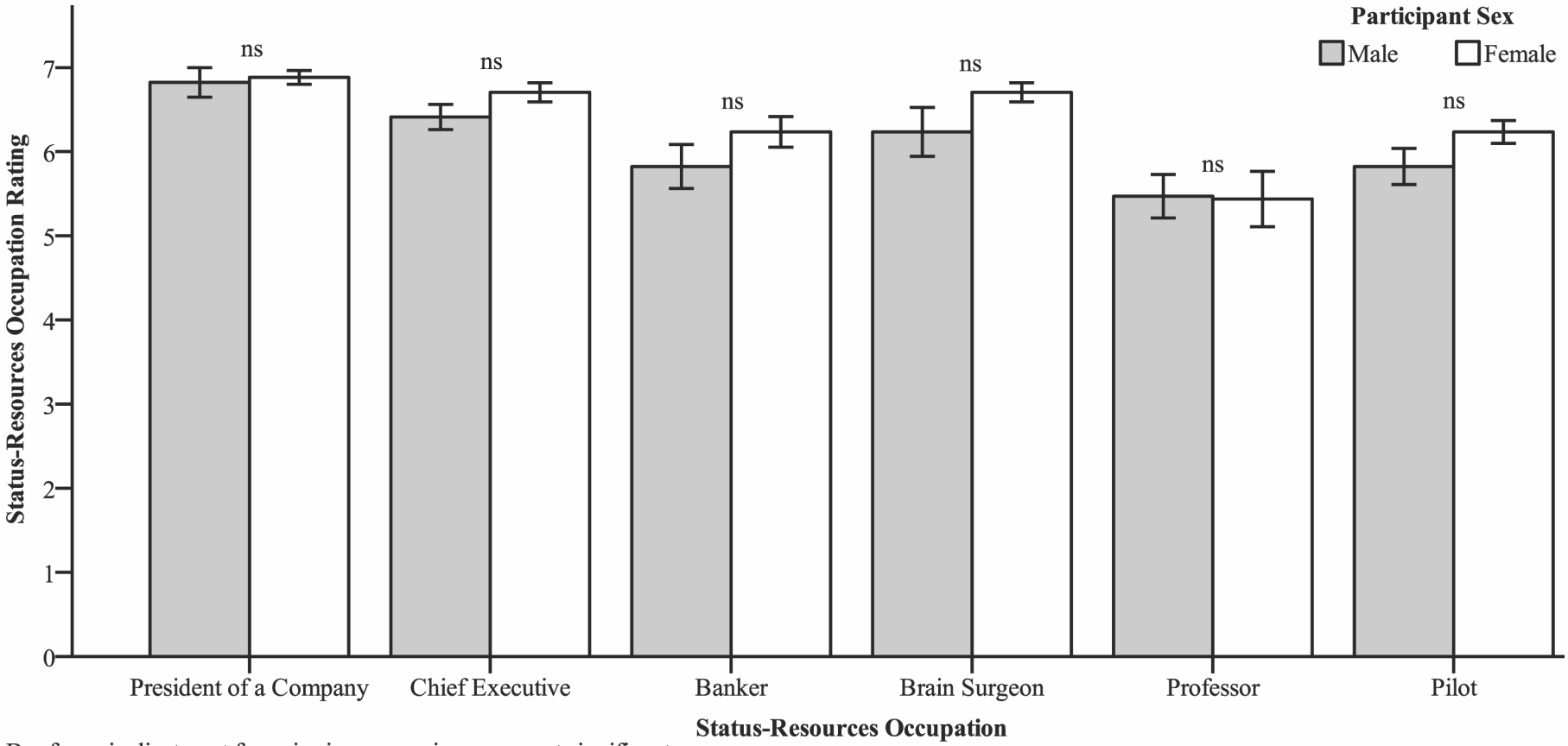
Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed mostly no significant sex differences in the occupations selected to represent warmth-trustworthiness that were rated in terms being indeed a warmth-trustworthiness occupation (see Figure 9.6). There were no significant sex differences in the occupations selected to represent status-resources that were rated in terms being indeed a status-resources occupation (see Figure 9.7). Likewise, there were mostly no significant sex differences in the occupations selected to represent vitality-attractiveness that were

rated in terms being indeed a vitality-attractiveness occupation (see Figure 9.8). The lack of sex differences is relevant as the occupations were selected to represent both male and female face images to be rated by opposite-sex participants.



