

The effects of female status on sex differentiated mate preferences

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DECLARATIONS

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Thesis Abstract

Mate preferences provide an opportunity to explore the validity of evolutionary and social role origin theories of sex differences in human behaviour. In evolutionary models, preferences are sex-specific adaptive responses to constraints to reproductive success. In social role models, sex differences arise from the allocation of men and women to different gender roles. I explored the effects of the status of women on preferences to assess the validity of the origin theories. I developed an adequate measure of female status (i.e. resource control), and explored its effects on female preferences in an online survey (Chapter 3), a mail-shot survey (Chapter 4), and a sample of non-industrial societies (Chapter 5). Results implicated a role of constraints on women in the expression of female-typical preferences. In an experimental manipulation of female perceptions of their status, results enabled greater confidence in the attribution of causal direction to relationships (Chapter 6). In Chapter 7, I explored the conditions under which the relationships of interest occurred. In Chapter 8, to further explore the origin models I investigated the effects of resource control on the magnitudes of sex differences in preferences. In Chapter 9, I explored relationships between a characteristic more closely related to the male gender role (i.e. apparent intelligence) and femininity in female faces. Women who were considered to look more intelligent were perceived as less feminine. In Chapter 10, I investigated the effects of reproductive strategy on mate preferences. Results were consistent with evolutionary models of behaviour. I argue that “status” is a multidimensional construct, and that its effects on mate preferences are complex, that while results were generally more consistent with an evolutionary than the biosocial model, integration of models would provide greater insight into human mate preferences.

Chapter 1. Introduction

1.1. Sex differences in human mate preferences

Sex differences provide an opportunity to investigate the influence of biology and culture on human behaviour. A number of origin theories for behavioural sex differences exist, from the strongly biological to the socio-cultural, with intermediate models that seek to incorporate biological and cultural influences. Supporting evidence for each origin theory has been reported, and the cause of behavioural sex differences has become a topic of debate.

Mate preferences represent one of the most widely researched behavioural sex differences in humans. Investigation of a recent social change, such as increasing female status, on mate preferences can inform as to the validity of the claims of each of the origin theories, and contribute towards an integrative approach. Therefore, the aim of the thesis was to test predictions regarding the role of widespread economic constraints on women on sex-differentiated mate preferences, and to attempt to integrate methodological and conceptual aspects of evolutionary psychology, human behavioural ecology, and social structural origin theories of sex differences.

1.2. Origin theories of sex differences in human mate preferences

1.2.1. Evolutionary Psychology

a. Theory

Evolutionary psychology (EP) seeks to explain characteristics of the human mind by reference to our evolutionary history. Evolutionary psychologists argue that natural selection (the process by which traits that convey survival advantage to individuals increase in a population over time; Darwin, 1859) acted on thousands of psychological mechanisms in the human mind (Cosmides and Tooby, 1987). Each mechanism is believed to have evolved as a functional response to a

specific problem faced recurrently during human evolution (Symons, 1979; Buss, 1999). As such, these mechanisms are “domain specific” as the successful solution to a specific problem is unlikely to provide an adaptive solution to any other (Symons, 1979; Buss, 1998).

Central to EP theory is the premise that psychological mechanisms evolved in our ancestral past and are not expected to be adaptive in the current environment. Tooby and Cosmides (1987) argue that changes in our modern culture occur faster than the evolution of our complex psychological mechanisms, resulting in an “adaptive lag”: a mismatch between the environment in which mechanisms evolved and the current environment. They argue that in order to understand human behaviour today, it is necessary to reconstruct the problems faced by our ancestors in the “environment of evolutionary adaptedness” (EEA: from Bowlby, 1969). The EEA is treated as a statistical composition of aspects of human ancestral environments depending upon their frequency and fitness¹ benefits (Tooby and Cosmides, 1990), and is typically viewed as a time period during the Pleistocene: the stone age, from 1.7 million to 10, 000 years ago (Tooby and Cosmides, 2000, p. 1170). Thus, it is believed that the adaptations employed by humans today evolved at a period in our evolutionary history when we were “hunter-gatherers” and are expected to have changed little since the EEA (Cosmides and Tooby, 1987). Inherent in this is the assumed universality of behaviours resulting from our evolved psychology (see Laland and Brown, 2002, p. 158-162). That is, as our psychological mechanisms are adaptive solutions to problems faced recurrently throughout our ancestral past, all humans are expected to possess these “innate” evolved responses to problems (e.g. Buss, 1989a,b, 1999).

¹ The number of copies of a variant of a trait passed on to the next generation, relative to other variants of the trait

b. Sexual strategies theory

i. Sex differences

EP explains sex differences in mate preferences as facets of a “sexual strategies” theory, which is in turn derived from sexual selection theory (Buss and Schmitt, 1993; Buss, 1994; Buss, 1999). While natural selection involves the selection of traits that convey survival advantages to individuals, sexual selection is the process by which traits enhancing an individual’s reproductive success (the number of offspring surviving to reproductive age) are selected (Darwin, 1871; Cronin, 1991; Andersson, 1994).

In mammals, minimum investment in reproduction by the female is greater than that of the male due to the costs of producing large gametes (Bateman, 1948), internal gestation, lactation and extended parental care (Trivers, 1972). Thus, male reproductive success is constrained by access to fertile females and his reproductive value to females lies in the resources needed to raise offspring. Female reproductive success is constrained by access to the resources needed to raise costly offspring and her reproductive value lies in her health, fertility, and reproductive capacity (Trivers, 1972). Symons (1979) developed hypotheses about sex differences in the psychology of sexual desire within this framework, with men desiring more partners than women and seeking partners signalling high fertility and reproductive value, and women seeking partners who signal the willingness and ability to provision. Evolutionary psychologists have emphasised “universal or near-universal sex differences” in these mate preferences (Buss, 1998, p. 421), regardless of diverse cultural and social conditions (Buss, 1989a; Kenrick and Keefe, 1992). In sexual strategies theory, these sex differences arise from sex-specific constraints on reproductive success that imposed different sexual selection pressures on men and women in the EEA (Buss and Schmitt, 1993).

Considerable evidence for sex differences in human mate preferences provides support for sexual strategies theory. The largest study to date comprised a survey of over 10, 000 men and women from 37 samples across 33 countries (Buss,

1989a). Participants were asked to indicate the ideal age difference between themselves and a partner, and to rank and rate a series of partner characteristics for desirability in “someone you might marry”. In 36 of the samples, women valued “good financial prospects” and “good earning capacity” in a mate more highly than did men. In 29 samples women had stronger preferences for “ambition and industriousness” than did men. In 34 samples men had a significantly stronger preference for “physical attractiveness” than did women. In all samples, women preferred partners older than themselves while men preferred partners younger than themselves, a finding that was corroborated by age at marriage. Similarly, Kenrick and Keefe (1992) found that women preferred partners older than themselves, while men preferred partners younger than themselves across time periods in the 20th century and five different countries. It was concluded that these cross-cultural sex differences arose from sexual selection pressures on men and women in the EEA, such that women express preferences for partners with resource acquisition characteristics and older partners (who have had time to accumulate resources), and men prefer partners with visible cues to fertility and reproductive capacity (Buss, 1989a; Kenrick and Keefe, 1992). A number of studies have replicated these sex differences in age preferences (e.g. Waynforth and Dunbar, 1995; Otta et al., 1999) and preferences for resource-acquisition characteristics versus physical attractiveness (e.g. Powers, 1971; Feingold, 1990, 1991, 1992a; Sprecher et al., 1994; Waynforth and Dunbar, 1995; Gil-Burmann et al., 2002; Li et al., 2002; Fletcher et al., 2004).

ii. Context-specificity and conditional strategies

The largest criticism of sexual strategies theory regards its over-emphasis of sex differences to the detriment of explaining high levels of intra-sexual variation in human mating behaviour (e.g. Smuts, 1991a, b; Waynforth and Dunbar, 1995). Despite arguing for universality in evolved psychological mechanisms, evolutionary psychologists have made some attempt to account for intra-sexual variation through incorporation of the concept of “context-specificity” into sexual strategies theory. They argue that the selection pressures encountered in

our evolutionary past favoured psychological mechanisms that enabled expression of different behaviours in response to “context”. That is, the large and complex array of psychological mechanisms in the human mind do not produce consistent results, but instead enable the expression of alternative, “context-specific”, behaviours (Buss, 1998).

The most widely used example of context-specificity in mating behaviour relates to long- versus short-term mating strategies. Alternative mating strategies are believed to represent different solutions to the problem of allocation of an individual’s finite “reproductive effort”. Reproductive effort can take two forms: “mating effort” (i.e. time invested in seeking mating opportunities) and “parenting effort” (i.e. time invested in offspring). As time spent on mating effort cannot be simultaneously invested in parenting effort, individuals must effectively “trade off” their allocation to each. As females (minimally) invest the most in reproduction, the optimal solution to this trade off for women should be to invest more in parenting and less in mating. Conversely, the increased likelihood of copulation with multiple partners resulting in multiple offspring for males, and the (minimally) smaller parental investment, means that males should do better to trade off parenting effort for mating effort. That is, in the “context” of being female, the most successful strategy should be to behave as a “parenting specialist”, whereas under the “context” of being male, the best strategy should be to behave as a “mating specialist” (Low, 2000, p.35-56). Consequently, the greater likelihood for men than women to express psychological tendencies associated with the desire to gain sexual access to a large number of partners, and to pursue more short-term relationships, is believed to reflect the optimal solution to the problem of allocation of reproductive effort (Buss and Schmitt, 1993).

This logic has also been used to account for intra-sexual variation. The optimal solution to the trade off may vary under different contexts within each sex, so men and women are expected to pursue long- and short-term strategies in accordance with the relative costs and benefits of each (Buss, 1998). This is consistent with the concept of “conditional strategies” from evolutionary biology:

selection pressures are unlikely to favour a single best strategy, and should instead favour phenotypic² diversity in mating resulting from a single genotype³ in response to environmental variation (Gross, 1996). Evolutionary psychologists adopted this concept in an attempt to further develop the idea of context-specificity and thereby increase the explanatory power of sexual strategies theory. In their model of strategic pluralism, Gangestad and Simpson (2000) argued that alternative human mating strategies are expressed as part of such a conditional strategy. As such, the theory that human sexual behaviour is “context-specific” was developed by inclusion of a mechanism by which alternative behaviours are expressed.

The “conditional strategy” has been applied to expression of alternative mate preferences: as no partner is likely to offer all desirable characteristics, there will be trade offs involved in mate choice decisions, the optimal solution to which is likely to be dependent on current conditions (Gangestad and Simpson, 2000). Trivers (1972) theorised that males can provide offspring with both material resources and/or heritable benefits. Preferences for mates who signal good genetic quality (i.e. “good genes” sexual selection) may increase female reproductive success by enhancing the resilience and viability of her offspring, whereas preferences for mates with material resources may increase offspring survival through adequate provisioning. There is evidence that, in humans, males offering “good genes” are less likely to offer investment in parenting (as the optimal solution to the trade off in mating and parenting effort, see above). For example, in a sample of 56 men living in rural Belize, Waynforth (1999) found that physically attractive men (as a proxy of genetic quality, and measured as facial attractiveness ratings) spent less time with kin and more time seeking access to females. Similarly, in the Hadza of Northern Tanzania, Marlowe (1999) found that men with high levels of mating opportunities provided less parental care to their children than men with fewer opportunities for multiple mating. It has been argued that this necessitates a mate choice trade off between

² Morphological or behavioural trait displayed by an individual

³ Genetic composition of an individual

securing “good genes” and “good provisioning” for females. Women must successfully solve the problem of providing their offspring with the most important paternal investment from their fathers (e.g. good genes or direct material investment) under varying conditions (Gangestad and Simpson, 2000).

The widely reported female preference for a partner with resources may be viewed as the optimal solution to the trade off in the importance of securing a mate willing and able to invest material resources over one offering good genetic quality. Evolutionary psychologists, however, have presented data to suggest that female preferences reflect alternative tactics in a conditional strategy: under circumstances in which the importance of acquiring good genes for offspring may outweigh those of paternal investment of material resources, female preferences shift. For example, women valued physical attractiveness (as a putative cue to good genes) more highly in short- than in long-term mating contexts when the importance of investment of material resources may be lower (Buss and Schmitt, 1993; Gangestad and Simpson, 1990). Furthermore, as one function of “good genes sexual selection” may be to ensure immunity to pathogens for offspring (Hamilton and Zuk, 1982), Gangestad and Buss (1993) predicted that the relative importance of acquiring good genes from a partner would increase in areas of high pathogen prevalence. In re-analyses of Buss’s (1989a) cross-cultural dataset, estimated parasite prevalence was positively related to rating of importance of physical attractiveness (Gangestad and Buss, 1993), and was negatively related to preferences for cues relating to “parenting abilities” (Gangestad, 1993) across societies. These results were argued to demonstrate that provisioning of resources is traded off for good genes under conditions of high pathogen pressure (Gangestad and Buss, 1993; Gangestad, 1993).

The exact relationship between “physical attractiveness” and genetic quality, however, is unclear. The “physical attractiveness” construct may be too heavily influenced by individual perceptions of the constituents of “attractiveness”. Furthermore, a healthy-looking individual may be perceived as “attractive”, or an

attractive individual may be perceived as healthy due to an attractiveness halo effect whereby positive qualities are attributed to physically attractive individuals (e.g. Zebrowitz et al., 2002). Secondary sexual characteristics may provide a less ambiguous measure, as they are believed to provide an honest indicator of genetic quality (Zahavi, 1975; Zahavi and Zahavi, 1997). Folstad and Karter (1992) proposed that only good quality individuals are able to cope with the immunosuppressant effects of the androgens (Wedekind, 1992; Hillgarth and Wingfield, 1997; for a meta-analysis of the immunosuppressant effects of testosterone across species see Roberts et al., 2004), which stimulate the development of male secondary sexual characteristics (Owens and Short, 1995). In humans, masculine male facial characteristics, such as enlarged jaw and brow ridges, develop under the action of the androgen testosterone (Enlow, 1990) and may thus provide a signal of genetic quality. Masculine male faces are perceived as cold, dishonest and less likely to make good parents than more feminine male faces (Perrett et al., 1998). Thus masculine and feminine male faces are associated with divergent costs and benefits: masculine male faces may signal heritable quality at the cost of decreased provisioning of resources and parental care, whereas male feminine faces may signal greater parental investment but lower heritable quality.

Female preferences for male facial masculinity, therefore, provide an opportunity to examine the relative importance of securing a “good parent” versus “good genes”, without the confounding effects of individual perceptions of the meaning of “physical attractiveness”. A number of studies have found that women tend to prefer feminised male face shapes (Berry and McArthur, 1985; Cunningham et al., 1990; Perrett et al., 1998; Penton-Voak et al., 1999). However, women in the fertile phase of the menstrual cycle (Penton-Voak et al., 1999), who are judging faces for attractiveness in the context of a short-term relationship (Little et al., 2002), or who are pursuing a short-term mating strategy (Waynforth et al., 2005), prefer more masculine male faces than those in the non-fertile phase or those considering faces for a long-term relationship. These findings have been interpreted as female strategies designed to secure reliable long-term partners

who are willing to invest in offspring (i.e. men with feminine facial features), but pursue males signalling heritable quality (i.e. men with masculine facial features) when the chances of conception are high (Penton-Voak et al., 1999), or in the case of short-term relationships, when investment of anything other than genes is unlikely (Little et al., 2002).

c. Predicted effects of female status on mate preferences

Until recently, evolutionary psychologists argued against a “structural powerlessness hypothesis” which states that sex differences in constraints on economic and social autonomy contributed to sex differences in mate preferences (e.g. Buss and Barnes, 1986). In the “structural powerlessness hypothesis”, female preferences for a partner with resources are argued to arise from constraints on female ability to acquire resources independently. Therefore, if constraints on women did contribute to sex-specific mate preferences, negative relationships would be expected between measures of female status and female preferences for resources in a partner. Evolutionary psychologists presented positive relationships between putative measures of female status and preferences for resources in a partner. It was argued that this was evidence against a role of constraints on women’s ability to acquire resources independently on sex differences in mate preferences. Buss (1989b) presented data from 200 men and women from the United States, in which he found a positive relationship between female personal income and preference for the economic status of a partner. Similarly, in samples of college students and community members, Wiederman and Allgeier (1992) found that the expected personal income of women was positively related to the importance placed on a partner’s earning capacity (college students) and financial prospects (community members). In both cases, it was concluded that the results did not support the “structural powerlessness hypothesis” of sex differences, and were instead consistent with the EP model that places sex differences in the context of biological constraints.

Studies that utilise female wealth or income as measures of female status have been criticised for confusing the effects of female status and socio-economic

status on mate preferences. That is, as assortative mating (i.e. mating on the basis of similarity on one or more characteristics) has been reported for cultural and economic status (Kalmijn, 1994), and for educational attainment and socio-economic origins (Kalmijn, 1991), it is possible that positive relationships between female wealth and preferences for resources in a partner reflect assortment for socio-economic status, rather than an independent effect of female status on preferences (Eagly and Wood, 1999). It has also been argued that current (or predicted future) income does not adequately or accurately assess female status. For example, Gangestad and Simpson (2000) argued that “wealth” does not include the aspects of power and control over resources required to provide for oneself independently. Wealthy women may be economically constrained if they have no control over the distribution of their wealth.

More recently, the EP view of the effects of female status on mate preferences has developed, and it is now argued that sexual strategies theory does not deny an effect of female economic status on sex-differentiated mate preferences. That is, to the extent that constraints on women’s ability to control resources imposed selection pressures in the EEA, conditional strategies should enable women to behave optimally with different levels of resource control (Gangestad and Simpson, 2000). Therefore, it has been predicted that the relative importance of securing a partner who offers good genes versus a partner who offers material resources may vary with female status (Gangestad and Simpson, 2000). This development does not indicate acceptance of a “structural powerlessness hypothesis”: sex differences do not arise from power differentials between the sexes’, rather that the optimal solution to trade offs in partner characteristics should depend upon the level of resource control women achieve.

d. Critique

While EP has undoubtedly made pioneering attempts to apply evolutionary principles to human psychology, and has provided some of the most extensive research into human mate preferences, it has been heavily criticised for dubious premises of the theory and methodology.

i. Theoretical assumptions

The domain-specific nature of psychological mechanisms has been questioned, largely due to the lack of evidence for the existence of many special-purpose modules in the brain (Lloyd, 2003). It is also argued that it is conceptually difficult to accept that a large number of domain-specific mechanisms could function optimally without conflict, and to imagine by what rules such conflicts are resolved so as to produce an optimal output (Smith et al., 2001). As discussed in the subsequent two sections of this chapter, alternative evolutionary frameworks and social structural models are at odds with this particular assumption and argue for domain-general mechanisms.

The argument that most natural selection on humans occurred in the context of hunter-gathering in the EEA has received considerable criticism. It has been argued that not only are selection pressures and consequences of past environments difficult to estimate in general (Betzig, 1998; Vickers and Kitcher, 2003), but our limited knowledge of the wide variety of environments, and ecological and social conditions faced by humans during the Pleistocene make estimations of the selection pressures faced in the EEA unjustified (Foley, 1995; Boyd and Silk, 1997; Strassman and Dunbar, 1999; Laland and Brown, 2002, p. 177-182).

Recent evidence suggests that trait change through selection can occur faster than assumed by EP (e.g. Kingsolver et al., 2001; Voight et al., 2006) and arguments for fixed, genetically determined traits that have not changed with vast advances in culture and technology are not justified (Bussey and Bandura, 1999). It has been argued that the last 10-15, 000 years of human evolution, with the rapid explosion of agriculture and sedentary group living, may provide a better estimation of the pressures which shaped human behaviours we see today than the Pleistocene (Gowaty, 2003). Indeed, a number of studies have found evidence for selection in modern populations (Durham, 1991; Pawlowski et al., 2000; Smith et al., 2000), suggesting that modern humans can behave adaptively

in environments that differ markedly from the Pleistocene. Thus, the assumption of an “adaptive lag” between the environment in which humans evolved and the current environment may not be justified.