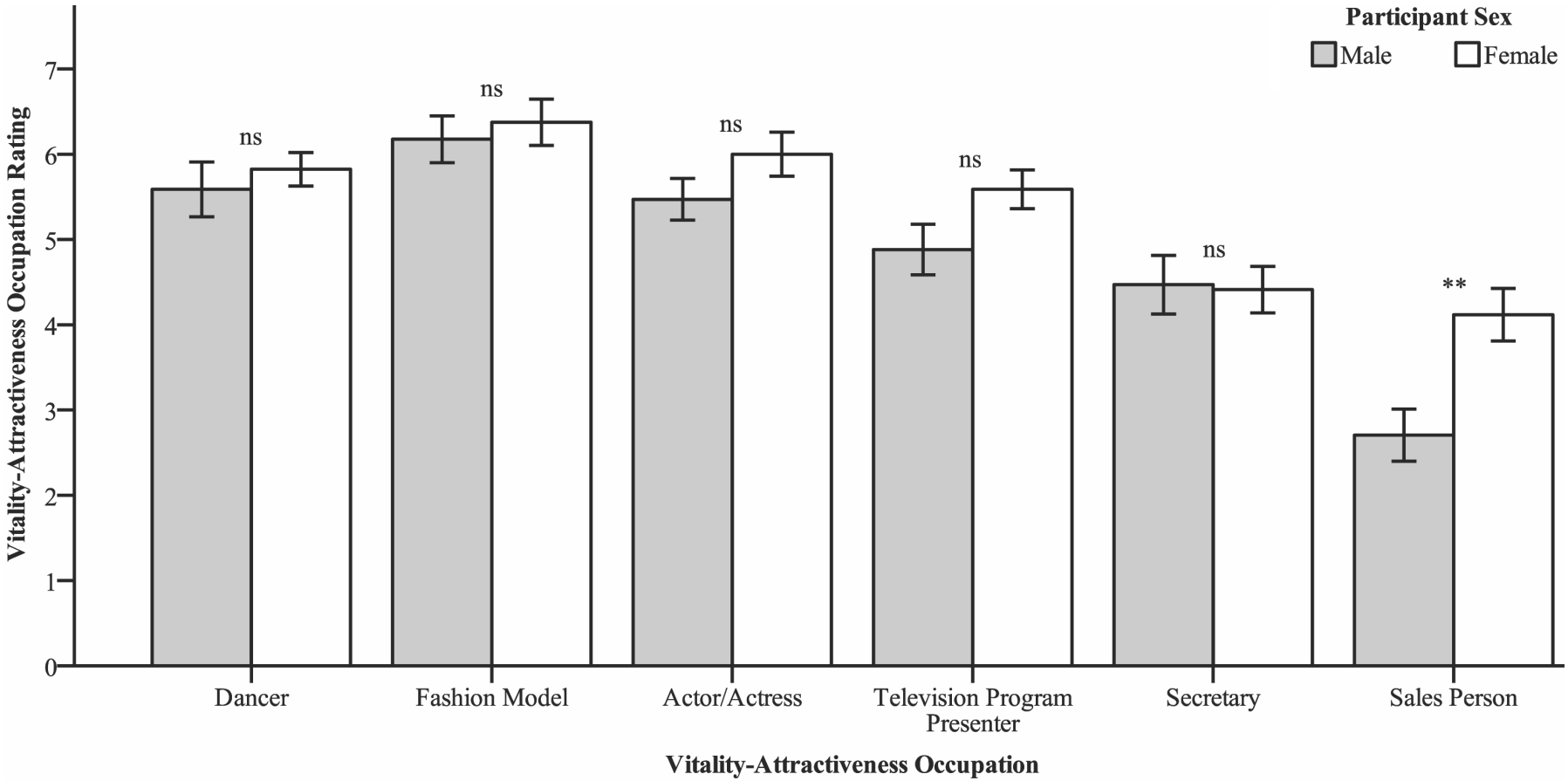
Bonferroni adjustment for pairwise comparisons: *. p < .05, ns. not significant
Error bars: +/- 1 SE

Figure 9.6. Ratings of occupations selected to represent warmth-trustworthiness, in terms of indeed being high warmth-trustworthiness occupations. Higher ratings reveal that a particular occupation is better suited to represent a warmth-trustworthiness occupation.



Bonferroni adjustment for pairwise comparisons: ns. not significant
Error bars: +/- 1 SE

Figure 9.7. Ratings of occupations, selected to represent status-resources, in terms of indeed being high status-resources occupations. Higher ratings reveal that a particular occupation is better suited to represent a status-resources occupation.



Bonferroni adjustment for pairwise comparisons: **. p < .01, ns. not significant
Error bars: +/- 1 SE

Figure 9.8. Ratings of occupations, selected to represent vitality-attractiveness, in terms of indeed being high vitality-attractiveness occupations. Higher ratings reveal that a particular occupation is better suited to represent a vitality-attractiveness occupation.

9.8. Study: Part 2

9.8.1. ANOVA

To determine whether there was a significant difference between the factors that are prioritised in face ratings as a function of occupation (lollipop man/lady, president of a company, and dancer), there were three steps in the analyses. Firstly, the regression factor scores representing each factor of the ideal partner face model for the 1000 photographs were computed (derived from Chapter 2). Secondly, the individual participant face ratings were correlated with the regression factor scores for the ideal partner face model and, then, these correlations were transformed using Fisher's z (Fisher, 1915, 1925). Thirdly, the individual participant Fisher's z scores were subjected to a mixed 3 x 3 x 2 ANOVA between ideal partner factors (warmth-trustworthiness, status-resources, and vitality-attractiveness), occupations (lollipop man/lady, president of a company, and dancer), and participant sex. A Greenhouse-Geisser correction was used as the model violated sphericity.