A further criticism levelled at EP regards its “adaptationist” approach. Evolutionary psychologists state that “selection is the most important cause of evolution” (Thornhill and Palmer, 2000, p. 8), thereby attributing all interesting traits to selective forces and downplaying genetic drift⁴ and gene flow⁵ as evolutionary forces (Lloyd, 2003). Furthermore, there has been no attempt to prove that the traits of interest are actually adaptations. For example, does possession of a given mate preference lead to an increased number of offspring and thus greater dispersal of genes into future generations? One approach to this question could involve comparing humans with closely related species to determine whether the trait in question exists elsewhere in the lineage, thus informing as to phylogeny of the trait, and the circumstances under which it may have evolved (Lloyd, 2003).

ii. Sexual strategies theory

Laland and Brown (2002, p. 191-193) argue that a number of conditions must be met when attributing any behaviour to sexual selection pressures: the existence of genetic variation underlying preferences and the trait in question, heritability of the trait and the preference, covariance of preference and trait with fitness, and evidence for sexual (as opposed to natural) selection. Thus, despite evidence consistent with sexual strategies theory, the lack of supporting evidence for any of these conditions suggests that firm conclusions about the role of sexual selection pressures on sex differences in human behaviour are unjustified.

EP’s focus on sex differences in mate preferences has also been questioned. In a meta-analysis, Eagly and Steffen (1984) demonstrate that many presumed sex differences in mate preferences are very small when compared to the magnitudes

⁴ Genetic change in a population that is not influenced by natural selection

⁵ The movement of genes between populations of a species

of intra-sexual variation. Evolutionary psychologists' more recent attempts to develop sexual strategies theory so as to account for this intra-sexual variation have, in turn, been criticised. First, it is argued that reliance on context-specificity and strategic pluralism to explain within-sex variation oversimplifies the trade offs made in mate choice decisions (Davis, 2000; Eagly, 2000). Second, despite their explicit acknowledgment that human sexual behaviour will vary in response to a wide variety of contexts including local cultural norms (Buss and Kenrick, 1998; Tooby and Cosmides, 1990; Bleske and Buss, 2000; Gangestad and Simpson, 2000), it has been argued that evolutionary psychologists fail to fully consider the role of culture and the strong tendencies of humans to follow cultural norms (Eagly and Wood, 1999; Newson and Lea, 2000; Perper and Carnog, 2000). For example, it is argued that female number of lifetime partners may have been considerably lower than at present as recently as two generations ago, due to the cultural norms of the time, not as a result of optimal responses to adaptive trade offs (Newson and Lea, 2000).

Finally, Buss (1989a) has been criticised for using his 37 culture sample as evidence for sexual strategies theory. It has been argued that industrialised societies are over represented in the sample while traditional societies are under represented (Crawford, 1989), and it is too heavily biased towards European influence and student populations (Borgia, 1989). Buss (1989a) acknowledges the over representation of western societies and cash-economies, and the under representation of rural, less educated, and low socio-economic status groups in his sample as potential weaknesses. The interpretation of results has been criticised for failing to acknowledge fully that results could provide support for a structural powerlessness explanation of sex differences (e.g. Caporael, 1989; Wallen, 1989; Zohar and Guttman, 1989). Indeed, knowing the location of the participant provided more information about mate preferences than gender (Laland and Brown, 2002, p. 172). While noting that societal structure (along with socialization differences during development and sex differences in sensory preferences) may represent proximate mechanisms directly responsible for sex differences, Buss (1989a) is criticised for failing to acknowledge that this could

mean there are no evolved sex differences. That is, women and men may want the same amount of financial resources from a partner, but the sex-specific constraints of the social structure means women must place more emphasis on resources than do men (Caporeal, 1989).

iii. Methodology

While the investigation of the cognitive mechanisms and the informational processes that underpin behaviour is of high value, EP's mate preference research has been criticised. Miller (1997) has argued that identifying attractiveness "cues" is not the same as identifying cognitive mate choice "mechanisms", and that the majority of mate preference studies have focused solely on informational inputs, when mate choice actually entails cognition, decision-making, and reasoning.

Mate preference research in general has also been criticised for focussing on undergraduate students, and it has been argued that cross-cultural similarities are likely to be found in such a homogenous group regardless of location (Laland and Brown, 2002, p. 173). Use of self-report data is also criticised for a number of reasons: participants may provide socially acceptable answers, play down or exaggerate preferences, and reported sex differences in behaviour are dependent upon whether the participant is assured anonymity (Alexander and Fisher, 2003). Finally, the sample of participants willing to complete mate preference questionnaires may be self-selecting (Borgerhoff Mulder, 2004).

e. Summary

EP has sought to apply evolutionary principles to human psychology. It has argued that domain-specific psychological mechanisms evolved in response to selection pressures faced in the EEA. Criticisms of its central assumptions (particularly those of an adaptive lag between the environment in which psychological mechanisms evolved and the current environment, the domain-specific nature of these mechanisms, and the lack of consideration given to

cultural influences on behaviour), however, raise questions about the validity of both the theory on which it is based, and conclusions derived from its research.

Evolutionary psychologists have paid particular attention to models of the evolution of human mate preferences. In sexual strategies theory, and its various extensions, it has been argued that sexual selection pressures faced by the sexes in our evolutionary past have yielded sex- and context-specific mate preferences. Originally evolutionary psychologists saw no role of economic or social constraints on women in the development of sex differences in mate preferences, and as such predicted no effect of female status on preferences in contemporary populations. With developments in sexual strategies theory, however, it is conceded that female preferences may shift in response to different levels of resource control as part of a conditional strategy. While considerable research has been generated with results that appear to support predictions about the psychological and behavioural results of hypothesised selection pressures, it is, as yet, still evidence for a model based on an estimation of past selection pressures. Given our lack of knowledge of the conditions under which we lived in the Pleistocene, and a lack of evidence that sexual selection pressures have influenced human behaviour, it is necessary to question the conclusions of such studies. While the results of EP investigations into mate preferences provide interesting and important insights into the ways in which humans choose their mates, they do not necessarily provide evidence for the sexual selection pressures of past environments.

1.2.2. Human behavioural ecology

a. Theory

Human behavioural ecology (HBE) applies the principles of evolutionary biology to anthropological problems (Smith, 1992). While both are grounded in an evolutionary theoretical framework, HBE differs from EP on a number of key theoretical and methodological principles.

EP's aim is to investigate psychological mechanisms as adaptations, whereas HBE attempts to determine whether behaviour is adaptive. While EP focuses on the mechanisms on which selection pressures are believed to have acted, HBE seeks to investigate relationships between behaviour and fitness. HBE argues that human behaviour is shaped by selection pressures in the same way as other animal species (e.g. Low, 2000). Accordingly, HBE research tends to parallel the research of behavioural ecologists on other species (e.g. Krebs and Davies, 1997). It is argued that if behaviour has been selected to maximise fitness, it is possible to predict the optimal behaviour under a given set of circumstances. As such, hypotheses are largely derived from mathematical models based on evolutionary theory, such as optimality and evolutionary game theories: if the behavioural data from real populations fit the model, then the prediction is upheld (Laland and Brown, 2002, p. 115-117).

EP emphasises universals in behaviour in response to selection pressures faced by humans over our evolutionary history. HBE focuses on variation in behaviour in response to the demands of the ecological and social environment (Winterhalder and Smith, 2000). Any unit of an individual's "effort" (e.g. energy or other resources) can only be allocated once, thus the problem of allocation of effort/resources to various activities must be solved so as to maximise reproductive success. Smith et al. (2001) argue that natural selection is unlikely to design individuals that excel at any one task, but should favour individuals who can weigh up the costs and benefits of energy allocation to numerous tasks optimally (see also Stearns, 1992). The costs and benefits of such trade offs will depend upon the demands of the environment (Volland, 1998). Natural selection can favour genes that allow expression of different phenotypes under different conditions – so called facultative traits (Schmalhausen, 1949; Maynard Smith, 1975, p. 19-26; Seger, 1976). Therefore, individuals with similar genetic make-up can exhibit different phenotypes via conditional strategies: in this situation, maximise fitness by employing behaviour X, and in that situation, maximise fitness by employing behaviour Y (Smith et al., 2001). Individuals that pursue the best strategies produce more offspring and increase fitness. This flexibility

of behaviour by optimising expenditure of a currency on different tasks so as to maximise fitness, or a proxy currency (Hill and Hurtado, 1996; Sellen, 1999; Smith et al., 2001), is known as phenotypic plasticity. One of the aims of HBE is to investigate how environmental and social factors result in variability in behaviour within and between populations (Borgerhoff Mulder, 1991).

Latterly, inclusion of “conditional strategies” into EP’s sexual strategies theory represents an attempt to incorporate evolutionary biology’s “life history theory”, and as such to adopt aspects of a behavioural ecological approach, albeit within limited “contexts” (Hill, 2000). The principal difference between the two is the attribution of variation in behaviour to domain-general “decision rules” that optimise fitness (HBE), versus domain-specific psychological mechanisms (EP). In EP, alternative sexual strategies are expressed in response to “context” through a psychological algorithm specific to that problem. In HBE, alternative tactics are expressed as the outcome of flexible decision rules, the function of which is to maximise fitness or a proxy measure.

Finally, unlike EP, HBE does not rely on estimates of past selection pressures. Instead, it is argued that the ability of individuals to shift phenotypes in response to changing conditions (Smith et al., 2000) suggests that behaviour can be adaptive in contemporary populations (Barrett et al., 2002, p. 8-10). Culture, and interactions with others and the environment are seen as current selection pressures. As cultural transmission is much quicker than genetic transmission, humans are always in evolutionarily novel environments (Low, 2000, p. 245-258), and it is argued that while the specific cues in the environment may be novel, the basic trade offs that underlie how the cues are dealt with are the same (Smith et al., 2001). Culturally transmitted knowledge, and physiological and psychological mechanisms that lead to behaviours are seen as proximate. The ultimate function of any behaviour is to increase fitness. As such, HBE investigates the pressures that may maintain current traits by investigating fitness differentials in current populations.

b. Mate choice

The HBE approach to mate preferences questions how various cues to partner quality are weighted and interact with one another. Behavioural ecologists do not see sex differences in mate preferences as the result of psychological traits fixed under differing reproductive constraints during the EEA, but argue instead for dynamic and ongoing selection pressures on behaviour, with bidirectional interactions between genes, environments, culture and development (Gowaty, 2003). Therefore, sex differences reflect the optimal solution to trade offs in mate choice made by men and women under prevailing conditions: if social, cultural, or ecological conditions cause the impact of reproductive and biological constraints to lessen, the optimal solution to mate choice trade offs may change.

c. Evidence

HBE research typically investigates whether behaviours exhibited in current human populations maximise fitness. It has primarily tested optimality models for foraging and reproductive strategies, and has produced convincing evidence that behavioural strategies maximise reproductive success. For example, behavioural differences between two traditional societies have been shown to maximise offspring survival and reproductive success under differing selection pressures. The !Kung San of South Africa have longer inter-birth intervals than the Hadza of Tanzania. The density of edible plants that can be easily collected by children is lower for the !Kung San, and mothers must carry their children for longer periods, than the Hadza, whose environment enables children to collect a larger proportion of their own food (Blurton Jones, 1986; Blurton Jones, 1987; Blurton Jones et al., 1990). Therefore, the optimal inter-birth interval is longer for the !Kung San than the Hadza.

While contributing less data to the study of human mate preferences than EP, the HBE focus on actual behaviour and its relationship to reproductive success has yielded some interesting insights into human mate choice. In the agro-pastoral Kipsigis of southern Kenya, for example, the number of children a woman is able to successfully rear is directly related to the wealth of her husband: female

choice for a wealthy partner increases her reproductive success (Borgerhoff Mulder, 1990). In post-industrial Poland, taller men have been shown to have greater reproductive success than shorter men (Pawlowski et al., 2000). As there is evidence that taller men are perceived as more desirable by women (Jackson, 1992), it is possible that female preferences for taller men (whether because of the genetic, social, or protection advantages associated with taller partners) result in fitness differentials for men on the basis of height, perhaps implicating selection pressures on mate choice in contemporary populations. Such data demonstrate that mate choice in contemporary populations does influence fitness, and suggest that humans can adjust their behaviour to modern environments in ways that make adaptive sense.

Some researchers have sought to relate intra-sexual variation in human mate preferences to social and ecological factors. While these studies bear considerable resemblance to the research into “context-specific” mate preferences of EP, they differ somewhat in the theoretical groundings of their predictions, and in the interpretation of results. For example, Waynforth and Dunbar (1995) predicted that mate preferences are contingent upon an individual’s value as a mate. In a sample of “lonely hearts” advertisements from publications in the US, they demonstrated that women who were younger, and who stated that they were physically attractive, sought more traits in a partner than older women or women who did not advertise their “attractiveness”. Men offering resources sought more traits in a partner than men who did not advertise their access to resources. Thus, individuals who offered the characteristics sought in a mate by the opposite sex were more demanding in their mate preferences. The authors argue that this represents bargaining in mate selection: mate preferences are contingent upon what an individual has to offer. While they argue that their results are concordant with an evolutionary explanation for mate preferences, it is not suggested that they reflect the context-specific outcomes of underlying domain-specific psychological mechanisms. In another analysis of “lonely hearts” advertisements from 23 US cities, McGraw (2002) investigated variation in female mate preferences in response to the demands of the local

environment. Women from densely populated cities and those with greater resource demands (i.e. high costs of living) were found to place more emphasis on a partner's resources than those from cities with fewer resource demands. He argued that his results demonstrate considerable flexibility in the optimal weighting of partner characteristics in female mate preferences in response to current environmental conditions.

d. Predicted effects of female status on mate preferences

Behavioural ecology predicts that environmental factors, including the social ecology, influence the optimal solution to the problems faced by individuals. Division of labour, socially acceptable gender roles, and constraints on the sexes are seen as part of the environment to which individuals must respond.

As described above, an HBE approach to mate preferences does not assume that sex differences in preferences are innate and inflexible, but rather are the current outcome of trade offs made by men and women. In an exploratory investigation of the characteristics Hadza men and women considered important in a partner, Marlowe (2005) found no sex difference in the importance placed on looks in a partner. This finding is interesting, as it runs contrary to one of the major sex differences in preferences argued by evolutionary psychologists to have evolved in the EEA, during which we supposedly lived much as the Hadza do now (i.e. as hunter-gatherers). The study suggests that the optimal outcome of trade offs in male and female mate choice does not always result in the sex differences reported by evolutionary psychologists. HBE would, instead, argue that under the current conditions of the Hadza population involved in the study, it was equally beneficial to men and women to seek physical attractiveness in a partner.

The female mate preference trade off most commonly investigated in EP research is that between partner looks and resources, as both can potentially increase female reproductive success. Waynforth (2001) demonstrated this trade off in a sample of North American undergraduate students. Female participants were asked to assign "mate choice points" from a limited budget to a number of

partner characteristics (including physical attractiveness) with and without male resource acquisition characteristics (e.g. hard working) included in the decision. Women added points to physical attractiveness in a long-term partner when they were told that partners under consideration were hard working. The results demonstrated that women expressed more “male typical” mate preferences when the trade off with partner resources was removed. This study represented a combination of concepts from EP and HBE perspectives on mate preferences. Evolutionary psychologists have argued that the optimal solution to the trade off between resources/parenting and good genes will be context-specific (e.g. Gangestad and Simpson, 2000). Waynforth (2001) interpreted his results as supportive of flexibility in female mate preferences so as to maximise fitness, but makes no claims as to the selection pressures in past environments that may have favoured this trade off. He argues that the sex difference in preferences for physical attractiveness may arise from a trade off in female mate choice decisions between attractiveness and resources.

It has been argued that most studies of human mate preferences have used samples from societies with cash economies and a division of labour in which women have historically been constrained in their participation in the work force (e.g. Buss and Barnes, 1986; Hrdy, 1997). When women can only secure resources through a partner, the optimal solution to the problem of choosing a mate may be to opt for a partner with material resources (Smuts, 1989). When women can access the resources necessary to raise offspring independently, the importance of male investment of resources in offspring may be expected to decrease (Low, 1990; Cashdan, 1993; Gangestad, 1993). As such, the optimal solution to the trade off between securing a partner with resources and a partner demonstrating “good genes” may shift.

While evolutionary psychologists have demonstrated positive relationships between female wealth and preferences for resources in a partner (e.g. Buss, 1989b; Wiederman and Allgeier, 1992), there is evidence to suggest that alternative measures of female status are associated with less “female-typical”

mate preferences. For example, in a re-analysis of Buss's (1989a) data, Gangestad (1993) predicted that the optimal solution to the "good genes" versus resources trade off in female mate preferences would differ across societies in accordance with female participation in the economy: women who were able to provide for themselves independently were predicted to have stronger preferences for cues to genetic quality than women in less egalitarian societies. Accordingly, he found a positive relationship between female participation in the economy and preference rankings for "physical attractiveness" across societies. Similarly, Koyama et al. (2004) predicted that the outcome of the trade off would vary with measures of female status at the level of the individual. In a sample of 218 female undergraduate students, they found that own-rated financial prospects were positively related to preference rankings for "physical attractiveness" in a long-term partner, and an attitudinal measure associated with perceptions of the status of women (i.e. "feminist attitudes" assessed using the Liberal Feminist Attitude Scale (Morgan, 1996)) was negatively related to preference rankings for "good earning potential". The results of both studies are consistent with a shift in the female mate preference trade off between "good genes" and resources with female status: when women are able to acquire the resource they need to raise offspring, the importance of securing a partner with resources decreases, and the optimal solution to the trade off shifts. This effect appears consistent both across societies, and within a student population. Furthermore, that this effect was observed when alternative measures of female status were used suggests that female wealth or income provide inadequate measures of female status. Female control over resources (e.g. female participation in economy, or endorsement of attitudes associated with autonomy) have different effects on mate preferences than does female access to resources (e.g. female wealth or income).

In an analysis of foraging populations (i.e. those with no agriculture, in which all provisioning comes from hunting, gathering and fishing) in the Standard Cross Cultural Sample, Marlowe (2003) demonstrated a relationship between the level of male provisioning of food, and the mating system employed. In societies with low levels of male provisioning, levels of polygyny (i.e. a mating system in

which one man can legally marry more than one women) were higher than those with high levels of male provisioning. He argued that when men provision little, there is little point to a female preference for a partner's resources, and instead, women are able to express preferences for "good genes". He argues that this results in a polygynous mating system, in which women are willing to "share" a partner with "good genes", as they do not lose out on the resources needed to raise offspring. When women contribute more to subsistence (as men contribute less), they may be less concerned with a partner who will provide resources, and more concerned with acquiring a partner with good genes.

As discussed, it is possible to derive predictions about the effects of female status on mate preferences from the theory and research generated by HBE. While the HBE approach to mate choice among women is to investigate the relative importance of various partner traits, most research and theorising has, like EP, focussed on the trade off between a partner's resources and cues to his genetic quality. Investigation of this particular trade off seems the most relevant starting point for understanding sex differences, as they typically relate to these two characteristics. Social constraints on women are viewed as part of the environment to which individuals must respond. As such, it is predicted that the sex differences reported in partner preferences may arise from the optimal solution to mate preference trade offs made by women under prevailing social and economic constraints. Therefore, when women are able to provide for themselves independently, they are expected to employ more "male-typical" preferences (i.e. weight cues to genetic quality more highly than resources) as the optimal solution to the trade off shifts.

e. Critique

Human behavioural ecology has been criticised for failing to identify human adaptations (such as psychological mechanisms), and focussing instead on behaviour that is proposed to be adaptive (e.g. Symons, 1987; 1989). For example, a mate preference is not an adaptation, but the psychological mechanism that underlies that preference is. As such, an adaptation may not be

currently adaptive (it may be a past adaptation), and adaptive behaviour need not arise from an adaptation (it may be an exaptation – a trait that increases fitness now, but was not originally “built” for the task). For evolutionary psychologists, who view adaptations as unlikely to be adaptive in contemporary environments, correlating trait variation with reproductive success is meaningless and provides no information as to the task for which the trait was originally built (Symons, 1990). In response, behavioural ecologists have argued that natural selection works on all levels – from physiological to behavioural, as morphology, physiology, psychology and behaviour are all parts of the gene-environment interaction (Turke, 1990). Furthermore, while behaviour can be readily measured, psychological mechanisms can only be inferred.