Findings revealed a significant interaction effect between factors, occupations, and participant sex $\left(F(2.85, 78.49) = 6.02, MSE = 0.19, p = .001, \eta_p^2 = .18\right)$, a significant interaction effect between factors and occupations $\left(F(2.85, 78.49) = 134.90, MSE = 4.29, p < .001, \eta_p^2 = .83\right)$, a significant interaction effect between factors and participant sex $\left(F(1.43, 78.49) = 7.57, MSE = 0.24, p = .003, \eta_p^2 = .12\right)$, and a significant interaction effect between occupations and participant sex $\left(F(2, 55) = 4.63, MSE = 0.17, p = .014, \eta_p^2 = .14\right)$. In addition, findings revealed a significant main effect for factors $\left(F(1.43, 78.49) = 22.43, MSE = 0.71, p < .001, \eta_p^2 = .29\right)$, occupations $\left(F(2, 55) = 72.44, MSE = 2.66, p < .001, \eta_p^2 = .73\right)$, and participant sex $\left(F(1, 55) = 10.25, MSE = 0.38, p = .002, \eta_p^2 = .16\right)$.

Examination of the interaction effect using Bonferroni's adjustment for multiple pairwise comparisons revealed that women rating the occupations president of a company and dancer prioritised warmth-trustworthiness more than men (*p*s < .01), with no sex

differences present for warmth-trustworthiness when rating the occupation lollipop man/lady (see Figure 9.47). Women rating the occupations lollipop man/lady and president of a company prioritised status-resources more than men (*p*s < .001), with no sex differences present for status-resources when rating the occupation dancer (see Figure 9.48). There were no sex differences in the vitality-attractiveness Fisher's z scores for lollipop man/lady, president of a company, or dancer (see Figure 9.49). These findings are in accordance with the hypothesis and with research (e.g., Davies & Oldman, 1999; Dotsch et al., 2008; Oldmeadow et al., 2013), revealing that people do not prioritise vitality-attractiveness when rating face images independent of context but, rather, that context has an impact on whether this factor is prioritised at all.

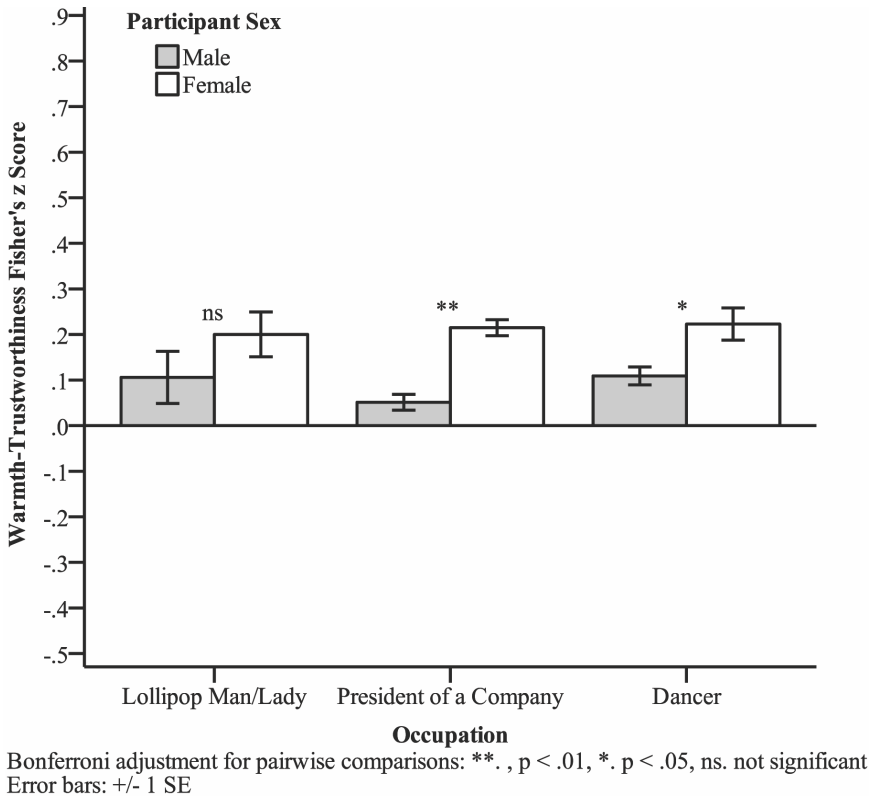
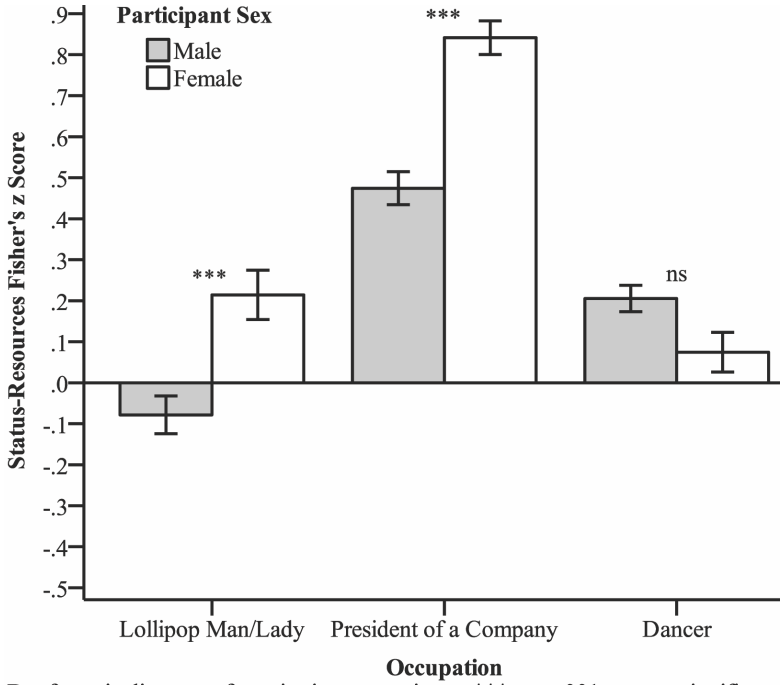
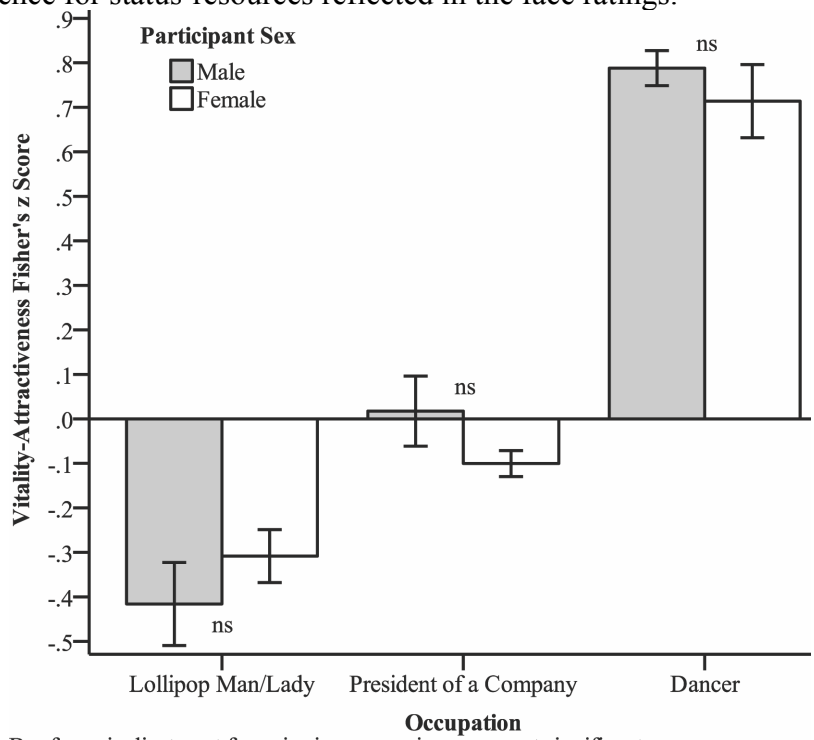