Evolutionary psychologists argue that a view of individuals as “fitness maximisers”, able to adjust their behaviour through flexible “decision rules”, confuses proximate motivations with evolutionary mechanisms (Daly and Wilson, 1999). That is, individuals actually strive to seek mates or food, rather than inclusive fitness, and as such a focus on these mechanisms as adaptations is more useful than attempting to prove that behaviour is adaptive. In response, human behavioural ecologists argue that EP’s view of the mind consisting of numerous distinct and self-contained modules that govern the performance of particular tasks does not inform as to how allocation of resources to various tasks could be optimised (see Smith et al., 2001).

While behavioural ecology provides valuable insight into the function of human behaviour from rigorous scientific observations and model testing, it tells little about the mechanisms by which individuals end up behaving adaptively (e.g. psychological mechanisms, cultural influences, learning, hormonal changes). It has also provided relatively little research into modern westernised populations, focussing instead on traditional societies.

f. Summary

HBE seeks to apply evolutionary principles to human behaviour. HBE assumes that evolution favours individuals able to adjust behaviour so as to maximise fitness under differing constraints and argues that behaviour in contemporary populations can be adaptive. Evolutionary psychologists argue that correlating traits with fitness in contemporary populations is both meaningless (as it says nothing about the adaptations that underlie behaviour), and pointless (as they do not expect behaviour to be adaptive in modern environments). HBE has provided convincing evidence, however, that individuals do behave adaptively under the constraints of current environments.

While the HBE approach to human mate preferences bears resemblance to that of EP, variation in mate preferences is seen as the output of generalised fitness-maximising decision rules, rather than of domain – specific adaptations. HBE studies have demonstrated that individuals shift their mate preferences in response to social and environmental variation. It is predicted that when social constraints on women's ability to provide for themselves change, the optimal solutions to trade offs in female mate preferences will shift accordingly.

1.2.3. The Biosocial Model

a. Theory

In their biosocial model of behavioural sex differences, Wood and Eagly (2002) argue that sex differences in behaviour result from interactions between biological sex differences and social contexts. The model utilises social role theory (Eagly, 1987), which argues that men and women become psychologically different in ways that enable them to fill “male” and “female” social roles. As such, the proximate determinants of psychological sex differences are assignment, or self-allocation, to social roles (e.g. Lorber, 1994). The allocation of men and women to differing roles is determined by the social structure. As the structure of societies varies with ecological, economic, and technological factors, so too does the social role distribution of men and women across societies.

Evolved, biological sex differences are also emphasised. For example, physical sex differences such as men's greater body size and strength, and women's capacity for childbearing and lactation are seen as ultimate determinants of the tasks that can be most effectively accomplished by men and women, and therefore contribute to the allocation of men and women to social roles. It is argued that men's greater upper body strength predisposes them to greater efficiency at jobs requiring physical strength than women, whereas women's capacity for childbearing and lactation limit their ability to perform tasks that require travel away from home during certain periods of their lives (Eagly and Wood, 1999; Wood and Eagly, 2002). Thus, biological differences contribute to the social structure, and in turn lead to psychological sex differences (Eagly, 1987; Eagly and Wood, 1999). Social structural and biological factors are also argued to interact, influencing the magnitudes of sex differences. If, for example, social conditions lead to a reduction in the importance of upper body strength to acquiring resources and status, or the constraints of child bearing on the ability to travel, the distinction between the social roles of men and women may be expected to diminish, leading ultimately to smaller behavioural sex differences.

Relations between social role allocation and behaviours are mediated by the formation of gender roles that dictate the characteristics men and women should possess in order to fulfil their social role (Eagly, 1987). Gender roles dictate the desirable and preferred attributes of men and women and emerge from the activities that are optimally (and typically) performed by each sex. The characteristics that are required to fulfil these activities become stereotypic. For example, the typical family and economic requirements of men and women require a variety of skills and behaviours that (in post-industrial societies at least) comprise the roles of "breadwinner", resource acquisition skills (for men), and "homemaker", domestic skills (for women) (Reskin and Padavic, 1994; Shelton and John, 1996). Thus, the psychological characteristics associated with the female role tend to be friendly and nurturing, interpersonal and communicative skills (Eagly and Wood, 1999), and those associated with subordination (Ridgeway and Diekema, 1992). The male role is associated with dominant,

assertive, and independent behaviours (Eagly and Steffen, 1984). Gender-stereotypic expectations then become internalized as part of an individual's self – concept and personality, thereby influencing behaviour (Feingold, 1994). Self-regulatory processes involve individuals' maximisation of utilities calculated from the costs and benefits that emerge in social interactions, which takes place within the constraints of a particular social structure (Wood et al., 1997). Further mediators of the process by which social roles are translated to behavioural sex differences are hormonal changes. For example, men's testosterone levels rise in response to anticipation of tasks associated with the male social role, such as competitive situations (Booth et al., 1989; Gladue et al., 1989; Cohen et al., 1996), and women's cortisol levels increase with motherhood (Cortier and Fleming, 1995; Fleming et al., 1997).

Despite acceptance of a role of evolution in biological sex differences (Eagly and Wood, 1999), sexual selection pressures are not assumed to lead to sex differences in psychology. Wood and Eagly (2002) argue that sexual selection pressures were likely to be weak over our evolutionary history due to low levels of intra-sexual competition (i.e. competition between men for access to women) and a monogamous mating system. It is argued that our low sexual size dimorphism indicates a lack of strong sexual selection pressures (e.g. Plavcan, 2000). Human sexual size dimorphism in comparison with other primate species is, however, consistent with a mildly polygynous mating system (Harcourt et al., 1981), implicating at least some role of sexual selection. It is unclear, however, whether the authors accept a contribution of sexual selection to sex differences in mate preferences. The arguments presented against sexual selection are a direct response to a strong EP argument for sexual selection pressures as the sole determinant of sex differences in aggression. Wood and Eagly (2002) do not discuss inter-sexual selection, in which one sex exerts choice for members of the opposite sex on the basis of favourable characteristics (e.g. material resources or good genes). It seems unlikely that at no point in human evolution has mate choice influenced reproductive success and therefore been prone to selection pressures, despite low levels of polygyny. The authors acknowledge that the

HBE view of sex-differentiated behaviours emerging from interactions between the environment and evolved attributes as dynamic processes are consistent with their model, but do not discuss how the role of sexual selection inherent in the HBE perspective of mate preferences fits with their model.

b. Evidence

Wood and Eagly (2002) provide evidence from the cross-cultural ethnographic record for their biosocial model. In a meta-analysis of cross-cultural research, strong sex differences in the division of labour were consistent with the assignment of certain tasks to each sex. Many of the activities performed primarily by men were physically demanding (such as hunting), and those performed primarily by women were those that could be carried out close to home, enabling close contact with children and infants, such as food and drink preparation. Findings also point to variability in task allocation across societies in line with the pressures of the effects of social factors on the impact of biological sex differences. For example, in some societies, women were found to hunt. In the Agta of the Philippines, the resource rich environment that enabled game hunting close to home meant that hunting and childcare were not incompatible. This indicates that a sex (in this case women) can perform tasks usually associated with the opposite sex if the biological factors which lead to typical role designation can be accommodated, thus providing support for the biosocial model. The evidence also supports the bi-directional flow between social structure and biology predicted by the model. For example, women's reproductive schedules may be altered for the economic demands of a given society (Nerlove, 1974; Schlegel and Barry, 1986; Mukhopadhyay and Higgins, 1988): in societies where women contribute to the subsistence economy, there are longer post-partum sex taboos, resulting in a decreased number of dependent offspring (Schlegel and Barry, 1986).

c. Predicted effects of female status on mate preferences

In social role theory, mate preferences reflect the attempts of individuals to maximise their utilities in a gendered environment. In many world societies,

there is a gender hierarchy in which men possess greater power and status and control more resources than women (Eagly and Wood, 1999). For example, in the contemporary US, the division of labour is such that women perform the majority of domestic work, and spend fewer hours in paid employment than men (Shelton, 1992). Furthermore, women in the paid work force receive lower wages than men, and are under-represented at the highest levels of employment (Jacobs, 1989; Reskin and Padavic, 1994; Tomaskovic-Devey, 1995). When gender roles are very distinct (e.g. “breadwinner”/“homemaker”), men and women are likely to seek partners who possess characteristics associated with the opposite gender role, and mate preferences should reflect these divergent responsibilities and obligations (Eagly and Wood, 1999). Thus, from a social role perspective, the widely reported sex differences in mate preferences reflect a tendency of men and women to find partners that fit a society’s sexual division of labour and marital roles, rather than evolved psychological mechanisms. This is why women seek cues associated with the breadwinner role (e.g. status and financial prospects). The greater male preference for physical attractiveness is tentatively attributed to a stereotype in which attractive individuals are perceived as more socially competent and popular (Eagly et al., 1991; Feingold, 1992b). Physical attractiveness in a partner may therefore be more important to men as the female social role typically demands greater social competence (Lippa, 1998; Cejka and Eagly, 1999).

The biosocial model proposes that, across societies, sex differences in behaviour should be contingent upon the social and ecological factors which enhance or diminish the impact of reproduction on women’s activities, and size and strength on men’s (Wood and Eagly, 2002). In modern post-industrial societies, economies are becoming more reliant on technology, reducing the importance of upper body strength in paid employment. Average number of children per family has declined. As the importance of biological factors that designate men and women to different roles decline, sex differences in mate preferences are predicted to decrease. Reanalyses of Buss’s (1989a) data from 37 cultures, have provided support for this prediction. Eagly and Wood (1999) measured female

empowerment using the Gender Empowerment Measure (United Nations Development Program, 1995) which increases as (a) women's percentage share of administrative and managerial jobs and professional and technical jobs increases, (b) women's percentage share of parliamentary seats rises, and (c) women's proportional share of earned income approaches parity with men's. They found that female preference ratings for male earning potential decreased with increasing level of empowerment. This was interpreted to reflect greater similarities between gender roles and associated mate preferences in more egalitarian societies.

In a further reanalysis of Buss's (1989a) sample, Kasser and Sharma (1999) hypothesised that the magnitude of the sex difference in preferences for resources would decrease when cultural levels of female reproductive freedom and educational opportunities were high. Objective measures of educational equality (percentage of literate females relative to males and percentage of females achieving primary and secondary level education) and reproductive freedom (maternal mortality rate, percentage of births attended by a trained health care professional, percentage of women using contraceptives, fertility rate and presence or absence of national domestic violence laws) were created using variables from the United Nations Development Program (1990, 1991, 1995). Educational equality was significantly negatively correlated with female preference for male resource acquisition characteristics and, although non-significant, the correlation with reproductive freedom was in the predicted direction. The magnitude of the sex difference in preference for resource acquisition characteristics was significantly negatively correlated with females' reproductive freedom and females' educational opportunity. Furthermore, when cultural economic wealth (gross national product per capita) was controlled for, correlations remained significant. Similarly, Glenn (1989) used indicators of cultural development (e.g. birth rate), to show that in the more developed cultures in Buss's (1989a) sample, both men and women preferred smaller age differences between themselves and a partner, and placed less importance on financial prospects, ambition and industriousness, and good looks.

At the level of the individual, Johannesen-Schmidt and Eagly (2002) tested the effects of changing attitudes inherent in increasing sexual equality (i.e. the extent to which women endorse the traditional female gender role of “home-maker”) on the mate preferences of 102 female undergraduate students. Attitudes towards gender roles were measured using the Ambivalent Sexism Inventory (Glick and Fiske, 1996), which measures multidimensional aspects of sexism. There were positive relationships between the extent to which females manifested benevolent sexism (a measure of approval for the traditional female gender role), and preferences for “good earning potential” and age in a partner. Thus, decreasing female endorsement of the traditional female gender role (which may reflect attitudinal changes inherent in increasing sexual equality) is related to decreased preferences for resource acquisition characteristics in a partner.

Thus, the biosocial model predicts that, as changes in society diminish the contribution of biological sex differences in assigning men and women to different social roles, sex differences in behaviour (including mate preferences) will decline (Wood and Eagly, 2002). If societies were completely egalitarian, male and female mate preferences are predicted to converge (Eagly and Wood, 1999).

d. Critique

The social role origin theory of sex differences has been criticised on a number of points. Given the differences in theoretical assumptions and frameworks, evolutionary psychologists argue that culture and social structure are unlikely to have an independent causal effect on sex differences in behaviour, but instead reflect underlying evolved dispositions (Tooby and Cosmides, 1990; Buss, 1994). It is also argued that individuals are treated by social role theory as passive in their assignment to roles (Buss, 1996), and that gender roles themselves are arbitrary (Buss, 1996, p. 19) or arise by accident (Archer, 1996, p. 915). These criticisms, however, predate the development of the biosocial model (Eagly and Wood, 1999; Wood and Eagly, 2002), and it is unclear how

evolutionary psychologists would respond to the proposed interactions between evolved dispositions and social conditions.

The arguments presented by social role theory against a role of sexual selection may apply when considering some sex differences, but it is difficult to imagine that, in a species with sexual reproduction, and at least some history of divergence in investment in offspring (as evidenced by the data taken to support the biosocial model that women more than men perform tasks that enable them to raise offspring), there will be no sexual selection pressures. Complete denial of a role of sexual selection pressures on human behaviour may result in an incomplete origin theory of sex differences.

e. Summary

Social role origin theories attribute sex differences in human mate preferences to the differential distribution of men and women into social roles. Domain-general psychological processes allow men and women to develop behaviours and tendencies that suit the gender role to which they are allocated. In the biosocial model, the positioning of men and women in different gender roles is believed to arise from interactions between biological sex differences and social conditions. In turn, the different roles of men and women lead to sex differences in behaviour, including mate preferences. When social or physical factors reduce the importance of biological sex differences in the allocation of men and women to different roles, sex differences in behaviour are expected to decline. The biosocial and HBE models are largely consistent, differing only on endorsement of HBE's assumptions that (i) behaviours are optimal outcomes to constraining conditions, and (ii) sexual selection pressures contribute to behavioural sex differences.

1.3. *Evaluation*

1.3.1. *Summary of origin theories*

EP posits that domain-specific psychological mechanisms in the human mind evolved in response to selection pressures in the EEA. Behavioural outputs of evolved psychological mechanisms are expected to be “universal” as they arose from selection pressures faced by all humans in our ancestral past, and are not expected to be currently adaptive. In sexual strategies theory, sex-specific constraints on reproductive success in the ancestral environment resulted in female preferences for a mate with resources, and male preferences for a fertile mate with a long residual reproductive lifespan. Variation in mate preferences is believed to result from alternative outputs of psychological mechanisms under differing “contexts”: partner characteristics are traded-off differently depending upon the context.

HBE uses optimality and game theories to derive predictions about the optimal behaviour under a given set of circumstances, and attempts to determine whether behaviour exhibited in current populations matches the predictions. HBE has been more concerned with variation in behaviour in response to environmental variation than EP, due to the belief that individuals are able to exhibit optimal behaviour under the varying conditions experienced throughout evolution, as the output of general “decision rules”. As such, this perspective does not rely on estimates of past selection pressures. Like EP, HBE models of mate choice assume a role of sexual selection, albeit with greater focus on intra-sexual variation through adaptive trade offs.

The biosocial model places sex differences in behaviour in the context of social structures and gender roles. Wood and Eagly (2002) argue that men and women are allocated to different gender roles as a result of interactions between biological sex differences and prevailing social conditions. The impact of biological sex differences is believed to vary through interaction with ecological

and technological changes. For example, when foraging or provisioning does not impinge on women's child rearing responsibilities, women may be as equally likely to provision as men. Furthermore, hormonal changes associated with gender-typical tasks are believed to mediate relationships between gender roles and behaviour.

1.3.2. Comparative evaluation

There is considerable evidence for cross-culturally consistent sex differences in mate preferences in accordance with assumed sexual selection pressures. EP's assertion that sex differences are universal, with their roots in sexual selection pressures of the EEA, however, seems outdated and simplistic in the light of mounting evidence for variation in preferences. Indeed, EP's explanations for sex differences in behaviour in modern populations that rely on estimates of past selection pressures seem dubious. Selection pressures of the ancestral environment argued to explain sex differences in the preferences of undergraduate students from modern westernised societies do not generate the same effects in contemporary populations living under conditions similar to those estimated to have existed in the EEA (e.g. Marlowe, 2003). EP's attempts to account for intra-sexual variation are limited by the narrow range of contexts considered, all of which are consistent with evolutionary stories about assumed selection pressures. Evidence that traits can evolve faster than previously assumed, and HBE research that demonstrates adaptive behaviour in current environments, lends doubt to EP's assumption of an "adaptive lag".

An HBE approach to mate preferences also relies on the assumption that sexual selection pressures act on humans. The model, however, does not rely on estimates of past selection pressures, and has instead provided convincing evidence that humans can adjust their behaviour adaptively in current environments. Mate preference research consistent with an HBE approach has demonstrated variation in preferences in relation to environmental demands. Like EP, it has demonstrated that females are able to solve the trade off between

seeking a partner with resources, versus a partner advertising good genes, in ways that seem likely to increase reproductive success, but argues that this is an adaptive response to current conditions, rather than the result of a psychological mechanism evolved in the EEA. As such, sex differences in preferences are viewed as the current outcome of highly flexible, environmentally-contingent mate choice trade offs.

While the HBE approach makes fewer assumptions, and is grounded in sounder evolutionary theory than the EP model, the biosocial model provides the most parsimonious framework, making no assumptions about selection pressures. Widespread sex differences in mate preferences are attributed to a prevalent “patriarchal” social structure that results, in part, from biological sex differences (e.g. due to sex differences in upper body strength). Under circumstances in which the importance of biological sex differences in allocating men and women to different social roles decreases, behaviour becomes less “sex typical”. Social role theorists have demonstrated that women perform male-typical tasks under circumstances in which women’s child-bearing and raising impose fewer constraints on behaviour (Wood and Eagly, 2002), and have shown that when women are “empowered” their mate preferences become more like those of men (Eagly and Wood, 1999).

Wood and Eagly (2002) state that their cross-cultural findings could equally support an HBE framework as the biosocial model. Both assume interactions between biological sex differences and the cultural environment lead to variation in behavioural outcomes, and emphasise a bidirectional, dynamic influence of culture on behaviour. It is argued that an HBE approach treats the distal biological and social structural causes of sex differences as a framework in which to place psychological theories of proximal causes (Wood and Eagly, 2002). The gender roles, socialization, stereotypes, and self-concept argued to result in sex-specific behaviour in the biosocial model can be viewed as part of the environmental problems to be solved in the HBE model. Similarly, the assumed ability of individuals to adapt their behaviour to maximise rewards and reduce

costs within varying social and ecological environments in the biosocial model may translate into individuals' ability to trade off partner characteristics so as to optimise reproductive success in HBE. The primary difference between the models lies in the acceptance of behaviours as the optimal, adaptive, outcomes to current conditions. HBE's level of analysis is functional (the ultimate "function" of behaviour is to increase reproductive success), and therefore assumes an adaptive component to mate preferences. The optimal trade off of partner characteristics is expected to vary in response to the social and physical environment, and is predicted to be "adaptive" as choosing the "right" partner under given circumstances will increase reproductive success. Social role accounts are unclear about the role of sexual selection in mate preferences, and do not claim an ultimate function of behaviour.

While I have argued that attribution of behaviour to sexual selection without demonstrating certain conditions (e.g. that the preference is heritable) is a weakness of evolutionary approaches, evidence for the ability of individuals to trade off partner characteristics in adaptively relevant ways is robust and should not be ignored. Evidence from HBE that individuals are able to behave adaptively in current environments suggests that selection pressures should be considered, and incorporation of a role of sexual selection, and associated "adaptive trade offs" into the biosocial model may serve to increase its explanatory power. Investigation of sex differences should involve analysis at proximal and distal levels, therefore requiring interdisciplinary integration of different levels of causal analysis (Wood and Eagly, 2002). A perspective that takes into account possible selection pressures as well as the proximate cues and psychological processes that interact to produce sex differences may provide greater insight into the causes of intra- and inter-sexual variation in preferences.

1.3.3. Predicted effects of female status on sex-differentiated mate preferences

Each of the three origin theories treats the role of female status on mate preferences differently. Therefore, investigation of its effects can inform as to

the validity of aspects of each model, and provide insight into the debate regarding the relative importance of biological and cultural constraints on sex-differentiated behaviour.