Figure 9.47. Occupation ratings for ambient face stimuli as a function of the warmth-trustworthiness face factor and separated by participant sex. Larger Fisher's z scores reveal a greater preference for warmth-trustworthiness reflected in the face ratings



Bonferroni adjustment for pairwise comparisons: ***. p < .001, ns. not significant
Error bars: +/- 1 SE

Figure 9.48. Occupation ratings for ambient face stimuli as a function of the status-resources face factor and separated by participant sex. Larger Fisher's z scores reveal a greater preference for status-resources reflected in the face ratings.



Bonferroni adjustment for pairwise comaprisons: ns. not significant
Error bars: +/- 1 SE

Figure 9.49. Occupation ratings for ambient face stimuli as a function of the vitality-attractiveness face factor and separated by participant sex. Larger Fisher's z scores reveal a greater preference for vitality-attractiveness reflected in the face ratings.

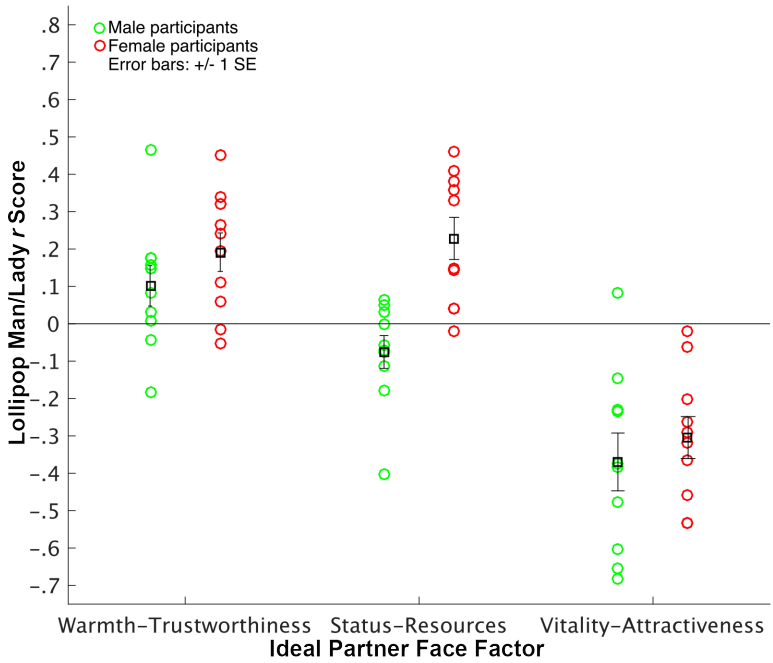


Figure 9.50. Individual participant face ratings for the occupation lollipop man/lady correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