In the past, EP researchers have argued against a “structural powerlessness hypothesis”, suggesting that female status has not contributed to sex-differentiated mate preferences. More recently, however, EP’s sexual strategies theory has been developed such that it predicts variation in female mate preferences in accordance with differing levels of status if constraints on the ability of women to provide for themselves independently exerted selection pressures in the EEA. Specifically, it predicts that when women are able to control the resources necessary to raise offspring, the output of the trade off between a partners’ resources and his genetic quality will shift, such that women will exhibit more “male-typical” preferences (i.e. prefer cues to heritable quality over resources). It could also be predicted that when women have independent access to resources, preferences for older partners (as a proxy measure of wealth) will shift: women may no longer need to risk the decreased life expectancy of an older partner in order to obtain access to resources. These effects are believed to arise from the context-specific outputs of domain-specific psychological mechanisms. Identical predictions can be derived from an HBE perspective. When women are able to control resources, the optimal solution to trade offs in mate preferences are expected to shift, such that their mate preferences become more like those typical of males, as the adaptive output of domain-general decision rules. Similarly, the same predictions can be derived from the biosocial model, although in this case shifts in preferences are seen as responses to merging gender roles and associated behaviours. Additionally, the biosocial model attributes preferences for physical attractiveness to an underlying preference for the favourable personality characteristics associated with the female gender role, rather than preferences for good genes.

Initially, EP research investigated the effects of female wealth or income as proxies of status on mate preference. The positive relationships yielded were

used as evidence against a contribution of economic constraints on women to sex differences in preferences. It was subsequently argued that these relationships may represent positive assortative mating on the basis of socio-economic status, and that more adequate measures of female status were required. Alternative measures of female status at cross-cultural (e.g. female participation in economy, male contribution to subsistence, and female empowerment, reproductive freedom and education) and individual (e.g. self-reported financial prospects, feminist attitudes, and endorsement of the traditional female gender role) levels were found to relate to female expression of more “male-typical” mate preferences (e.g. preferences for physically attractive partners). While these results have been argued to provide evidence for a contribution of economic constraints on women to sex differences in mate preferences, they have been attributed to both the optimal outcome of mate preference trade offs under differing circumstances (i.e. EP and HBE), and responses to the merging of gender roles as social changes influence the impact of biological sex differences on the tasks allocated to the sexes (i.e. biosocial model).

As the three origin theories do not generate conflicting predictions, it is not possible to design simple tests of each. In order to test between the biosocial and evolutionary models, it would be necessary to test whether sexual selection pressures shape human mate preferences (e.g. by demonstrating heritability of the trait and preference). To test between the EP and HBE origin theories, it would be necessary to determine whether variation in female preferences in response to status influences reproductive success, or an adequate proxy. While both of these tests are beyond the scope of the thesis, it is possible to investigate the validity of the mechanisms by which female status is proposed to influence preferences in each model through detailed analyses of relationships. For example, if an adequate measure of female status were found to relate positively to preferences for physical attractiveness in a partner, it would be possible to explore whether this reflected increased preferences for favourable personality characteristics (as proposed by the biosocial model), or as an increased interest in cues to good genes (as expected in the evolutionary models).

1.3.4. *Thesis aims and objectives*

The aim of the thesis was to investigate the effects of an adequate measure of female status on sex-differentiated mate preferences. By so doing, I attempted to investigate the validity of each of the three origin theories, and to integrate methodological and theoretical aspects of each.

The first objective was to address the discrepancies in reported effects of alternative measures of female status on mate preferences. To this end, previous measures of female status were reviewed and evaluated, and a more comprehensive measure was developed (Chapters 2 and 3).

The second objective was to investigate the effects of the measure of female status on sex-differentiated mate preferences. I tested the prediction that, when females have higher status their mate preferences become more like those typical of males (i.e. they prefer physical attractiveness over resources, and prefer younger partners) in samples of women with a wide socio-economic profile, using online surveys (Chapter 3), questionnaires distributed through the post (Chapter 4), and in a sample of ethnographic data from traditional societies (Chapter 5). I also investigated the effects of female status on the magnitudes of sex differences in mate preferences (Chapter 8).

The third objective was to investigate whether the effects of female status on mate preferences were consistent with the optimal outcome of a mate preference trade off in the importance placed on cues to good genes versus material resources (as argued by EP and HBE), or with the merging of gender roles and the associated characteristics considered desirable in the opposite sex (as argued in the biosocial model). An increase in female preferences for physical attractiveness associated with a decrease in preferences for a partner's resources would be consistent with both perspectives. Investigation of the effects of female status on preferences for putative cues to heritable quality, such as sexually dimorphic male facial characteristics, however, provides an exploratory test of

the opposing models. Investigation of the relationship between female status and preferences for masculine versus feminine male facial characteristics can inform as to whether preferences shift towards cues to good genetic quality (i.e. masculine male faces) or cues to favourable personality characteristics (i.e. feminine male faces) with increasing female status (Chapter 3). Furthermore, investigation of correlations between female preference rankings for physical attractiveness, favourable personality characteristics, and cues to heritable quality (such as good health) may provide further insight into the underlying basis of preferences for physical attractiveness (Chapters 3, and 4).

The fourth objective was to investigate the effects of the proximate mechanisms proposed by the biosocial model to translate gender roles to sex-specific behaviour. I investigated relationships between female status and endorsement of traditional gender roles, and the potential mediating and moderating effects of various psychological and hormonal variables on relationships between female status and mate preferences (Chapter 7). This provided an integration of concepts from social role and evolutionary perspectives.

To address the limitation of most preference studies imposed through use of populations of undergraduate students, I accessed participants from wider age and socio-economic profiles (Chapters 3 and 4). To address the issue of reliance on self – report data, I sought to test predictions using ethnographic data (Chapter 5). I attempted to address the issue of attributing preferences for “physical attractiveness” to preferences for “good genes” by assessing female preferences for sexually dimorphic male facial characteristics (Chapters 3 and 10). I also assessed whether “preferences” related to the characteristics women said were important in their current partner (i.e. by assessing actual mate choice; Chapter 4). Finally, as the majority of mate preference studies follow a correlational design, I developed an experimental manipulation of perceptions of female status to attempt to determine the causal direction of relationships between female status and mate preferences (Chapter 6).

In Chapter 9, I attempted to determine whether perceptions of a facial characteristic more typically associated with success in the male gender role (i.e. apparent intelligence) influenced the attractiveness and femininity ratings of female faces. By so doing, I explored relationships between gender roles and stereotypes, and ratings of attractiveness of female faces. In Chapter 10, I further explored flexibility in female mate preferences through investigation of relationships between female reproductive strategy and mate preferences.

Chapter 2. Measurement of female status

2.1. Introduction

The first objective of the thesis was to develop a measure of female status that enabled a test of the predictions derived from each of the three origin theories. In previous studies (as discussed in Chapter 1), the effects of female status on mate preferences have varied depending upon the measure of status employed. Therefore, it was necessary to develop an adequate measure of female status that addressed these discrepancies in effects. To this end, I identified key components of female status and critically evaluated previous measures.

2.2. Female status

Constraints on female status are widespread both cross-culturally and historically. Violence against women is the most pervasive human rights violation globally, affecting women of all ages, cultures and socio-economic status: it can be physical, sexual, or financial (Canadian Panel on Violence against Women, 1993). Examples include forced pregnancies, abortions and sterilisation, bride- and widow-burning, dowry-related abuses, trafficking, forced prostitution, rape, sexual mutilation and sexual torture as weapons of war, genital mutilation, 'honour' crimes, forced marriage, early marriage, acid violence, sexual harassment, stalking, humiliation, and control of finances (<http://www.amnesty.org.uk/svaw>). Worldwide statistics demonstrate the extent to which violence constrains women's lives. Domestic violence is the major cause of death and disability for women aged 16 to 44. One in every three women has been beaten, coerced into sex or otherwise abused. In England and Wales, domestic violence accounts for a quarter of all recorded violent crime: two women are killed each week by a current or former partner, one in 20 women

has been the victim of completed rape, and approximately 160 women are raped every day (<http://www.amnesty.org.uk/svaw>).

Gowaty (1992) argues that factors that encourage female reliance on male partners, such as economic dependence, increase the occurrence of violence against women. She suggests that limitations to women's economic control are related to control of other aspects of women's lives - it is easier to control and exploit individuals who are reliant on others for essential resources. Therefore, constraints on the economic freedom of women may be a precursor to more general constraints on women. Even in modern western societies with increasing sexual equality, women are not able to access and control resources on an equal basis to men. Occupations with the highest levels of status and wealth are male dominated, and women remain underrepresented in leadership positions (Eagly and Karau, 2002). Women face discrimination in gaining employment (Fitzgerald and Betz, 1983; Glick, 1991) and sexual harassment at work (Gutek, 1985). Furthermore, public political power is largely male (Low, 1990, 2000). Therefore, assessment of the ability of women to provide for themselves independently and their reliance on a partner for essential resources should be central to any measure of female status. Ability to acquire and control resources may also provide the most useful measure of female status when testing the predictions of the three origin theories outlined in Chapter 1. It is predicted in the evolutionary frameworks that when women are able to provide material resources for themselves, the mate preference trade off will shift as women will be "afford" to seek partners advertising good genes, rather than having to seek a partner with resources. The gender roles that are argued to influence mate preferences in the biosocial model are also likely to be closely related to the ability of women to provide for themselves independently.

2.3. *Previous measures of female status*

2.3.1. *Societal level measures*

Much of the research into female status at a societal level has been conducted in traditional societies (e.g. hunter-gatherer or traditional agricultural societies). In an extensive literature search of the odd-numbered societies in the Standard Cross-Cultural Sample (SCCS: Murdock and White, 1969; for a description of the SCCS, see Chapter 5), Whyte (1978, 1979) identified all possible indicators of female status relative to males, without relying on any specific theory about the nature or measurement of the construct. Inter-correlations between 52 variables demonstrated that most aspects of female position relative to that of males were not closely related. Clusters of variables were identified, each composed of three to five interrelated codes, which fell into three broad categories: (i) access to and control of resources (e.g. control of the fruits of males' and own labour and dwellings), (ii) power (e.g. domestic authority, participation in community affairs and kin power), and (iii) attitudes towards the female role in society (e.g. ritualised fear and attitudes towards extra-marital sex). It was concluded that there was no such construct as "female status" which holds cross-culturally, and that there was no key aspect of the role of women influencing their status in a consistent manner (Whyte, 1978). This conclusion was confirmed by Low (1990) who reanalysed the same sample of societies and found that, despite some inter-correlations (e.g. when women were reported as being able to control the fruits of male and joint labour, they were also more likely to be able to inherit property and be active in community affairs), measures of female status did not cluster together to form a single measure.

I have argued that the ability of women to control resources should relate to other aspects of female status. There has been controversy, however, over such inter-correlations. Some investigations have failed to find relationships between women's economic contribution and other indicators of status (e.g. Sanday, 1973; Hendrix and Hussain, 1988). Conversely, in an examination of 185 non-

industrial societies, Schlegel and Barry (1986) found that evaluations of women and premarital sexual permissiveness were greater in societies in which women made substantial contributions to the food based economy. This discrepancy may arise from an increase in the economic status of the individual by contribution to public industries, but not by tasks performed for the family (Engels, 1972). Thus, the contribution of women to the wider economy, as well as to the family, should be a consideration in assessment of female status.

Indicators of female status developed for traditional societies are based on data from populations with a large variety of social and ecological conditions, and can inform the development of measures of female status in other societies, and at the level of the individual. The codes, however, may not be directly applicable to all other societies, such as those of the post-industrial west. Measures used to assess female status across developed, and developing, nations are the Gender-Related Development Index (GDI) and the aggregate Gender Empowerment Measure (GEM), developed by United Nations researchers (United Nations Development Programme, 1995). The GDI assesses sexual equality in achievements of life expectancy, educational attainment, and income, thereby providing a measure of the abilities of men and women to access basic resources, which is not related to the income level of a society. Of 130 countries for which sufficient data were available, the Nordic countries scored highest for gender equality on this index (the UK ranked 13th). Afghanistan, Sierra Leone, and Mali were amongst the lowest. The GEM assesses how empowered women are to take part in different aspects of public life on an equal basis to men. This is assessed as participation in political decision-making (share of parliamentary seats), access to professional opportunities (share of jobs classified as professional, technical, administrative, and managerial), and earning power (income). It was emphasised that education alone does not provide a good measure of female participation in public affairs or of economic power, as women may obtain higher education, but still be constrained by cultural or economic barriers in getting a job that utilises the skills they have gained. Of 116 countries for which data was available, the Nordic countries scored most highly on the GEM index. A number of developing

countries scored higher than richer, industrialised countries. For example, Trinidad and Tobago scored higher than the UK.

The developers of these indices note that certain aspects of female status are not captured (United Nations Development Programme, 1995). For example, participation in community life, input in decision-making and allocation of resources within the family are not assessed. Furthermore, they do not explicitly assess the ability of women to provide for themselves independently, or the control women have over the resources available to them. For example, women may have an income, but have no control over how it is allocated. These deficits are largely due to the lack of adequate data (e.g. data for female participation in local bodies such as municipal councils is rare, as is data from rural areas). Furthermore, these indices may not be applicable to some traditional societies. Women in hunter-gatherer societies, for example, may not participate in a “work force” with men or hold political power, but may provision for themselves independently, and exert authority in the family and community.

To summarise, cross-cultural analyses of female status implicate the multidimensional nature of “female status”. The measures developed by Whyte (1978) for traditional societies highlight the importance of female participation in public economies, power, and resource control as aspects of status. These aspects are assessed to an extent in the GEM, although attitudinal constraints on female behaviour and actual control of resources are not adequately assessed.

2.3.2. *Individual level measures*

Within-society studies of female status tend to utilise measures either of female income or attitudes towards the female role in society. While these are both important aspects of female status, control of resources and power have not been adequately assessed.

A number of studies have used income as a measure of female status (e.g. Townsend, 1989; Wiederman and Allgeier, 1992). This measure has been criticised for (i) confusing women's income with their socioeconomic status (women from high socio-economic brackets are likely to have higher incomes; Eagly and Wood, 1999) and (ii) not tapping the power and control needed to independently provide for oneself and to obtain autonomy (Gangestad and Simpson, 2000). While income may provide one measure of access to resources, and may relate to other aspects of status, it is not, in isolation, a sufficient indicator of female status (as discussed in Section 1.2.1.c).

A number of scales have been developed to assess attitudes towards the role of women in society, such as the Modern Sexism Scale (Swim et al., 1995) and the Neo-Sexism Scale (Tougas et al., 1995). More recently, however, the development of The Ambivalent Sexism Inventory (ASI) by Glick and Fiske (1996) enabled assessment of multiple aspects of sexism and in particular, approval for the traditional female gender role (benevolent sexism) and disapproval of the non-traditional female gender role (hostile sexism). Participants are asked to indicate their level of agreement with statements such as "No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman" and "Women exaggerate the problems they have at work". This provides a measure of individual-level attitudes towards the female role. The scale was developed in samples of students and community members in the USA and so may not be widely applicable to other cultures (Glick and Fiske, 1996).

A similar attitudinal measurement is the Liberal Feminist Attitude and Ideology Scale (Morgan, 1996). This scale measures liberal (as opposed to Marxist or radical) feminism (Jaggar, 1983), specifically identification with feminist beliefs in the general population (Morgan, 1996). Participants are required to indicate agreement with statements such as "It is insulting to the husband when the wife does not take his last name" and "Women should be more concerned with

clothing and appearance than men”. This scale is also unlikely to be widely applicable cross-culturally.

Individual level measures have not provided as comprehensive an assessment of female status as societal-level measures. Income represents access to resources, but may be confounded by socio-economic status and provide an inaccurate indicator of autonomy. Social attitudes towards females may constrain behaviour, thus endorsement of the traditional female gender role and attitudes associated with feminist thought provide important measures of female perception of acceptable behaviour and attainable status. Neither measure, however, assesses control of resources or power, which are likely to be central to general female status. Measurement of individual differences in female status should incorporate access to and control of resources and power as well as the social attitudes that may influence status.

2.4. *Development of a measure of female status*

The primary aim of the thesis was to investigate the effects of female status on the expression of sex-differentiated mate preferences. Evolutionary based origin theories of sex differences in preferences (i.e. EP and HBE) concur that constraints on women’s ability to access and control the resources needed to raise offspring may influence female mate preferences. In the biosocial model, social structure is seen to result in allocation of men and women to gender roles, which in turn lead to behavioural sex differences. As argued in Sections 2.2 and 2.3., there is no single measure or indicator of female status. The ability of women to independently control resources, however, may be central to all other aspects of female status and is likely to be dependent upon, or at least related to, the social structure and resultant gender roles. Therefore, in order to test the predictions of the origin theories, the most effective measure of female status in general, was considered to be ability to control essential resources.

Measures of resource control were developed for the sample on which predictions were tested: female residents of the UK. In the UK, access to basic resources, such as health care, are reasonably standard. Thus, access to resources was measured as income, education and ambition (i.e. how driven an individual is to acquire resources). Ability to provide for oneself independently and control resources was assessed as financial independence and control of finances. Power was also considered an aspect of the ability to access and control resources, and was assessed as input in decisions in the home and at work. For a full description of the questionnaire items used, see Appendix 1. In Chapter 3, an initial exploration of female responses to the measure was conducted, including a factor analysis to isolate any distinct dimensions within the measure. In further chapters, relationships between resource control and attitudes towards the traditional female gender role were examined (Chapter 7), and effects of resource control on mate preferences were compared to those of more general measures of female status (Chapter 5).

Chapter 3. An investigation of the effects of female control of resources on mate preferences using online questionnaires.

3.1. Introduction

The aim of the study was to investigate the effects of control of resources on female mate preferences in a contemporary post-industrial society. By exploring the current effects of resource control on preferences, I attempted to provide insight into how economic constraints on women may have shaped sex differentiated mate preferences. As an exploration of the effects of an adequate measure of female status on preferences, the principle aim of the study was to test predictions common to each of the three origin theories. Specifically, the following predictions were tested: female control of resources is associated negatively with female preferences for resource acquisition characteristics in a partner, and positively with female preferences for physical attractiveness. Preferences for resource acquisition characteristics were assessed as preference rankings for “good financial prospects” in a partner and age preferences (self-reported and preferences for age in male faces). Preferences for “physical attractiveness” in a partner were assessed through preference rankings.

To recap, HBE and EP models attribute the predicted effects of female status on preferences to a shift in the trade off in the importance of acquiring a partner able to invest material resources versus a partner with “good genes”. The biosocial model attributes shifts in preferences to a merging of preferences for characteristics in the opposite sex. To further explore the validity of the three origin theories, I investigated whether any effects of female status on preferences reflected shifts in a “good genes” versus “resources” trade off (i.e. evolutionary models), or a shift towards more male-typical preferences for favourable personality characteristics (i.e. biosocial model). This was achieved through investigation of the effects of female status on preferences for sexually dimorphic male facial characteristics, and an exploration of relationships between female preference rankings for “physical attractiveness” and those associated with “good

genes” (i.e. “good health”) versus favourable personality characteristics (e.g. “kindness”). A further aim of the study was to explore the new measure of control of resources. Data was collected via online questionnaires and face preference tests.

The study built on previous research by (a.) investigating the effects of a newly developed measure of female status on mate preferences, (b.) utilising wider age and socioeconomic profiles than most previous mate preference studies, and (c.) employing multiple measures of mate preferences (i.e. questionnaire items and face preferences).

3.2. *Method*

3.2.1. *Participants*

An online survey was developed, and displayed on the Perception Lab website. The survey was advertised in magazine and newspaper articles and a television programme about Perception Lab research. Participants accessed the website, and chose to participate in the study by completing the survey. Four thousand, three hundred and fifty-nine female participants completed the study (age: mean = 24.23, sd = 9.59). I identified and removed 5918 duplicate data entries (i.e. the same participant completing the test, or parts of the test, more than once) using a random number allocated at the start of the test. Only those aged between 18 and 35, and who reported being completely heterosexual were included in analyses. One thousand, eight hundred and fifty-one females (age: mean = 24.35, sd = 4.98) met these criteria. All participants were volunteers and completed the online test on remote computers. Responses from participants of online tests have been found to be as reliable as responses from participants in lab-based tests (Kraut et al., 2004).