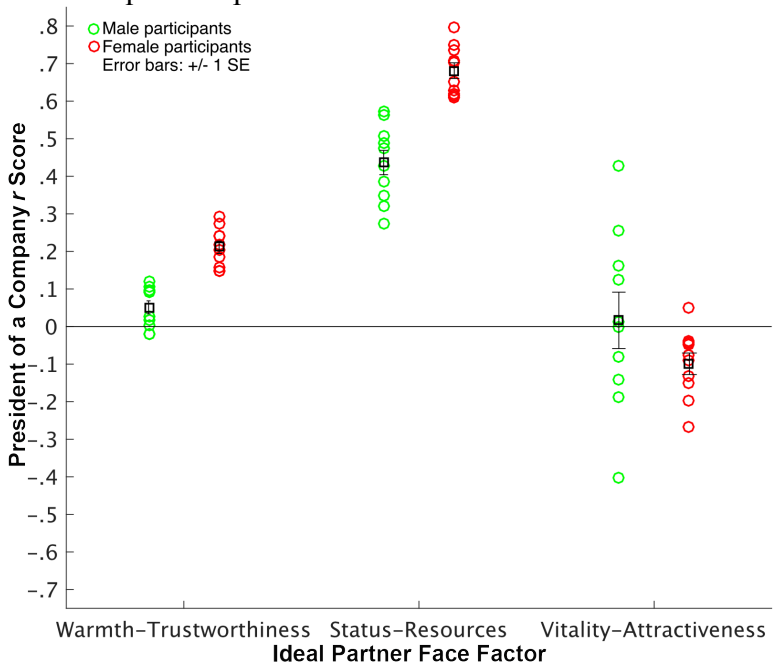


Figure 9.51. Individual participant face ratings for the occupation president of a company correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

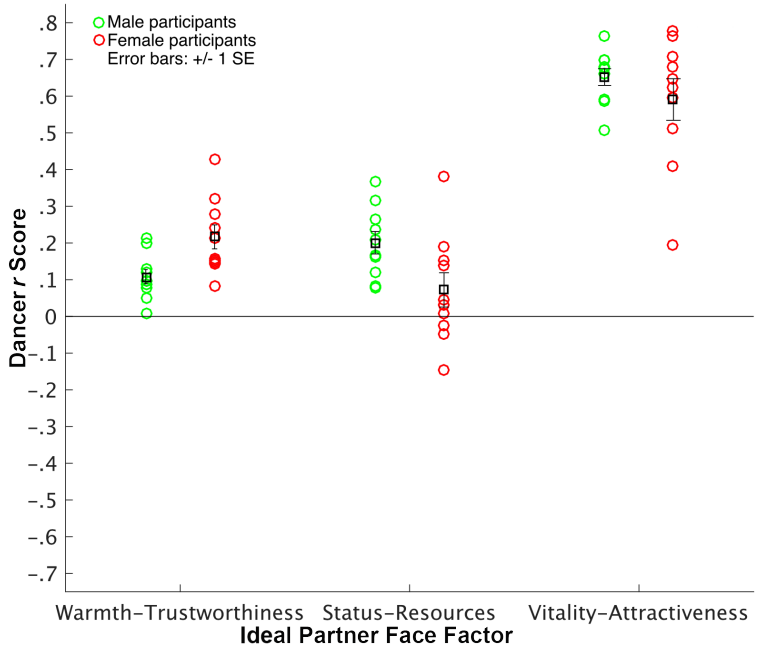


Figure 9.52. Individual participant face ratings for the occupation dancer correlated with the ideal partner face factor scores. Larger participant correlations for a factor reveal that this is prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