3.2.2. *Questionnaire*

Participants provided demographic information: age, country of residence, ethnicity, marital status (single, casual relationship, serious relationship – living apart, serious relationship – living together, married), sexual orientation (1 to 7 scale where 1 = homosexual, 4 = bisexual, and 7 = heterosexual), own income and parents' income while growing up (bottom 25% income bracket, lower middle 25% income bracket, upper middle 25% income bracket, and upper 25% income bracket), and numbers of inhabitants and rooms in first childhood home (as a further measure of socio-economic status). Participants were also asked to indicate the kind of relationship they would prefer if they were looking for a relationship on the day of testing (1 to 6 scale where 1 = casual, and 6 = committed), and their self-rated attractiveness (1 to 7 scale where 1 = not at all attractive, and 7 = extremely attractive). Marital status was collapsed into a dummy variable (0 = single or in a casual relationship, 1 = in a serious relationship or married).

3.2.3. *Control of resources*

The measures of control of resources developed in Chapter 2 were employed. That is, seven questionnaire items designed to assess financial independence, importance of financial independence, control of finances, importance of having a career, maximum level of education, and input in decisions in the home and workplace, were completed (see Appendix 1).

3.2.4. *Mate preferences*

Participants were asked to rank 13 characteristics in order of importance in a potential partner for a long-term relationship (where the least important characteristic received a rank of “1”, and the most important a rank of “13”). Such a partner was defined as “someone you would be willing to commit to in a serious relationship and would consider marrying, or entering a relationship with

on grounds similar to marriage”. The 13 characteristics were in part taken from those used by Buss (1989a; Hill, 1945) and included good financial prospects, ambition and industriousness, favourable social status, physical attractiveness, good health, dependability, sense of humour, good communication skills, kindness, good domestic skills, fondness of children, willingness to commit to relationship, and good parenting abilities. Participants were asked not to give more than one characteristic the same rank. Analysis focussed on “good financial prospects” and “physical attractiveness”, target characteristics relevant to the predictions.

Participants were also asked to report ideal partner age and maximum and minimum partner ages tolerated (in years).

3.2.5. *Face preference tests*

Seven pairs of male faces differing in masculinity at 5-year age brackets (from ages 20 to 50), and 11 pairs of male faces differing in age by 5 years at 2.5-year intervals (from ages 20 and 25, to 35 and 40) were presented with a Java applet (for stimuli creation see Appendix 2). Participants indicated which face they preferred and the strength of their preference from face pairs differing in masculinity or age on the 8 – point scale displayed below the images (strongly prefer left, prefer left, slightly prefer left, guess left, guess right, slightly prefer right, prefer right, strongly prefer right). The order in which pairs were displayed, and the side each face was displayed on was fully randomised.

Masculinity preference in peer relevant faces for the sample was calculated as the mean preference for face pairs differing in masculinity at ages 20, 25, 30, and 35 years. Age preference in peer relevant faces for the sample was calculated as mean preference for face pairs differing in age at ages 20 and 25, 22.5 and 27.5, 25 and 30, 27.5 and 32.5, 30 and 35, 32.5 and 37.5, and 35 and 40. A score of less than 3.5 indicated a preference for the younger or feminised face, and a score greater than 3.5 indicated a preference for the older or masculinised face. A

score of 3.5 indicated no preference in either direction.

3.2.6. *Procedure*

Participants completed the demographic and resource control questionnaires followed by partner characteristic preference rankings and face preference tests.

3.2.7. *Data processing and analytic strategy*

Missing values accounted for a maximum of 12% of responses (income) for questionnaire items, and 37% of responses for face preferences. As there were no variables that could be considered to influence the likelihood of answering any question, and distribution of missing values was random, missing values were replaced with the mean of the series (Cohen et al., 2003).

Variables generating coefficients outside the specified parameters of normality (i.e. skewness coefficients $< \pm 1$ or kurtosis coefficients $< \pm 3$; West et al., 1995) were re-expressed using power transformations (i.e. importance of financial independence, importance of having a career, and number of inhabitants per room in first childhood home).

Relationships between all variables (with the exception of the marital status dummy variable) were first explored using Spearman's correlations. As bivariate analyses hide covariance, and given the multiple possible factors influencing mate preferences, predictions were then tested using multivariate regression models. Previous studies have not controlled for a number of factors that may confound relationships between female status and mate preferences. Gangestad (1993) suggested that studies examining these relationships must control for the fact that women with resources may have, or perceive themselves to have, a higher mate value. As self-perceived mate value (attractiveness) is known to influence mate preferences (i.e. "condition dependence"; Little et al., 2001),

perceptions of mate value were controlled for in analyses by inclusion of a measure of self-rated attractiveness. To control for effects of access to social and material resources through background socioeconomic status (Duncan et al., 2002) “crowding” in first childhood home (number of inhabitants per room in first childhood home; Krieger et al., 1997), and parents’ income while growing up were assessed. Furthermore, current relationship status and the kind of relationship currently sought may influence both current mate preferences and resource control. Thus, marital status and ideal relationship type at time of testing were assessed.

Predictions regarding self-reported age, and face preferences, were tested using standard hierarchical multiple regression models. Potential confounding variables identified above were entered as covariates in the first level of each model, and resource control variables and own income (as a measure of access to resources) were entered in the second level. This allowed identification of the effects of each predictor variable on the dependent variable while controlling for the effects of covariates and other predictor variables (Tabachnik and Fidell, 2001). Due to the non-independence of ranked data, predictions regarding ranked preferences for “good financial prospects” and “physical attractiveness” were tested using binary logistic regression. For this model, preference ranking for “good financial prospects” was subtracted from preference ranking for “physical attractiveness” and recoded as “0” (a stronger preference for resources than attractiveness) or “1” (a stronger preference for attractiveness than resources). As before, potential confounding variables were entered as covariates in the model. All variables in all models were robust to multicollinearity (tolerance > 0.62; West et al., 1995).

To investigate relationships between preferences for “physical attractiveness”, “good health” and those associated with a favourable personality, I inspected Spearman’s correlations between preference rankings.

3.3. *Results*

3.3.1. *Sample characteristics*

Eighty-eight per cent of participants reported being of Caucasian ethnicity, and 42% indicated residence in the UK. Fifty-six per cent were single or in a casual relationship. The majority of participants were in the middle brackets for current income (60%) and parents' income while growing up (85%), and had been educated to university or college level (87%).

3.3.2. *Resource control*

Table 3.1 shows the distribution of scores for the seven resource control items.

Measure of control of resources	Mean	SD
Financial independence	4.42	2.09
Importance of financial independence	5.74	1.36
Maximum level of education	3.06	0.58
Importance placed on having a career	5.62	1.39
Control of finances	4.77	1.75
Input in decisions in the home	4.41	1.44
Input in decisions in a workplace	2.66	2.07

Table 3.1 Means and standard deviations of resource control measures (n = 1851)

To reduce the number of variables included in the analyses, and to further explore the construct “control of resources”, measures of female participants' resource control were entered into a factor analysis. Factors were extracted using principal components analysis and rotated using the standard Varimax rotation with Kaiser Normalization. Two factors with Eigenvalues greater than 1 were

extracted (see Table 3.2). Variables that loaded highly on Factor 1 (Eigenvalue = 2.15, accounting for 30.74% of the variance) were financial independence, control of finances and input in decisions in the home and the workplace. Factor 1 was interpreted as representing “financial independence and power”. Variables that loaded highly on Factor 2 (Eigenvalue = 1.34, accounting for 19.19% of the variance) were importance of financial independence and importance of having a career. Factor 2 was interpreted as representing “ambition”. Participants’ scores for each factor were computed using the regression method, such that the mean of each factor was zero and the variance equal to the squared multiple correlation between estimated and true factor scores.

Factor	Eigenvalue	Percent of variance	Variable	Loading (r)
Financial independence and power	2.15	30.74	Financial independence	0.75
			Control of finances	0.60
			Input in decisions in the home	0.69
			Input in decisions in the work place	0.69
Ambition	1.34	19.19	Importance of financial independence	0.80
			Importance of having a career	0.84

Table 3.2 Measures of resource control: Factor loadings, eigenvalues, and percents of variance for factor analysis on resource control questionnaire responses.

3.3.3. Preliminary analysis

Spearman's correlations between resource control factors, mate preferences and possible confounding variables are displayed in Table 3.3. To reduce chances of a Type II error, Bonferroni correction was applied (i.e. p-values were multiplied by the number of relationships examined). There were positive correlations between own age, and self-reported age preferences and preferences for age in male faces. The replication of the known relationship between own age and self-reported age preferences (e.g. Kenrick and Keefe, 1992) in face-age preferences,

implies that the face age stimuli provide an accurate measure of age preferences. There were positive correlations between age preferences and “financial independence and power” and income. There were also, however, negative correlations between age preferences and “ambition”. This preliminary analysis may suggest that the factors tap different aspects of resource control. All potential confounding variables, however, were found to correlate with at least one of the dependent or independent variables (with the exception of crowding in natal home). Therefore, these effects should be controlled for before conclusions can be drawn. Crowding was not included in further analyses, as it was not related significantly to any other variable.

	Ideal partner age	Maximum partner age tolerated	Minimum partner age tolerated	Preference ranking for physical attractiveness	Preference ranking for good financial prospects	Preference for masculinity in male faces	Preference for age in male faces	Income	Financial independence and power	Ambition
Own age	0.87*	0.78*	0.83*	0.03	-0.01	-0.06	0.10*	0.40*	0.52*	-0.16*
Parents' income while growing up	-0.11*	-0.10*	-0.11*	-0.01	0.01	0.03	0.04	0.07	-0.11*	-0.03
Crowding	0.06	0.05	0.08	0.02	0.02	-0.06	0.01	0.05	0.03	0.02
Self-rated attractiveness	0.07	0.03	0.06	0.09*	0.03	-0.01	-0.04	0.12*	0.10*	0.05
Ideal relationship type on day of testing	0.13*	0.20*	0.15*	-0.02	-0.07	0.04	-0.01	0.01	0.08	-0.07
Ideal partner age		0.85*	0.83*	0.02	0.01	0.04	0.12*	0.39*	0.48*	-0.40*
Maximum partner age tolerated			0.66*	0.02	-0.01	0.05	0.09*	0.33*	0.41*	-0.17*
Minimum partner age tolerated				0.03	0.02	0.03	0.12*	0.38*	0.49*	-0.13*
Preference ranking for physical attractiveness					0.12*	-0.03	0.03	0.01	0.04	0.05
Preference ranking for good financial prospects						-0.02	0.01	0.04	-0.02	0.03
Preference for masculinity in male faces							0.02	0.03	-0.01	-0.03
Preference for age in male faces								0.02	0.03	-0.01
Income									0.42*	-0.08

Table 3.3 Spearman's zero-order correlations among all variables

* $p < 0.01$ (with Bonferroni correction)

3.3.4. Analysis

a. Mate preference variables

Table 3.4 shows means and standard deviations of mate preference items. Perhaps surprisingly, women ranked “physical attractiveness” as more important in a long-term partner than “good financial prospects”. Face preferences demonstrated low variance, and were centred around the mid-point of faces manipulated for age and masculinity.

Mate preference item	Mean	SD
Ideal partner age (years)	26.89	5.60
Maximum partner age tolerated (years)	33.19	7.65
Minimum partner age tolerated (years)	22.62	4.33
Preference ranking for “good financial prospects”	6.42	3.37
Preference ranking for “physical attractiveness”	7.35	3.10
Preference for masculine male facial characteristics	3.21	0.94
Preference for age in male faces	3.55	0.68

Table 3.4 Means and standard deviations of mate preference items (n = 1851)

b. Age preferences

Ideal partner age, maximum and minimum partner ages tolerated, and preference for age in male faces were entered in turn as dependent variables in a hierarchical regression model (see Table 3.5 for full results of models).

There was a positive relationship between own age and ideal partner age ($\beta = 0.80$, $p < 0.001$), replicating previous findings that partner age preferences are contingent upon own age (Kenrick and Keefe, 1992). Self-rated attractiveness was positively related to ideal partner age ($\beta = 0.03$, $p = 0.01$), perhaps indicating condition dependence in preferences for older partners with greater accumulated resources (e.g. Little et al., 2001). Parents’ income while growing up ($\beta = -0.03$, $p = 0.05$) and marital status ($\beta = -0.03$, $p = 0.05$) were negatively related to ideal age: women from a wealthier background, or who were in a

relationship, preferred younger partners than did women from less wealthy backgrounds, or single women. Ideal partner age was significantly predicted by own income ($\beta = 0.05$, $p < 0.01$). That is, wealthier women preferred older partners than less wealthy women. There was no effect of resource control on ideal partner age.

Ambition was significantly negatively related to maximum partner age tolerated ($\beta = -0.05$, $p < 0.01$). That is, ambitious women were less willing to tolerate partners much older than themselves than less ambitious women, providing support for prediction 1. There was a positive relationship between own age and maximum partner age tolerated ($\beta = 0.7$, $p < 0.001$) indicating that maximum partner age tolerated increased with own age.

“Financial independence and power” ($\beta = 0.05$, $p < 0.01$) and income ($\beta = 0.06$, $p = 0.001$) were both positively related to minimum partner age tolerated. That is, wealthier women and financially independent, powerful women were less willing to tolerate younger partners than were less wealthy or independent women. Thus, prediction 1 was not supported in this measure. Minimum partner age tolerated was also significantly predicted by own age ($\beta = 0.73$, $p < 0.001$) and ideal relationship type ($\beta = 0.03$, $p < 0.01$). That is, minimum partner age tolerated increased with own age, and women who were seeking a committed relationship were less tolerant of younger partners than women seeking a casual relationship.

There were no effects of resource control factors on preferences for age in male faces. There were significant positive relationships between own age, marital status, and parents' income while growing up and face age preferences (own age: $\beta = 0.09$, $p = 0.01$; marital status: $\beta = 0.09$, $p < 0.01$; parents' income while growing up: $\beta = 0.07$, $p < 0.05$). That is, older women, women in a relationship, and women from wealthier backgrounds, preferred older male faces. The latter results contradict the finding that parents' income and marital status were negatively related to self-reported ideal partner age. While women who are in a relationship or who come from a wealthy background report that they prefer

younger partners, they demonstrate preferences for older male faces.

c. Preference for masculinity in male faces

Masculinity preference was entered as the dependent variable in the linear regression model. There were no effects of resource control factors on preference for masculinity in male faces. There was a significant positive relationship between parents' income while growing up and masculinity preference ($\beta = 0.54$, $p = 0.03$). Women from wealthier backgrounds preferred more masculine male face shapes than women from less wealthy backgrounds.

d. Preference rankings

The dichotomous variable indicating preference for "physical attractiveness" versus "good financial prospects" was entered as the dependent variable in a binary logistic regression model. Independent variables and covariates were as described above. "Financial independence and power" significantly predicted this preference ($\beta = 0.15$, $\text{Exp}(\beta) = 1.2$, $p = 0.01$): resource control was associated with preferences for physical attractiveness over good financial prospects, providing support for prediction 2. Income also significantly predicted this preference ($\beta = -0.18$, $\text{Exp}(\beta) = 1.2$, $p = 0.006$), indicating that wealthy women preferred good financial prospects over physical attractiveness.

	Ideal partner age		Maximum partner age tolerated		Minimum partner age tolerated		Preference for age in male faces		Preference for masculinity in male faces		Preference for physical attractiveness over financial prospects*	
	β	p	β	p	β	p	β	p	β	p	β	p
Own age	0.80	<0.001	0.70	<0.001	0.73	<0.001	0.09	0.01	0.03	ns	-0.01	ns
Marital status	-0.03	0.05	0.01	ns	0.02	ns	0.09	0.01	-0.01	ns	-0.01	ns
Ideal relationship type	-0.01	ns	-0.02	ns	0.03	0.02	-0.03	ns	-0.01	ns	0.04	ns
Parents' income while growing up	-0.03	0.05	-0.02	ns	-0.01	ns	0.07	0.01	0.54	0.03	0.04	ns
Self-rated attractiveness	0.03	0.01	0.01	ns	-0.01	ns	-0.04	ns	-0.04	ns	0.01	ns
Income	0.05	0.01	0.02	ns	0.06	0.01	-0.05	ns	-0.04	ns	-0.18	0.01
Financial independence and power	0.02	ns	0.02	ns	0.05	0.01	0.05	ns	-0.04	ns	0.15	0.01
Ambition	-0.01	ns	-0.05	0.01	0.01	ns	0.04	ns	-0.01	ns	0.01	ns
Adjusted R ²	0.68		0.52		0.62		0.02				0.01	
F	490.92		252.29		383.64		3.12				NA	
p	<0.001		<0.001		<0.001		0.001				0.07	

Table 3.5 Multiple linear regression models with mate preferences as independent variables

*binary logistic regression model

e. Relationships between preference rankings

Spearman's correlation analysis indicated that preference rankings for "physical attractiveness" were positively correlated with "good health" ($r = 0.26$, $p < 0.001$), "good sense of humour" ($r = 0.2$, $p < 0.001$), "good communication skills" ($r = 0.18$, $p < 0.001$), and "kindness" ($r = 0.08$, $p < 0.001$). That is, preferences for physical attractiveness were positively related to both those associated with "good genes" (i.e. "good health"), and to those associated with favourable personality (i.e. sense of humour, communication skills, and kindness).

3.4. Discussion

A series of questionnaire items were designed to assess multiple aspects of female control of resources. Two dimensions of resource control were identified: "financial independence and power" and "ambition". Relationships between these factors and mate preferences were investigated. To my knowledge, this was the first study to assess the effects of control of resources on sex-differentiated mate preferences, to investigate individual-level effects of female status on a sample with wider age and socioeconomic profiles than undergraduate students, and to control for a number of covariates. The study also investigated the effects of female resource control on the posited mate preference trade off between material resources and good genes. "Financial independence and power" was associated with older minimum partner ages tolerated, and preferences for "physical attractiveness" over "good financial prospects" in a partner. "Ambition" was associated with younger maximum partner ages tolerated. The results suggest that resource control is an important predictor of sex differentiated mate preferences, the effects of which are independent of those of female income or background wealth.

In accordance with previous attempts to assess female status, measures of "resource control" did not group together as a single factor (e.g. Whyte 1978, 1979). As no variable loaded highly onto both resource control factors, and as each factor influenced mate preferences independently, it can be concluded that

the factors are distinct and tap different aspects of resource control. For example, “Financial independence and power” may tap actual resource control, whereas “ambition” may tap attitudes and desires associated with obtaining resource control and autonomy. Given the differing effects of these factors on mate preferences, assessment of multiple dimensions of female status, even within the construct “control of resources”, is essential when examining its effects on behaviour.

Women who were “financially independent and powerful” ranked “physical attractiveness” as more desirable than “good financial prospects” in a long-term partner. “Ambitious” women were less willing to tolerate older partners. “Financial independence and power”, however, was also associated with a higher minimum partner age tolerated. With the exception of the latter, results were consistent with a shift in female preferences towards those more typical of males. The effect of “financial independence and power” on minimum partner age tolerated may reflect an unwillingness of financially independent, powerful women to support a younger partner. Alternatively, this may reflect assortment for personality characteristics associated with obtaining independence and power, which may not be associated with younger partners. Results were largely consistent with the hypothesis that constraints on female access to and control of resources contribute to sex differences in preferences for physical attractiveness and resources in a partner.

It was predicted that the effects of resource control would differ from that of income, due to assortative mating on the basis of wealth, and the importance of autonomy in actual control over resources. There was a positive relationship between income and ideal partner age, but no effect of resource control. The effect of “financial independence and power” on minimum partner age tolerated was in the same direction as that of income. This resource control factor, however, was also associated with preferences for “physical attractiveness” over “good financial prospects”, whereas income was associated with the opposite preference. Largely, the effects of resource control on preferences differed from those of income, implicating the importance of assessing control of, as well as

access to, resources when measuring female status. The effects of female income on partner preferences used to argue against a role of economic constraints on women in sex differences in preferences (e.g. Buss, 1989b; Wiederman and Allgeier, 1992), are limited by failure to tap control over resources and to control for assortative mating.

While neither resource control factor provided independent support for both predictions, results demonstrated that resource control leads to shifts in mate preferences in the predicted directions, and in opposite directions to that of income. The results are concordant with the findings of studies that have assessed attitudes towards the traditional female gender role, feminist attitudes and cultural levels of female empowerment (e.g. Koyama et al., 2004; Johannesen-Schmidt and Eagly, 2001; Eagly and Wood, 1999; Gangestad, 1993). It is predicted that these measures will correlate with resource control, but the results of the current study emphasise the importance of constraints on female ability to access and control resources in sex differentiated mate preferences.