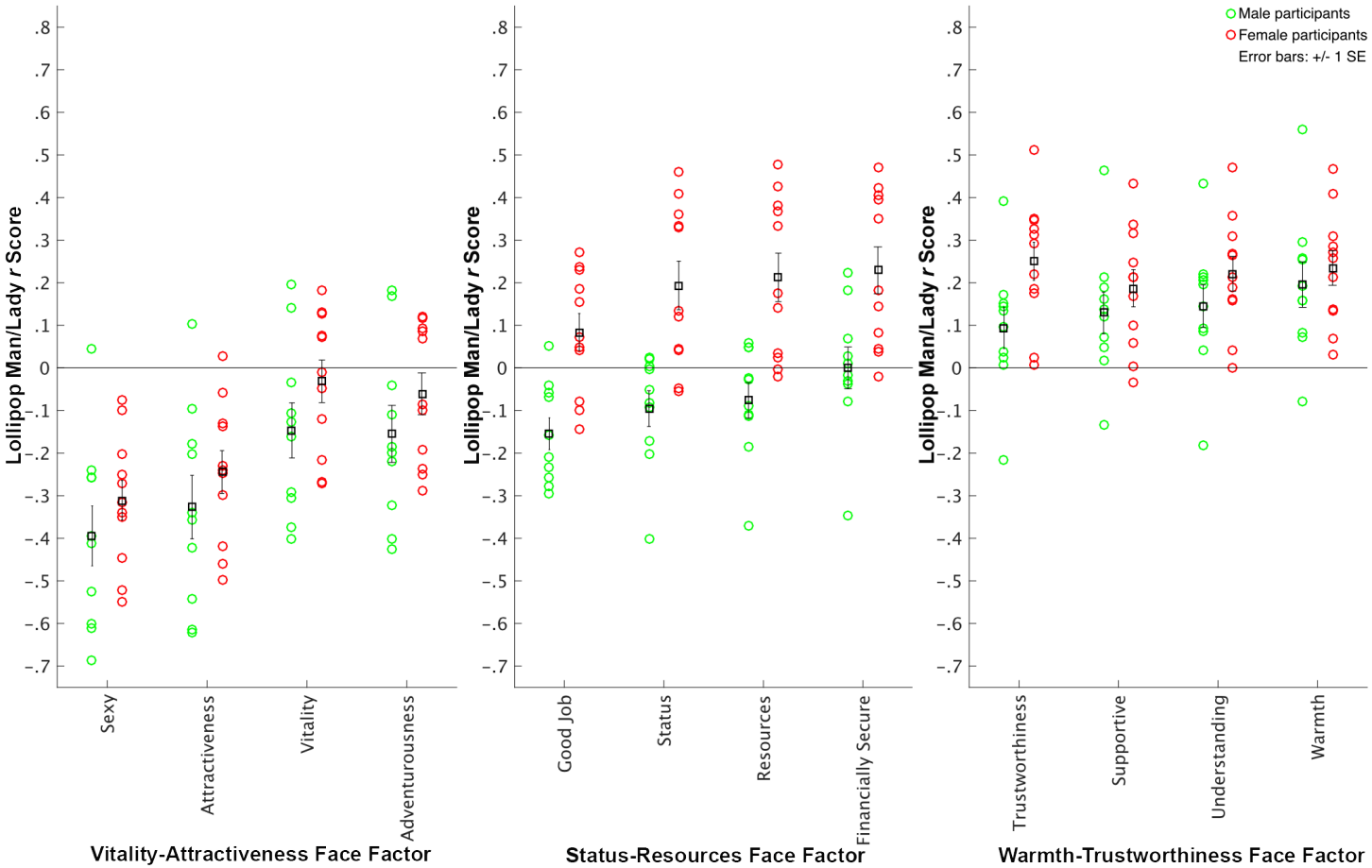


Figure 9.53. Individual participant face ratings for the occupation lollipop man/lady correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

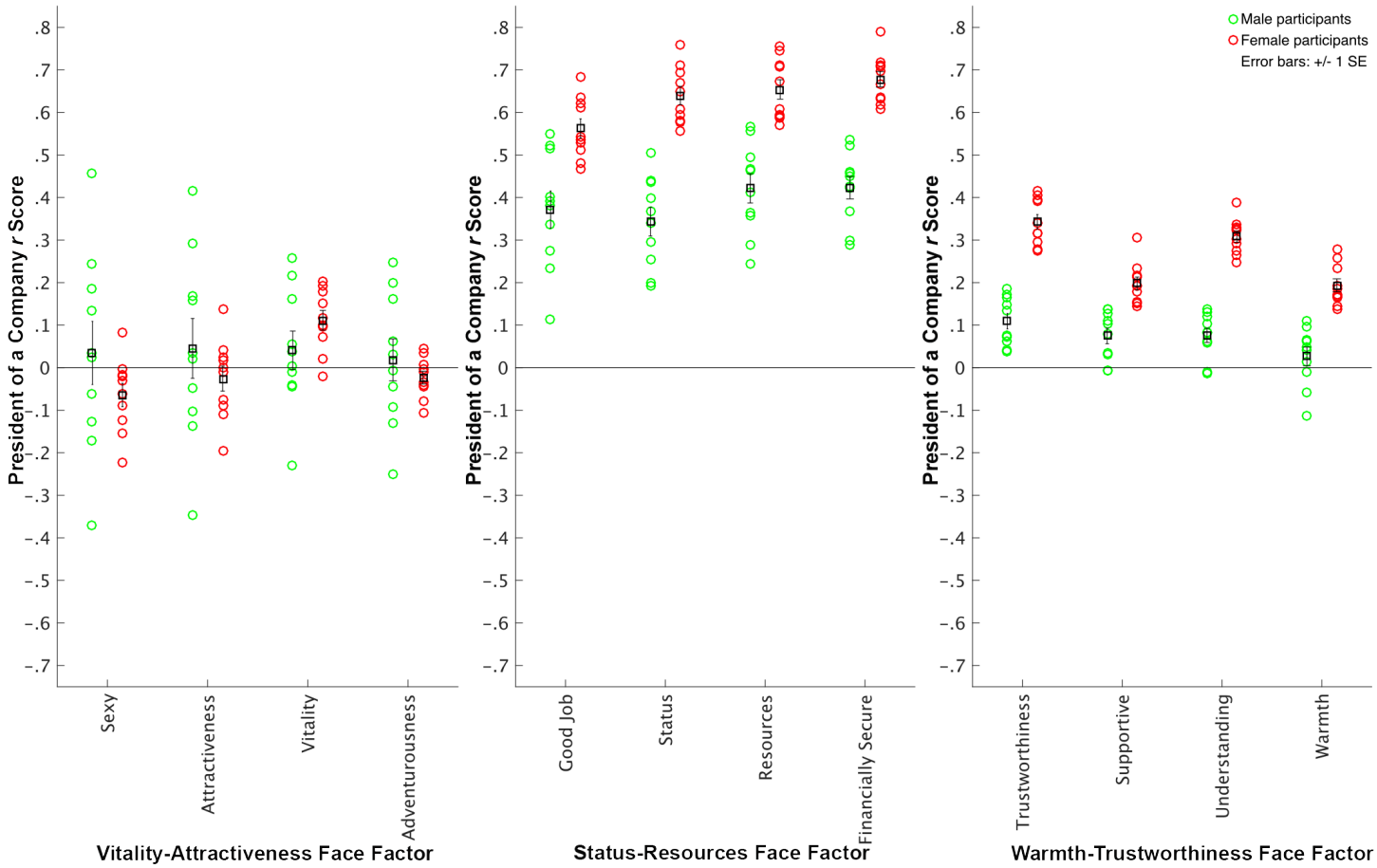


Figure 9.54. Individual participant face ratings for the occupation president of a company correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

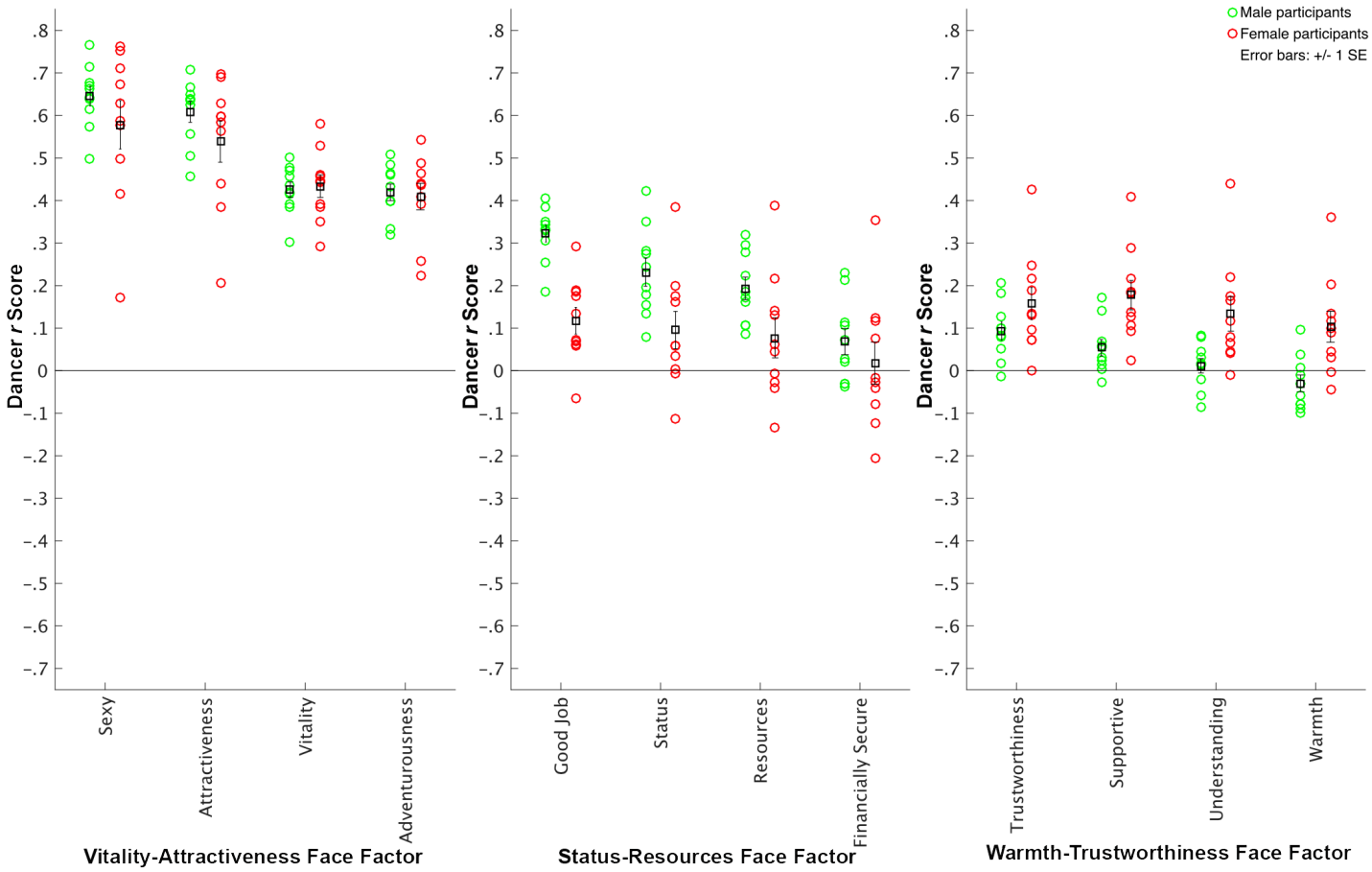


Figure 9.55. Individual participant face ratings for the occupation dancer correlated with trait ratings for the vitality-attractiveness (left), status-resources (middle), and warmth-trustworthiness (right) face factors. Higher r values for traits reveal that these traits are prioritised in participants' ratings. Green circles represent data for individual male participants and red circles represent data for individual female participants. The black squares represent the mean r values.