Preferences for age in male faces provided an additional measure of preferences for material resources in a partner. However, no effects of resource control on face age preferences were observed. It is possible that any effects are too subtle to be detected using facial stimuli: a five-year age difference between faces in pairs may have been too small to detect subtle differences in age preferences. Furthermore, the distribution of face age preferences was very limited in the sample, perhaps suggesting that the test did not effectively detect variation in age preferences. An alternative explanation may be linked to the finding that the effects of resource control on self-reported age preferences were only evident when participants were asked to indicate the maximum and minimum partner ages they would tolerate, but not ideal age. The face age preference was a general measure of the attractiveness of faces differing in age, and was perhaps more similar to the self-reported ideal age. It is possible that ideal age is too closely related to own age to be predicted by resource control, whereas maximum and minimum partner ages tolerated force participants to consider a wider age range with greater variability. Face age preferences were, however, predicted by

other variables. As well as a positive relationship between own age and preferences for age in peer-relevant male faces (possibly lending validity to the use of the stimuli as a measure of age preferences), women who were in a relationship preferred older male faces. This may be due to a preference for someone who looks more likely to settle, or to have accumulated resources, thus providing a more secure option for a long-term relationship.

There was a positive relationship between parents' income while growing up and face age preference, suggesting "assortment" for wealth and status. This explanation, however, is not supported by self-reported age preferences, for which there is a negative relationship with parents' income. This discrepancy in results is difficult to explain, and suggests that either participants do not provide reliable estimates of their ideal partner age, or that there are methodological issues with the facial stimuli.

As a measure of preferences for cues to genetic quality versus cues to favourable personality characteristics and willingness to invest in offspring, preferences for sexually dimorphic male facial characteristics were assessed. This additional measure of preferences provided a less ambiguous measure of preferences for "good genes" than the ranking of "physical attractiveness", and could inform as to whether or not resource control influences the mate preference trade off between material resources and genetic quality. There were no effects of resource control on this preference. This may have resulted from a problem with the facial stimuli (e.g. the masculinity transform may have been too small – see Appendix 2), or may reflect the subtle nature of the relationship. While "financial independence and power" was found to relate to preferences for "physical attractiveness" over "good financial prospects", it is not possible to conclude that this reflects a shift in the trade off in favour of "good genes" versus investment of resources based on facial preferences (as would have been demonstrated by a positive relationship between resource control and preferences for masculine male face shapes). Similarly, it is not possible to conclude that the results are more consistent with the biosocial model, as resource control was not associated with a preference for feminine male face shapes (which would indicate increased preferences for favourable personality characteristics typically

associated with the female gender role). Furthermore, preference rankings for “physical attractiveness” were positively related to preference rankings for putative cues to both “good genes” (i.e. good health) and favourable personality characteristics associated with the female gender role (e.g. kindness). Therefore, it was not possible to conclude that the results are more consistent with either the evolutionary or biosocial models.

The temporal context of the mating strategy pursued is known to influence mate preferences (e.g. Buss and Schmitt, 1993; Gangestad and Simpson, 2000; Little et al., 2002). Therefore, it is possible to argue that any variation in mate preferences associated with resource control may reflect underlying differences in the temporal context of the relationship sought. For example, women who are financially independent from a partner may be single through choice, or choose to pursue only casual relationships, thus employing a short-term mating strategy. By including marital status and ideal relationship type on day of testing in analyses, however, it was demonstrated that resource control influenced mate preferences above and beyond the effects of the pursuit of long- or short-term mating strategies.

To conclude, results implicate a role of constraints on the status of women in the expression of sex differences in mate preferences. The results contradict predictions that sex differences in mate preferences arise regardless of the status of women, and implicate the use of inadequate measures of “female status” in previous studies which report positive relationships between status and preferences for resources in a partner (e.g. Buss, 1989b; Wiederman and Allgeier, 1992). Results of ranking of partner characteristics were consistent with a shift in the trade off between a partner’s resources and genetic quality posited by EP and HBE. Resource control, however, did not influence preferences for sexually dimorphic male facial characteristics. Furthermore, preference rankings for physical attractiveness were positively related to preferences for both cues to genetic quality and favourable personality characteristics. Therefore, it was not possible to conclude whether results are more consistent with an evolutionary framework or the biosocial model. Finally,

the sample was limited by its narrow socio-economic profile, both in terms of income and maximum level of education achieved.

Chapter 4. The effects of female control of resources on mate preferences in a broad socio-economic profile.

4.1. Introduction

The sample utilised in Chapter 3 was limited by a narrow socio-economic profile. The majority of participants were educated to university level, and were in the middle or upper income brackets. The purpose of the current study was to attempt to access women from a broader socio-economic profile, and to replicate results.

In the current study, I also attempted to address a number of criticisms of mate preference research methodologies (Laland and Brown, 2002, p. 173). First, the characteristics that participants indicate they prefer in a partner in a survey may not be the characteristics that actually drive mate choice decisions in the real world, either due to frequency dependent factors and trade offs, lack of consideration when responding to questionnaire items, or provision of socially desirable, rather than honest, responses. Furthermore, pre-listed partner characteristics may lead responses. Therefore, participants were asked to complete measures designed to tap actual mate preferences and were given the freedom to list the characteristics that attracted them to their current (or most recent) partner, without the constraints of pre-listed characteristics. Finally, I investigated relationships between resource control and a comprehensive measure of socio-economic status, to further explore relationships between access to, and control over, resources.

4.2. Methodology

4.2.1. Data collection

Questionnaires were distributed to households in Dundee. Dundee (population = 145 000) is situated on the east coast of Scotland and has a socio-economic profile representative of Scottish cities (Scottish census data: www.gro-

scotland.gov.uk). Participants living at addresses in areas of the highest, lowest, and mid socio-economic status were targeted. Levels of deprivation of populations of postcode sectors (the set of unit postcodes which differ only in the last 2 characters) were identified using Carstairs scores based on 2001 Scottish census data (McLoone, 2004). Carstairs scores provide a measure of the level of material deprivation of an area based on overcrowding, male unemployment, social class, and proportion of residents not owning a car. The postcode sectors of Dundee with the highest (7.09) and lowest (-4.91) deprivation scores were targeted, as was one postcode sector identified as average (0.88). Names and addresses of residents of the target postcode sectors were obtained from the 2001 Scottish Census Data.

Data collection comprised two waves of 250 questionnaires. In each wave, 100 questionnaires were posted to female residents of the postcode sector identified as having high levels of deprivation, and 75 to females in the postcode sectors identified as having mid- and low- levels of deprivation. Higher numbers were distributed to the area with high material deprivation, as response rates are known to be lower for low socio-economic status areas (Oppenheim, 1992). Names of participants within each sector were chosen at random. Each participant received a cover letter describing the purpose of the study, a questionnaire (with informed consent details, instructions and debriefing) and a stamped, addressed envelope with which to return completed questionnaires (see Appendix 3). Reminders were sent out after three weeks.

Response rates were extremely low (5.6%). To supplement data, dentist and doctors' surgeries, as well as large employers in Dundee, were approached with requests to distribute questionnaires in waiting and staff rooms. Given the nature of some of the questions, however, many employers were not willing to distribute questionnaires, imposing considerable constraints on the ability to collect data for this study.

4.2.2. *Questionnaire*

a. Resource control and socioeconomic status

Control of resources was assessed using identical measures to those described in Chapter 3 (see Appendix 1). Socio-economic status was assessed using the National Statistics Socio-economic Classification (NS-SEC), a coding system derived from occupation and employment status information to provide five classes of socio-economic status (see Appendix 3).

b. Mate preferences

Mate preferences were assessed using self-reported ideal partner age, maximum and minimum partner ages tolerated (in years), and ranking of partner characteristics (see Chapter 3). Additionally, a number of measures were included to assess the characteristics that attracted participants to their current or most recent partner. Participants were asked to list five characteristics that attracted them to their current or most recent partner in order of importance, and to indicate by how many years their current or most recent partner was older or younger than them.

c. Demographic details

Participants also provided personal information including age, ethnicity, marital status, sexual orientation, and self rated attractiveness.

4.2.3. *Data processing and statistical analysis*

There were low levels of missing values on a number of variables (maximum = 7) that were replaced with the mean of the series.

Resource control measures were entered into an identical factor analysis to that described in Chapter 3 (i.e. with Varimax rotation).

Responses to the questionnaire item designed to assess the characteristics which attracted participants to their current (or most recent partner) were recoded to

provide measures of the importance of “status” and “physical appearance” for attraction to partner. Characteristics considered to represent “status” included: financially stable, hard working, and good at managing finances. Characteristics that were considered to represent “physical appearance” included: attractiveness, height, eyes, smile, and nice face. For a full list of characteristics reported, see Appendix 4. Characteristics were weighted in accordance to their importance in attracting a participant to their partner. For example, if a “status” characteristic was entered in the first position (i.e. the most important characteristic), “status” received a score of “5”. If a “status” characteristic was entered in the fifth position, this represented a score of “1”. If status was mentioned more than once, the “status” score was the sum of all weighted positions in which it was mentioned. Therefore, preferences for “status” and “physical appearance” ranged from 0 to 15.

As in chapter 3, preference rankings for “good financial prospects” were subtracted from rankings for “physical attractiveness”, and transformed to a binary variable in which “0” represented preferences for “good financial prospects” over “physical attractiveness”, and “1” represented the opposite preference.

Marital status was collapsed into a dummy variable (i.e. 0 = single or casual relationship, 1 = serious relationships –living apart/together, and married).

Variables generating coefficients outside the specified parameters of normality (i.e. skewness coefficients $< \pm 1$ or kurtosis coefficients $< \pm 3$; West et al., 1995: attraction to “status” and “appearance” in most recent partner, preference rankings for “favourable social status”, “kindness”, and “good sense of humour”, importance placed on having a career, control of finances, and NS-SEC) were re-expressed using power transformations.

Analysis of the effects of resource control on partner preferences were conducted using hierarchical multiple regression models. Covariates included in the first level of models were own age, self-rated attractiveness, marital status dummy

variable, and NS-SEC, and predictor variables entered in the second level were resource control measures. Age preferences and scores for attraction to “status” and “physical appearance” were entered as dependent variables in linear regression models. The binary variable for preferences for “physical attractiveness” over “good financial prospects” was entered as the dependent variable in a binary logistic regression.

Relationships among preference rankings of partner characteristics and attraction to “status” and “appearance” in most recent partner, self-reported age preferences and partner age, NS-SEC and measures of resource control, were inspected using bivariate correlations.

4.3. *Results*

4.3.1. *Sample*

Due to the low return rate, it was necessary to utilise data from females of a wider age range than that of Chapter 3. All women under 50, who reported a heterosexual orientation, were included in analyses ($n = 73$; age: range = 17-50, mean = 31.79, $sd = 9.95$). Twenty-two per cent of women reported being single. All women reported being “white British”, “other European”, or “other white”.

One woman reported reaching primary level education, 11% reported secondary school level education, 29% college level, and 16% reported achievement of undergraduate and 43% postgraduate degrees.

Socio-economic status (as measured by NS-SEC) was concentrated in the highest class (managerial and professional occupations: 62%). Twelve per cent were in the second class (intermediate occupations), seven per cent in the fourth class (lower supervisory and technical occupations), and 19% in the lowest class (semi-routine and manual occupations).

4.3.2. *Resource control factor analysis*

Two factors with Eigenvalues greater than 1 were extracted (see Table 4.1). Variables that loaded highly on Factor 1 (Eigenvalue = 2.86, accounting for 40.84% of the variance) were input in decisions in the home, importance of financial independence, financial independence, and control of finances. Variables that loaded highly on Factor 2 (Eigenvalue = 1.01, accounting for 14.47% of the variance) were education, importance placed on having a career, input in decisions in the work place, and control of finances. Thus, Resource control factors were not comparable to those of Chapter 3, possibly due to the smaller sample size, and the wider age profile of the current sample. Therefore, it was not appropriate to utilise resource control factors in an attempt to replicate the previous findings, and individual measures of resource control were entered as the independent variables in regression models.

Factor	Eigenvalue	Percent of variance	Variable	Loading (r)
1	2.86	40.84	Input in decisions in the home	0.82
			Importance of financial independence	0.71
			Financial independence	0.67
			Control of finances	0.41
2	1.01	14.47	Maximum level of education	0.70
			Importance of having a career	0.68
			Input in decisions in the workplace	0.63
			Control of finances	0.54

Table 4.1 Measures of resource control: Factor loadings, eigenvalues and percents of variance for factor analysis on resource control questionnaire responses.

4.3.3. Analysis

a. Effects of resource control on mate preferences

Ideal partner age, maximum and minimum partner ages tolerated, age of most recent partner, and attraction to “status” and “appearance” in current or most recent partner, were entered in turn as dependent variables in a hierarchical regression model. There were no effects of resource control measures on any of the partner preferences (all p s > 0.05).

The binary variable for preferences for “physical attractiveness” versus “good financial prospects” was entered as the dependent variable in a binary logistic

regression model. There were no effects of resource control measures on this preference (all p s > 0.05).

b. Relationships between mate preference measures

Bivariate (Spearman's) correlation analysis demonstrated that preference ranking for "physical attractiveness" in a potential long-term partner, and attraction to "physical appearance" in current or most recent partner, were significantly positively correlated ($r = 0.46$, $p < 0.001$). Preference ranking for "good financial prospects" and attraction to "status" in current or most recent partner were significantly positively correlated ($r = 0.24$, $p = 0.04$). Age of current or most recent partner was significantly positively related to ideal partner age ($r = 0.89$, $p < 0.001$). There was a significant positive correlation between preference rankings for "physical attractiveness" and "good sense of humour" ($r = 0.34$, $p < 0.005$).

c. Relationships between resource control measures and socio-economic status

In bivariate (Spearman's) correlations, there were significant negative correlations between NS-SEC and two measures of resource control: maximum level of education ($r = -0.32$, $p < 0.01$), and input in decisions in the workplace ($r = -0.35$, $p < 0.005$).

4.3. Discussion

The aims of the current study were to replicate the findings of Chapter 3 in a sample with a broader socio-economic profile, to compare measures of mate preferences with measures of actual mate choice, and to investigate relationships between resource control and socio-economic status. I attempted to access women from a range of socio-economic backgrounds through questionnaires distributed through the mail. Due to extremely low return rates and difficulty in distributing the questionnaire in alternative locations (e.g. doctors surgeries and staff rooms), data collection was constrained. The reasons for the low return rate of the mail-shot questionnaire are unclear. It is possible that questions about partner preferences are considered too personal, and despite assured anonymity

and confidentiality, recipients were unwilling to participate. As a result, the sample size was much lower than desired, and it was necessary to include women from a wider age profile than that of Chapter 3, highlighting the more general problems associated with accessing participants, particularly those from low socio-economic status groups.

Despite the small sample size, the socio-economic profile was somewhat broader than the sample in Chapter 3. Unlike the internet sample, in which the majority of participants were concentrated in the middle income brackets, the majority of participants in the current sample were in the highest NS-SEC category (i.e. managerial and professional occupations). The remainder of participants were reasonably equally distributed across the lower categories. In general, there was greater representation of women in the highest and lowest socioeconomic status brackets than the previous sample. Unfortunately, the education profile of the current sample was similar to the internet sample, with an equivalent proportion of participants having achieved further education. It is possible that the older age of the current sample accounts for the high levels of education, or that the sample was self-selected.

The resource control factor analysis did not yield factors consistent with those of Chapter 3. This may be due to the small sample size and the wide age range of women included. It was not possible to attempt to replicate the previous findings using resource control factors. When individual resource control measures were entered as predictor variables in multiple regression models, there were no effects of resource control on any of the partner preference measures. Therefore, the current study did not replicate the findings of Chapter 3. Again, this may have resulted from the smaller sample size (the sample size of Chapter 3 was nearly 20 times larger), or the wider age profile, which may have obscured any effects of resource control on partner preferences (for an analysis of the mediating and moderating effects of age on relationships see Chapter 7).

It was, however, possible to investigate the validity of use of mate preference measures as proxy measures of actual mate choice. There were positive

relationships between preference rankings and attraction to “status” and “appearance” in a real partner. This lends validity to the use of preference rankings as a measure of the mate preferences expressed in the real world. While listing of the characteristics that attracted participants to their real partners may still be prone to bias towards socially desirable characteristics, a positive relationship between partner age (which may not be so easily adjusted to match social expectations), and ideal partner age lends further validity to the use of preference measures.

On inspection of inter-relationships among the preference rankings of partner characteristics, a positive correlation was found between preference for “physical attractiveness” and “good sense of humour”. Whether this relationship is more consistent with the biosocial model’s explanation for shifts in partner preferences with increasing female status (i.e. women begin to prefer characteristics more typically associated with the female role) than the evolutionary perspective (i.e. shift in trade off between “good genes” and resources) is unclear. While “good sense of humour” can be considered a favourable personality characteristic, it is not necessarily strongly associated with the desirable “feminine” characteristics of the female gender role. It has been argued that sense of humour could have evolved through “good genes” sexual selection in males (e.g. Miller, 2000). Therefore, the relationship may be somewhat more supportive of the evolutionary than the biosocial model.

It was also possible to investigate relationships between resource control and socio-economic status. I have argued that background wealth and own income are unlikely to influence mate preferences in the same manner as actual control of resources. The results demonstrated that NS-SEC (i.e. a measure of socio-economic status based on occupation) did not relate to the majority of resource control measures, suggesting that it is control over resources that enables women to adjust their partner preferences, rather than access to resources. The resource control measures that did relate to NS-SEC were those that would be most likely to relate to occupation (i.e. maximum level of education and input in decisions in the workplace) rather than direct control of resources.

To conclude, the effects of female control of resources on partner preferences obtained in Chapter 3 were not replicated in the current study. It is possible that this was due to the difficulties of obtaining an adequate sample size, and the inclusion of women from a wider age profile. It was possible, however, to investigate relationships between self-reported partner preferences (e.g. through preference rankings and self-reported age preferences) and self-reported actual mate choice (i.e. self-reported actual partner age and the characteristics that attracted participants to their most recent partner). Relationships between the two lend validity to the use of measures of self-reported preferences. Inter-relationships among preference rankings of partner characteristics were somewhat more supportive of evolutionary than biosocial models. Finally, it was possible to investigate relationships between measures of resource control and the NS-SEC. The results demonstrated that resource control was not generally related to socio-economic status, perhaps suggesting that it is actual control over resources, rather than access to resources, that enables women to adjust their partner preferences.

Chapter 5. An analysis of the effects of female status on mate preferences across non-industrial societies.

5.1. Introduction

The aim of the current study was to investigate the effects of female status on sex-differentiated mate preferences across non-industrial societies. Previous cross-cultural studies have reported effects of female empowerment (Eagly and Wood, 1999), and female education and reproductive freedom (Kasser and Sharma, 1999), on mate preferences. The sample on which these analyses were based (Buss, 1989a), however, has been criticised for over-representation of western societies and cash-economies, and under-representation of rural, less educated, and non-industrial societies (see Section 1.2.1.d.ii). Therefore, it is possible that the effects of female status on mate preferences reported in both cross-cultural (e.g. Eagly and Wood, 1999; Kasser and Sharma, 1999) and within-society (Koyama et al., 2004; Johannessen-Schmidt and Eagly, 2002; Chapter 3) analyses are limited to post-industrial societies with cash economies. By testing predictions in a sample of non-industrial societies, I attempted to assess whether the effects of female status result from conditions in post-industrial societies, or apply across a wider range of social structures and economies.

I tested the predictions common to the three origin theories (i.e. female status is negatively associated with more “male typical” mate preferences) across a sample of non-industrial societies. Use of a sample of qualitative data from ethnographic records also addressed a further criticism of mate preference studies: over-reliance on self-report data (e.g. Laland and Brown, 2002).

5.2. *Methodology*

5.2.1. *Sample*

The Standard Cross-Cultural Sample (SCCS: Murdock and White, 1969) consists of pre-coded ethnographic data for 186 geographically representative, non-industrial societies studied by a qualified ethnographic researcher. The societies were selected to be culturally dissimilar thereby avoiding the confounding effects of cultural diffusion and shared histories on cross-cultural analysis (Murdock and White, 1969). Whyte (1978) conducted an analysis of the status of women in the odd-numbered half sample of the SCCS ($n = 93$ societies) using pre-coded variables. Measures of female status were found not to covary such that they can be usefully combined to provide a single measure (Whyte, 1978, 1979). From 52 relevant variables, he developed nine composite codes of female status (see Table 5.1). The distributions of males and females on these scales have been replicated in other, similar measures (e.g. Hayden et al., 1986; Sanday, 1981), lending validity to their applicability as a measure of female status. The codes have been used to examine the effects of female status across societies in a number of previous studies (e.g. Low, 1990a; Yanca and Low, 2004).

Female status code	Description of variable
Property control scale	1 = Women have low control over property 4 = Women have high control over property
Kin power scale	1 = Low power of women in kinship contexts 3 = High power of women in kinship contexts
Value of life scale	1 = Low value placed on women's lives 3 = High value placed on women's lives
Value of labor scale	1 = Low value of women's labour 5 = High value of women's labour
Domestic authority scale	1 = Low women's domestic authority 4 = High women's domestic authority
Ritualised female solidarity scale	1 = Low female solidarity 5 = High female solidarity
Control of sex scale	1 = Stricter controls over women's than men's marital and sexual lives 3 = More equal controls over women's and men's marital and sexual lives
Ritualized fear scale	1 = High ritualized fear of women 3 = Low ritualized fear of women
Joint participation scale	1 = Low joint participation of men and women 3 = High joint participation of men and women

Table 5.1 Codes dealing with the status of women in the Standard Cross-Cultural Sample (Whyte, 1978).

Data on the traits considered attractive in males were taken from the Human Relations Area Files (HRAF) for the 17 societies for which data was available (i.e. Alorese, Amhara, Andamanese, Aranda, Bemba, Callinago, Chukchee, Garo, Iban, Inca, Kurd, Mbuti, Pomo, Saramacca, Tupinamba, Wolof, and Yanomamo).

The Human Relations Area Files are a multi-cultural database, consisting of in-depth ethnographic information taken from a variety of source documents (e.g. books, articles, and dissertations). The electronic ethnographic and archaeological databases were searched for references to mate preferences. Relevant pre-defined sections were identified (e.g. 581: Basis of marriage; 832: Sexual stimulation, and 839: Miscellaneous sexual behaviour) and searched for references to mate preferences. Relevant search terms were also entered for each society (e.g. attraction, attractiveness, attracted, beauty, beautiful, mate, and spouse). Any reference to characteristics considered attractive in males by females were noted. In total, 69 traits were identified from aspects of appearance such as muscular strength, to industriousness and family status. To develop measures of preferences for male access to resources and physical attractiveness across societies, I computed the sum of references to each. This provided a measure of the number of times these constructs were referred to in the available material for each society, and was taken as a proxy of the importance of status and appearance in female mate preferences. Preference for male access to resources was represented as the sum of references to resources and their acquisition, as well as general status: industrious, rich, status of family, old (as an indirect measure of accumulated resources), not descended from slaves, property, courage, and hunting ability. The composite score for preferences for physical attractiveness was computed as the sum of references to physical attributes: wavy hair, muscular strength, thick hair, facial hair, square shoulders, wide straight chest, physical attractiveness, light skin, small eyes, medium sized ear, long face, red facial skin, plump face, wide apart eyes, heavy eyebrows, straight eyebrows, straight nose, black hair, and bow-legged. A number of physical characteristics were referred to as indicators of status (i.e. large forehead as an omen of good fortune, and high bridged nose and thin lips as indicators of nobility), and as such were not included in the composite scores. There were no references to mate preferences for the Callinago, reducing the number of societies in the sample to 16. Codings of mate preferences from the ethnographic material, and development of the composite scores, were conducted by two independent researchers. Inter-rater reliability was high (Cronbach's Alpha > 0.8), and discrepancies were investigated and resolved. A measure of the relative

importance of appearance to status in female mate preferences for each society was computed as the number of references to access to resources subtracted from the number of references to physical appearance.

5.2.2. *Statistical analysis*

The score representing the relative importance of appearance to status was entered as the dependent variable in a multiple linear regression model, with all female status variables entered as predictor variables. Measures of female status and mate preference generated coefficients within the specified parameters of normality (i.e. skewness coefficients $< \pm 1$ or kurtosis coefficients $< \pm 3$, West et al., 1995).

5.3. *Results*

The following predictor variables showed low tolerance to multicollinearity (i.e. tolerance < 0.4) and were removed: kin power scale, ritualized fear scale, and joint participation scale. Thus, female status scales (i.e. predictor variables) in the reduced model were as follows: property control, value of life, value of labor, domestic authority, joint participation, ritualised female solidarity, and control of sex (all tolerance to multicollinearity > 0.4).

Preference for male appearance relative to access to resources was significantly predicted across societies by two measures of female status: domestic authority and ritualised female solidarity (see Table 5.2). In societies with high female domestic authority, female preferences for a partner's appearance relative to those for status were higher than in those societies with low female domestic authority. Conversely, in societies with high ritualised female solidarity, female preferences for a partner's appearance were relatively lower than those for status.

	β	p	Female status variable
Preference for physical attractiveness relative to access to resources	1.02	0.02	Domestic authority
	-0.80	0.05	Ritualised female solidarity

Table 5.2 Significant results of reduced model multiple linear regression showing effects of female status on mate preferences (n = 16 societies).

5.4. Discussion

The aim of the current study was to investigate the effects of female status on female mate preferences in non-industrial societies. Predictions were tested in a subsection of the odd-numbered half sample of the Standard Cross-Cultural Sample, supplemented with data on mate preferences from the Human Relations Area Files. I tested the prediction that female status would relate to more “male typical” mate preferences across societies. Using Whyte’s (1978) codes on the status of women, conflicting results were found, suggesting complexity in the construct of “female status”. In societies with high female domestic authority, women had relatively stronger preferences for physical attractiveness than status in a partner than in those with lower female domestic authority. In societies with high ritualised female solidarity, however, women had relatively lower preferences for a partner’s appearance relative to status than in those with lower female solidarity.

While the former result supports the prediction that women in societies with higher female status will express more “male typical” mate preferences, the latter suggests that women in societies with higher female status express stronger “female typical” mate preferences. It is possible that only specific aspects of the complex “female status” construct lead to more “male typical” female mate

preferences. The domestic authority scale is comprised of items assessing whether or not there is an explicit view that men should dominate their wives, as well as who has final authority over the upbringing of infants and post-infant unmarried children. The ritualised female solidarity scale is comprised of items that assess the prevalence of community-wide exclusively male or female work groups, menstrual taboos, existence of female initiation ceremonies, and the existence of a clearly stated belief that women are inferior to men. While both scales appear to tap the general status of women, the domestic authority scale may assess the status of women within marriage, whereas the female solidarity scale may tap more general attitudes towards women. As both scales provide a measure of the status of women, it is not possible to conclude that greater “female status” leads to expression of “male typical” mate preferences. The results do, however, provide interesting insight into the importance of aspects of female “status” in determining mate preferences. For example, it is possible that it is power and status of women in the home, and within the husband and wife relationship, that enables women to adjust their mate preferences.

By utilising the SCCS, I have investigated the effects of female status on mate preferences in societies that differ considerably from those used in previous studies. This has facilitated a more comprehensive assessment of the role of constraints on women in sex-differentiated preferences. Furthermore, use of ethnographic data has provided an alternative methodology to the widely used questionnaire responses of undergraduate students. Rather than employing a measure of resource control, I utilised pre-existing codes of female status developed specifically for the sample. It is encouraging that the effects of one of these codes for mate preferences reflect those of my measures of resource control (particularly as it appears to be “power” that is associated with increased preferences for physical attractiveness in a partner in both cases), lending support to my argument that resource control is an integral and representative dimension of female status. While I have previously relied on preference rankings for the specific partner characteristics “physical attractiveness” and “good financial prospects”, it was necessary in this study to use references to less specific partner characteristics related to a partner’s physical appearance and resource

acquisition/status. The effects of female status on these preferences were generally similar to those on more specific measures. Results of the current analysis provided some support for my previous analyses: relationships between female status and partner preferences hold in non-industrial societies, and with a different measure of female status and mate preferences.

Chapter 6. An experimental manipulation of conceptions of female status and effects on mate preferences.

6.1. Introduction

The aim of the current study was to test the hypothesis that female control of resources leads to more “male-typical” mate preferences through an experimental manipulation of female perceptions of their status in society, and investigation of related effects on mate preferences. In Chapter 3, dimensions of female control of resources were found to relate to age preferences, and to preferences for “physical attractiveness” over “good financial prospects” in a partner. While results implicate an effect of female resource control on sex-differentiated mate preferences, it was not possible to determine the causal direction of relationships due to the correlational design. Furthermore, correlated changes in resource control and mate preferences may arise from another, unmeasured variable (i.e. phenotypic correlation; Laland and Brown, 2002, p. 120). While a number of potential confounding variables were controlled for (for further investigation of mediators and moderators, see Chapter 7), the complex nature of the social environment in which the relationships are located makes it difficult to identify, and measure, all confounding factors.

In Chapter 2, I argued that resource control is likely to represent one dimension of female “status”. I have argued that the ability of women to provide for themselves and offspring independently is key to female status, and as such is an important measure of general female autonomy. In Chapter 3, however, I found resource control to have two distinct dimensions (i.e. “ambition” and “financial independence and power”), with differing effects on mate preferences. I found somewhat consistent results and similar complexity with a societal-level measure of female status in Chapter 5. Given this complexity, an experimental manipulation of female resource control may be difficult, and even a successful manipulation may not be predicted to result in straightforward shifts towards more male-typical mate preferences. A more successful methodology may be to operationalise general attitudes towards women that are already present in

women's conceptions of their gender. This would alleviate the complexities of focussing on the complicated "resource control" construct, and a stronger manipulation may be achieved by tapping attitudes covering wider dimensions of female status. While I first attempted to manipulate women's perceptions of their ability to control resources to provide consistency with the construct measured in the previous studies, I anticipated the necessity of employing a methodology that tapped perceptions of a more general female "status".

Individuals are likely to have given considerable thought to the partner characteristics they prefer. Therefore, to detect effects of a manipulation on mate preferences, it was necessary to employ measures of mate preferences sensitive enough to detect potentially small effects. Allocation of a limited budget of "mate-choice points" to partner characteristics has been found to yield differences in mate-choice priorities between conditions in previous studies (Waynforth, 2001; Li et al., 2002). Ideal partner age and maximum and minimum partner ages tolerated were also measured.

6.2. *Pilot Study 1. A manipulation of perceived permeability between gender roles*

6.2.1. *Introduction*

In Pilot 1, I explored the effects of an attempt to manipulate female perceptions of their ability to control resources on mate preferences. The objectives were to investigate (a.) the effects of the manipulation on confidence in ability to provide for oneself independently, and (b.) the effects of the manipulation on mate preferences. A manipulation of female perceptions of their ability to provide independently was developed, as it was not possible to manipulate actual resource control. Asking women to imagine being more or less financially stable may not be effective as it may be difficult to imagine how one would behave under previously un-experienced circumstances. Therefore, I employed a methodology that causes individuals to focus on the possibility of crossing group

boundaries by manipulating perceived status differences between men and women.

The permeability of group boundaries defines the likelihood of an individual successfully crossing these boundaries (Ellemers et al., 1993). Perceived permeability of boundaries between randomly assigned high- and low-status groups has been successfully manipulated in the laboratory by informing participants that, on successful completion of a task, it was either possible or impossible to move between groups (Ellemers et al., 1993). Permeable group boundaries have been found to cause group members to focus on individual mobility (Ellemers et al., 1988; Ellemers et al., 1990; Ellemers et al., 1993), particularly individuals from lower-status groups. As the female gender is typically considered the lower status gender group (Ellemers et al., 1993), manipulation of perceived permeability between gender roles may cause women to consider individual mobility across gender group boundaries, and to consider behaviour less typical of their gender. I attempted to manipulate women's perceptions of the "permeability" between gender roles in terms of achievement in the workplace and ability to provide for oneself, thereby causing women to feel more or less able to cross gender boundaries. It was predicted that, if the manipulation were successful, women in the positive condition (i.e. in which barriers between genders were depicted as "permeable") would feel more confident in their ability to provide for themselves, and show more "male-typical" mate preferences than would women in the negative condition.

6.2.2. *Methodology*

a. Participants

Participants were 15 female students at the University of St Andrews (age: mean = 24, sd = 2.82). Ten women indicated that they were single, and the remainder indicated that they were in a relationship. Participants were randomly assigned to two conditions (positive condition, n = 6; negative condition, n = 9).

b. Manipulation

Two conditions were designed in which the perceived permeability of boundaries between male and female success in the workplace and associated financial independence was either raised or lowered. This was achieved by presenting participants with a passage portraying opportunities for, and success of, women in the workplace as either equal to those of men (i.e. positive condition), or lower than those of men (i.e. negative condition). Passages consisted of facts derived from the Equal Opportunities Commission's "Sex and Power" Report (2005), and from information on government initiatives and policies regarding maternity and paternity leave available on the internet (www.homeoffice.gov.uk). Facts chosen for the positive condition portrayed increasing opportunities for women in the workplace through favourable maternity and paternity leave schemes, and the success achieved by women in powerful careers and education. Facts chosen for the negative condition conveyed constraints to women's ability to achieve equal success to men, such as the gender pay gap and the under-representation of women in positions of power. Each passage was 400 – 500 words long (for the passages presented to participants see Appendix 5).

c. Measures

Participants indicated their ideal partner age, and maximum and minimum partner ages tolerated (in years). They were then asked to allocate 25 "mate-choice points" to five partner characteristics (i.e. physical attractiveness, willingness to work hard, educational attainment, being the preferred age, and being a good companion), such that each characteristic obtained the number of points that corresponded to the value placed on that characteristic (Waynforth, 2001). Preferences for "physical attractiveness" and "willingness to work hard" were considered most relevant to the predictions of the study. Participants then indicated their age, ethnicity, relationship status, and sexual orientation.

d. Procedure

The experiment ran over two sessions and was presented to participants on a computer, with responses entered using the keyboard.

In the first session, participants were informed that the study was designed to assess the flexibility of female mate preferences over time, and completed the mate preference and demographic questions as described above. At the end of the first session, participants were asked to return for a second session between one and two weeks later, to provide an additional measure of their mate preferences in order to assess the flexibility of preferences over time.

In the second session, participants were asked to first complete a questionnaire designed to assess the salience of certain facts about women in the workplace. Participants were informed that this was an unrelated study being conducted for a different researcher. They were then presented with a passage that portrayed women's opportunities in the workplace either positively (positive condition), or negatively (negative condition), and were asked to complete a short questionnaire about the passage. The purpose of the short questionnaire (framed as a "memory task") was to ensure that participants read the passage carefully and were distracted from the true nature of the study. Participants were then asked to complete the mate preference questions again, as well as two measures designed to assess whether the manipulation influenced feelings of resource control (1. How confident are you that you are able to provide for yourself financially independently at the present time, and 2. How confident are you that you will be able to provide for yourself financially independently in the future? Responses on 1 – 7 Likert scales where 1 = Not at all confident, 7 = Extremely confident). For the full questionnaire see Appendix 6.

Participants were fully debriefed as to the true purpose of the study, and answered some informal questions regarding the experimental design.

e. Statistical analysis

To determine the effect of condition on mate preferences, analysis was conducted using analysis of variance for repeated measures in which the within subjects variable was session (two levels: sessions one and two) and between subjects variable was condition (two levels: positive and negative conditions). Own age was included as a covariate, and a marital status dummy variable (where 0 =

single, and 1 = in a relationship) was included as a between-subjects variable. As only one measure of confidence in ability to provide for oneself at present and in the future was obtained, effects of condition on these variables were investigated using univariate analysis of variance.

6.2.3. *Results*

There were no missing values, and no variables differed significantly from a normal distribution (Kolmogorov-Smirnov all p s > 0.08).

There was a significant effect of condition on confidence in ability to provide for oneself financially at the present ($F_{(1, 15)} = 4.84$, $p = 0.05$). Contrary to expectations, however, women in the positive condition were less confident of their financial security at present than women in the negative condition (positive condition: mean = 3.22, sd = 1.99; negative condition: mean = 6.33, sd = 0.82). There was a significant effect of condition on confidence in ability to provide for oneself in the future ($F_{(1, 15)} = 5.61$, $p = 0.04$). Women in the positive condition were more confident in their ability to provide for themselves in the future (mean = 6.56, sd = 0.73) than women in the negative condition (mean = 6.17, sd = 0.75).

In repeated measures analysis, there were no significant main effects of session on ideal partner age, maximum partner age tolerated, minimum partner age tolerated, or points allocated to “physical attractiveness” or “willingness to work hard” (all p s > 0.09). There were no significant interactions between condition and session (all p s > 0.2). Therefore, the manipulation did not influence mate preferences either within or between subjects.

6.2.4. *Discussion*

The aim of Pilot 1 was to manipulate female perceptions of their ability to provide for themselves independently, and to investigate the effects of this on mate preferences. The manipulation did not influence feelings of resource

control consistently, perhaps explaining the lack of effect of manipulation on mate preferences. Women in the positive condition felt less able to provide for themselves at present, but more able to provide for themselves in the future than women in the negative condition. One possible explanation is that women in the positive condition felt that (as a student), they had not yet achieved the maximum possible for women (as portrayed in the passage) and, therefore, felt less able at present, but more confident of their opportunities in the future, to provide for themselves independently. This perhaps confirms that perceptions of resource control cannot be easily manipulated, and while actual levels of resource control relate to mate preferences, it is not possible to manipulate a construct highly dependent upon a number of related factors, including stage in life.

In informal discussion with participants on completion of the study, it was determined that participants tended to remember the partner preferences they had indicated in the first session, and to repeat them in the second session. This was the case even when up to two weeks passed between sessions, and may explain the lack of effect of condition on mate preferences. A within-subjects design may be unlikely to detect effects of condition on preferences, even with a successful manipulation.

6.3. *Pilot Study 2: Manipulation of perceptions of costs and benefits of being female*

6.3.1. *Introduction*

The aim of Pilot 2 was to manipulate attitudes towards the female gender role between groups. The objectives were to develop a manipulation not constrained by the complexities of the “resource control” construct, that taps broader costs and benefits of being female, and to examine the effects of this on mate preferences.

It has been demonstrated that making accessible different conceptions of gender-group relations, along with the implications of these to outcomes in life, can

result in an altered view of the in-group (i.e. one's own gender), and in turn influence measures of wellbeing (Branscombe, 1998). Branscombe (1998) found that asking female participants to consider either the ways in which they “have been privileged or received advantages” or “not been privileged or received disadvantages” as a result of being female, influenced gender-esteem. When completed for gender, the Collective Self-Esteem Scale (Luhtanen and Crocker, 1992) measures the positivity of an individuals' gender group identity, providing a measure of orientation towards the group, and an estimation of the group's worth (e.g. feelings of pride or value placed on the group). Women in the “negative” condition viewed their gender less positively, and had a lower estimation of the “worth” of their gender (Branscombe, 1998).

By making accessible different conceptions of the female gender and its impacts on one's life, I attempted to manipulate female perceptions of their status in society (e.g. through feelings of the value and worth of their gender). Causing women to focus on either positive or negative aspects of being female may not only influence perceptions of female status, but also of the opportunity to behave in more or less “female-typical” ways. Therefore, I predicted that women in the “positive” condition would be more likely to express more “male-typical” mate preferences than would women in the negative condition due to temporary differences in the perceived status of women.

6.3.2. *Methodology*

a. Participants

Participants were 77 female first year Psychology undergraduate students at the University of St Andrews (age: mean = 18.64, sd = 2.01). All participants were completely heterosexual, and 40 indicated that they were single. Allocation to condition was random (positive condition, n = 39; negative condition, n = 38).

b. Measures and procedure.

Participants were informed that the study was designed to investigate the effects of gender on mate preferences. The manipulation was conducted at the

beginning of the experiment, and was based on the methodology developed by Branscombe (1998). Participants were asked to list thoughts as follows: “We would like you to think about and consider the ways that you [positive condition: have *received privileges or been advantaged*] [negative condition: have *not received privileges or been disadvantaged*] because of your *gender*. Below we would like you to write down *as many different ways* as you can think of that you [positive condition: have *benefited or been advantaged*] [negative condition: have *not benefited or been disadvantaged*] because of your gender.” Participants were given two minutes to complete this section, timed by the experimenter.