9.8.2. Face Averages

To view a visual representation of participant ratings of ambient face images on the occupations lollipop man/lady, president of a company, and dancer, six averaged images representing each occupation, separated by face sex, were created. The images were created as follows:

1. An ambient image database of 1000 photographs of faces (Santos & Young, 2005, 2008, 2011), representing 500 female and 500 male Caucasian non-famous adults was used (see Chapter 2 for more information).
2. Based on the occupation ratings, the images were ordered from high to low. Only the highest 50 and lowest 50 images representing each occupation were selected, separated by face image sex.
3. 179 fiducial points were manually positioned on each image using PsychoMorph (Tiddeman et al., 2001) to mark the outlines and positions of internal and external features of each face. Two experimenters verified this delineation.
4. Averaged images for each of the groups of 50 images representing high and low ratings of each occupation were created using PsychoMorph (Tiddeman et al., 2001).
5. The resulting images were 300 pixels in height and were cropped to reveal only the individuals' head and shoulders (see Figure 9.9).

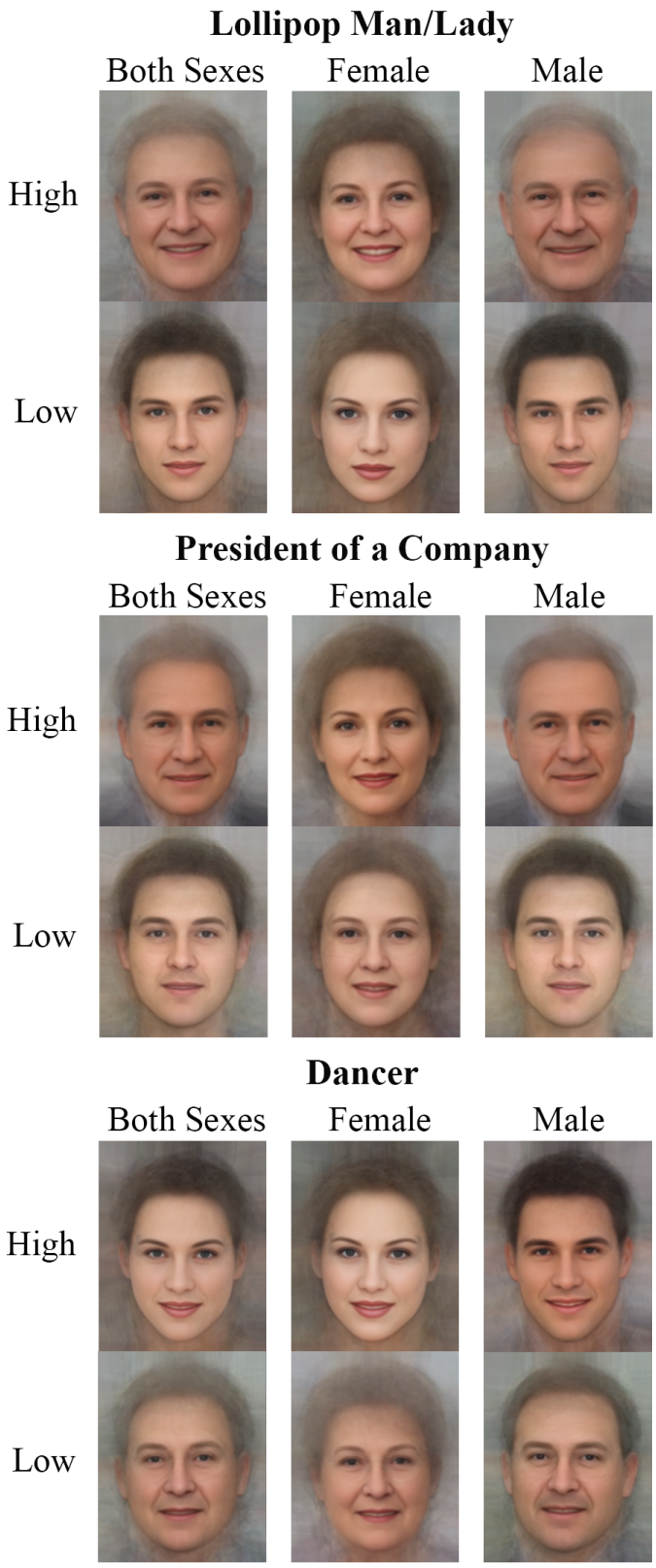


Figure 9.9. Averaged face images (each made from 50 ambient images) representing high and low levels of the occupations lollipop man/lady (top), president of a company (middle), and dancer (bottom) using male and female images combined (left), female images only (middle), and male images only (right).

The averaged images of the occupations lollipop man/lady, president of a company, and dancer, represented in Figure 9.9, reveal distinctive images for each occupation and face image sex, further emphasising that traits related to vitality-attractiveness are not always emphasised in participant face ratings. Rather, the emphasis individuals place on vitality-attractiveness is context dependent. Indeed, the male and female averaged images representing high levels of dancer depict high vitality-attractiveness, representing youthful individuals, which is unsurprising given research linking attractiveness to age (e.g., Sutherland et al., 2013). In contrast, both the male and female averaged face images representing high levels of lollipop man/lady and high levels of president of a company depict older individuals. Of note, the male president of a company image reveals the outline of a shirt, which is also represented in the averaged high status-resources face images (see Chapters 2 and 4). Hence, the face images that represent specific occupations can vary substantially, likely as a function of the underlying traits that each occupation stereotype represents. For example, individuals rating face images on occupations viewed as being high in vitality-attractiveness, such as a catwalk model, would likely result in higher ratings for faces that depict attractiveness-related traits, whereas this probably would not be the case for occupations stereotypically viewed as being low in vitality-attractiveness and higher in other traits, for example, a high status occupation such as an engineer.

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