Participants were then asked to complete the mate preference measures described in Pilot 1, the collective self-esteem scale (Luhtanen and Crocker, 1992) for gender group, the resource control check measures described in Pilot 1, and to give personal demographic details such as own age and ethnicity. Participants were also asked to complete a number of other measures (e.g. Rosenberg’s Self-Esteem Scale (Rosenberg, 1989)), as well as more extensive measures of mate preferences (e.g. characteristics that attracted participants to their current or most recent partners) for a different study (see Chapter 7). For the questionnaire relevant to Pilot 2, see Appendix 7. Participants were debriefed and informed of the true purpose of the study once all questionnaires were completed and returned to the experimenter.

c. Statistical analysis

As the experiment followed a between-subjects design, it was possible to use multiple linear regression models to assess the effect of condition on dependent variables. Condition, own age, and marital status (collapsed into a dummy variable) were independent variables. As points allocated to “physical attractiveness” and “willingness to work hard” were non-independent, a dummy variable was created in which 0 represented a greater allocation of points to “willingness to work hard”, and 1 represented a greater allocation of points to “physical attractiveness”. This was then entered as the dependent variable in a binary logistic regression, with condition, own age, and the marital status dummy variable, as independent variables.

There were low levels of missing values (2 – 3) on a number of variables that were replaced with the mean of the series. Variables generating coefficients outside the specified parameters of normality (West et al., 1995: ideal age, and maximum and minimum partner ages tolerated) were re-expressed using power transformations.

6.3.3. *Results*

a. Thoughts listing

The thoughts listed in response to the positive condition tended to relate to such advantages and benefits as receiving polite gestures from men (e.g. doors being held open), receiving bigger discounts than men from male staff, receiving more relaxed attitudes than males when breaking rules, avoiding violence, and being allowed to show emotion. In response to the negative condition, participants reported feeling disadvantaged by being unable to join certain sports teams, receiving less respect than males, and feeling sexualised. For the complete list of thoughts in response to the task see Appendix 8.

b. Statistical analysis

In multiple linear regression models there were significant effects of condition on confidence in ability to provide for oneself independently at present ($\beta = -0.33$, $p < 0.005$), and confidence in ability to provide for oneself in the future ($\beta = -0.25$, $p = 0.03$). The direction of these results, however, indicates that the effects were in the opposite direction to that predicted, with greater confidence in ability to provide in women in the negative condition than those in the positive condition. In a further model, there was no effect of condition on gender esteem ($p > 0.1$).

There were no significant effects of condition on ideal partner age or maximum partner age tolerated. There was a significant effect of condition on minimum partner age tolerated ($\beta = 0.21$, $p = 0.02$). This was, however, in the opposite direction to that predicted, with women in the positive condition having an older minimum partner age tolerated than women in the negative condition. In the

binary logistic regression, there was no effect of condition on points allocated to “physical attractiveness” and “willingness to work hard” ($p > 0.1$).

6.3.4. *Discussion*

Causing female students to focus on the costs or benefits to themselves of being female influenced confidence in ability to provide for oneself at present and in the future in the opposite direction to that desired: women who were asked to consider the advantages of being female were less confident in their ability to provide than women asked to consider the disadvantages to being female. Similarly, there was an effect of condition on minimum partner age tolerated in the opposite direction to that predicted (women in the positive condition had an older minimum partner age than women in the negative condition). While these results demonstrate that a between-subjects design has a greater effect on both feelings of resource control and mate preferences than the within-subject methodology described in Pilot Study 1, the effects were not as expected of a successful manipulation.

The thoughts listed by women in the positive condition tended to reflect benefits gained through paternalistic behaviour of males (e.g. having doors held open), which is a form of sexism (Glick and Fisk, 1996). Consideration of such benefits may be disempowering, and cause women to feel more dependent upon men, thereby explaining the effects on confidence in ability to provide, and minimum partner age tolerated (women who are caused to feel more dependent may be less willing to settle for a younger, less financially stable, partner). The thoughts listed by women in the negative condition were relatively limited and did not tend to relate to the more global problems faced by women (such as threat of domestic or sexual violence, or difficulty in juggling careers and parenting), and instead were related to (comparatively minor) gender inequalities such as limited access to certain sports teams. One reason for this may be the discrepancy in women’s acknowledgement of gender discrimination to women in general, and to oneself (Crosby, 1984; Taylor et al., 1993). That is, women may acknowledge that gender discrimination occurs to others, but are less able or willing to

attribute acts towards themselves personally as discrimination. Therefore, the framing of the manipulation in terms of “ways **you** have *not received privileges or been disadvantaged* because of your *gender*” may not successfully prompt females to consider larger issues of sexual discrimination.

6.4. *Manipulation of perceptions of costs and benefits to women as a result of being female*

6.4.1. *Introduction*

In the current study I attempted the manipulation described in Pilot 2, but this time asked women to think of the costs or benefits to women in general as a result of being a member of the female gender. By so doing, I attempted to (a.) reduce the limitations of thinking only in terms of one’s own experiences, and to focus instead on the experiences of women in general, and (b.) to alleviate the problem of women being unlikely to consider personal experiences of gender discrimination as such.

6.4.2. *Method*

a. Participants

Participants were 66 female undergraduate students recruited from the University of St Andrews and Perth College (age: mean = 21.48, sd = 4.54). All participants were completely heterosexual, and 35 reported being single. Due to a printing error, the resource control measures (i.e. confidence in ability to provide for oneself independently at present and in the future), and gender-esteem scale were not included in a subset of the questionnaires (n = 17).

b. Measures and procedure

Mate preference, resource control, gender esteem and demographic measures were identical to those described in Pilot Study 2. The phrasing of the manipulation differed from Pilot 2, such that participants were asked: “We would like you to think about and consider the ways that women [positive

condition: *receive privileges or are advantaged*] [negative condition: *do not receive privileges or are disadvantaged*] because of their *gender*. Below we would like you to write down *as many different ways* as you can think of that women [positive condition: *benefit or are advantaged*] [negative condition: *do not benefit or are disadvantaged*] because of their gender.” That is, women were asked to think about the costs or benefits of being female to women in general, rather than to themselves specifically. An additional mate preference measure was included to further explore inter-relationships between preferences for partner characteristics (see Chapters 3 and 4). Participants were asked to rate the desirability of each of the 13 characteristics included in the ranking of partner characteristics task of Chapters 3 and 4.

Questionnaires were distributed to female students in classes. Students were informed that the study was designed to investigate the effects of gender on partner preferences and were asked to spend two minutes (timed by the experimenter) on the first section (the manipulation) before continuing with the rest of the survey. Once all questionnaires were completed and returned, the students were debriefed and informed of the true purpose of the study.

To further explore the effects of the manipulation on gender esteem, I investigated the effects of manipulation on the four sub-measures of the gender esteem scale (Luhtanen and Crocker, 1992). These are membership esteem (judgement of how worthy individuals are of belonging to their social group), private esteem (individuals’ personal judgements of how good or worthy their social group is), public esteem (judgements of how others view the social group), and importance to identity (importance of social group to individuals’ self-concept).

c. Statistical analysis

Statistical analysis was identical to that described in Pilot Study 3. There were low levels of missing values on age preference variables and points allocated to “physical attractiveness” and “willingness to work hard” (1-2), which were replaced with the mean of the series. On resource control check variables and the

gender esteem scales, levels of missing values were considered too high to be replaced, thus sample sizes in models for which these were dependent variables were lower.

Variables generating coefficients outside the specified parameters of normality (West et al., 1995: ideal partner age, maximum and minimum partner ages tolerated, and confidence in ability to provide for oneself in the future) were re-expressed using power transformations.

6.4.3. Results

a. Thoughts listing

The thoughts listed by women in the positive condition were similar to those described in Pilot Study 2, reflecting paternalistic behaviour by men. There were a number of alternatives such as the ability to have children, having a higher pain threshold, and being better able to multitask and express emotion, which indicated a somewhat greater range of thoughts. In the negative condition, there was some evidence that women considered a greater range of the more global problems faced by women than those expressed in Pilot Study 2. For example, thoughts included the problems of raising children and having a career, the glass ceiling, the greater concentration of men in high status jobs, and the gender pay gap. For full lists of thoughts generated by the task, see Appendix 9.

b. Statistical analysis

In multiple linear regression models, there were no significant effects of condition on confidence in ability to provide for oneself at present or in the future, gender esteem, or on member, private, or public esteem (all p s > 0.1). There was a trend towards a significant effect of condition on importance of gender to identity ($\beta = 0.25$, $p = 0.08$), demonstrating that women in the positive condition considered their gender to be marginally more important to their identity than did women in the negative condition.

There was a significant effect of condition on minimum partner age ($\beta = -0.15$, $p = 0.01$) and a marginally significant effect on ideal partner age ($\beta = -0.12$, $p = 0.06$), demonstrating that women in the positive condition had a younger ideal partner age and minimum partner age tolerated than women in the negative condition.

In a binary logistic regression, there was no effect of condition on points allocated to “Physical attractiveness” or “willingness to work hard” ($p > 0.4$).

6.4.4. Discussion

The aim of the study was to manipulate female perceptions of their status by causing them to think about the costs and benefits experienced by women as a result of their gender, and to investigate the effects of this on sex-differentiated mate preferences.

The manipulation was more successful than the previous version of the methodology (Pilot Study 2), as demonstrated by a marginal effect of condition on one of the gender esteem subscales in the desired direction. Women in the positive condition considered their gender to be more important to their self-concept than did women in the negative condition, indicating that the manipulation influenced the value and worth placed on the gender group. There was no effect, however, of the manipulation on confidence in ability to provide for oneself independently. In the previous methodology, in which women thought about the personal costs and benefits of being female, the manipulation significantly influenced feelings of resource control in the opposite direction to that desired. It is insightful that a small rewording of the manipulation task yielded considerable differences in feelings of resource control, from a significant difference in the wrong direction to no effect, perhaps suggestive of a general inability to attribute personal experiences to discrimination. In Pilot Study 2, women in the positive condition tended to focus on paternalistic behaviour by males, and women in the negative condition focussed on relatively minor problems faced by women. In the current methodology, women in the

negative condition focussed on the larger problems faced by women, and in the positive condition placed emphasis on a wider range of benefits. Therefore, the effect of the second methodology may have been to cause women to focus less on an indirect reliance on men, thereby reducing relationships with resource control in an unexpected direction. While it may be expected that the effect of the second manipulation on gender esteem should tally with concordant effects on feelings of resource control, it is possible that women did not focus on problems faced by women in terms of economic dependence on men, or that the effect was diluted by a focus on a wider range of issues relating to female status.

Despite no effect on confidence in ability to provide for oneself, the manipulation influenced ideal partner age and minimum partner age tolerated in the ways predicted, and in accordance with the effects of “ambition” on age preferences reported in Chapter 3. That is, in Chapter 3, ambitious women were less willing to tolerate much older partners. Women in the current study who thought about the benefits of being female, preferred younger partners than women who considered the costs. By demonstrating that it is possible to alter women’s mate preferences through an experimental manipulation of perceptions of female status, it is possible to conclude that the effects on mate preferences in Chapter 3 arise from female resource control. The results suggest that the effects of a more general “female status” tally with the effects of at least one dimension of resource control. This may indicate that assumptions that resource control represents one dimension of a wider female status variable are valid.

In Chapter 3, the second dimension of resource control - “financial independence and power” - was associated with an older minimum partner age tolerated. This result is in contrast to the effects of the “ambition” dimension of resource control on age preferences, and to the results of the current study, in which experimentally raising the perceived status of women results in more male-typical partner age preferences. This perhaps provides support for the explanation introduced in Chapter 3. That is, women who are financially independent and powerful are less willing to settle for younger partners as they want partners with similar personality characteristics to themselves.

Alternatively, the positive relationship between “financial independence and power” and preferences for “physical attractiveness” over “good financial prospects” reported in Chapter 3 was not replicated in the manipulation, perhaps suggesting that the manipulation had no effect on feelings of independence or power, and was more related to the “ambition” dimension of the resource control construct.

Chapter 7. Mediation and moderation of relationships between female control of resources and mate preferences

7.1. Introduction

7.1.1. Rationale

Moderators are variables that alter the direction or strength of a relationship (Baron and Kenny, 1986; Holmbeck, 1997; James and Brett, 1984; Frazier et al., 2003). A moderator effect is an interaction: the effect of a independent variable on the dependent variable depends on the level of another (moderating) variable. Identification of moderators of a relationship can provide insight into the nature of a relationship, inform as to the conditions under which a relationship occurs, account for variation in relationships across samples, or account for an unexpected lack of a relationship (Baron and Kenny, 1986). Mediators are variables that explain how or why one variable predicts another (Baron and Kenny, 1986; Holmbeck, 1997; James and Brett, 1984). That is, a mediator is a variable that explains a relationship between variables: if a relationship is found between a predictor and a dependent variable, it may be that the predictor actually influences a mediating variable, which in turn influences the dependent variable (Frazier et al., 2004). Identification of important moderators and mediators of relationships increases the sophistication of an inquiry (Frazier et al., 2003; Hoyle and Kenny, 1999). Relationships between female resource control and mate preferences are likely to be mediated or moderated by a range of social and psychological factors. The aims of the current study were to (a) gain further understanding of relationships between resource control and mate preferences and between resource control and other dimensions of female status, and (b) to further explore the biosocial model by investigating hormonal mediators of relationships. As such, a number of potential psychological, attitudinal, and hormonal mediators and moderators were identified, and three studies were conducted to assess the effects of each on the relationships of interest.

7.1.2. *Potential moderators and mediators*

In previous analyses (e.g. Chapter 3), a number of variables were identified as potential covariates of relationships between female resource control and mate preferences (i.e. age, self-rated attractiveness, socio-economic status, marital status and ideal relationship type on day of testing). Each of these variables could potentially mediate or moderate relations between resource control and mate preferences. For example, resource control may increase self-perceived attractiveness, which in turn influences mate preferences, thereby acting as a mediator. Alternatively, only older women or women who do not desire a serious relationship may be in a position to allow their resource control to influence their mate preferences (i.e. age or relationship status may moderate relationships). It should be noted that own age could not act to mediate relationships between resource control and mate preferences, as own age cannot be influenced by resource control. In addition to formally investigating the nature of the effects of these covariates on relationships between resource control and mate preferences, a number of additional variables were identified as described below.

a. Female status

I have argued that resource control represents one dimension of female status. I sought to investigate whether relationships between resource control and mate preferences were mediated or moderated by women's perceptions of their role in society. Two measures of perceptions of the status of women were employed.

i. Endorsement of the traditional female gender role

The Ambivalent Sexism Inventory (ASI: Glick and Fiske, 1996) measures multidimensional aspects of sexism: hostile-sexism (general antipathy towards women), and benevolent-sexism (women are perceived positively but not as equal members of society). Benevolent sexism is grounded in traditional gender roles, with men as breadwinners and women as homemakers, thereby providing a measure of approval of the traditional female gender role. Hostile sexism

provides a measure of disapproval of the non-traditional female gender role. See Appendix 10.

Endorsement of the traditional female role was investigated as both a mediator and moderator. Resource control may lead to endorsement of a less traditional female role, thus empowering women to alter their mate preferences (i.e. mediator). Alternatively, resource control may only influence mate preferences in women who do not endorse the traditional female role, as it is only these women who are able to utilise their resource control to the extent to which they are able to shift their preferences (i.e. moderator).

ii. Gender esteem

Luhtanen and Crocker's (1992) collective self-esteem scale measures the positivity of an individuals' social or group identity. When completed for membership of one's gender group, it provides a measure of orientation towards women as a group, and an estimation of their gender's worth (e.g. feelings of pride or value placed on being a woman). This provides a measure of female attitudes towards their gender, enabling assessment of the effects of females' perception of the status of their gender on relationships between resource control and mate preferences. While the ASI provides a measure of endorsement of the traditional female gender role, gender esteem measures more general perceptions of the value or status of the female gender. See Appendix 5.

As with endorsement of the traditional female gender role, mediating and moderating effects of gender esteem were investigated. Resource control may influence gender esteem, which in turn empowers women, enabling them to express less traditional mate preferences (i.e. gender esteem is a mediator). Alternatively, only women with high gender esteem may be empowered enough to translate resource control into mate preferences (i.e. gender esteem is a moderator).

b. Personal self-esteem

Personal self-esteem is the orientation towards oneself and an estimation of one's worth. The most widely used measure of personal self-esteem is Rosenberg's Self-Esteem Scale (1979). Self-esteem may act as a mediator: resource control may raise self-esteem, which in turns enables women to adjust their mate preferences. Self-esteem may also act as a moderator: resource control may only influence mate preferences in women with the self-esteem to utilise their resource control in such a way as to influence their demands of a potential partner. See Appendix 11.

c. Social support

The influence of access to female allies on avoidance of male coercion (Smuts, 1995), and resource control (Yanca and Low, 2003), implicates the importance of supportive relationships on autonomy. It has even been argued that a tendency towards patrilocal residence in human societies (i.e. women disperse away from their kin on marriage) was one of the underlying causes of patriarchy in humans (Smuts, 1995). Women with social support may be able to achieve greater resource control, or may need social support to utilise resource control (i.e. social support is a moderator). Alternatively, women may gain greater social support by having resource control (e.g. through meeting others in the workplace), and it may be this support which influences mate preferences. The Multidimensional Scale of Perceived Social Support (Zimlet et al., 1988) provides an assessment of individuals' perceptions of the level of social support they receive. The scale can also be broken down into perceived social support from family, friends, and a significant other. See Appendix 12.

d. Reproductive strategy

Reproductive strategies are the scheduling of, and investment in, reproduction. According to life history theory, an individuals' reproductive strategy is a set of flexible life history traits, which are adjusted facultatively with shifting environmental constraints (Wilson, 1975). Thus, individuals are able to adjust their strategy adaptively under a range of environmental and social conditions

(e.g. Stearns, 1992), with reproductive strategies showing considerable variation in response to the environment (Wilson, 1975).

In societies such as the post-industrial UK there is a trend towards increased investment in a smaller number of offspring, such that family sizes are typically at or below the replacement rate (i.e. the “demographic transition”; Barrett et al., 2002, pp. 385). This decline of fertility has coincided with increasing female participation in the work place. Although there is little evidence of a direct causal link between the two, females must now make complex trade offs between caring for offspring and competing in the work place: at a basic level, time spent nursing and raising offspring cannot be simultaneously allocated to resource garnering (Low, 2000 pp. 250 - 252). In western societies such as the UK, there are few high paying jobs that women can do while simultaneously raising offspring (Low, 2005). Women who control resources may desire fewer children because of the conflict between career and raising a family, and therefore show less interest in a partner’s resources because they are anticipating fewer costs of offspring (i.e. mediator). Alternatively, it may only be women who desire fewer children who can afford to let their own resource control translate to less interest in a partner’s resources (i.e. moderator).

e. Hormonal profiles

In the biosocial model, Wood and Eagly (2002) propose the translation of male and female gender roles to sex-differentiated behaviour is mediated by hormonal responses to gender-typical tasks. They use examples of increasing testosterone in response to tasks associated with the male role, and increasing cortisol levels associated with maternal behaviour. Therefore, as gender roles and associated acceptable “tasks” for men and women change, it is possible to predict that the resultant hormonal processes lead to behavioural changes. Alternatively, it is also possible to predict that individual differences in adherence to gendered tasks, and ability to complete tasks typically associated with the opposite gender, are reliant upon individual differences in hormone levels. In this case, hormonal processes would moderate relationships between gender roles and behaviour.

Testosterone is the hormone perhaps most closely associated with male-typical behaviour due to its relationships to dominance and associated behaviours. Levels of circulating testosterone increase in both males (e.g. Booth et al., 1989) and females (Bateup et al., 2002) in anticipation of a male-typical task (i.e. physical competition), suggesting that the endocrinological responses to tasks may not be entirely sex specific. There is considerable evidence that individual differences in testosterone and measures of physical masculinisation in females relate to the expression of gender-typical behaviours and personality traits. Masculine personality traits are associated with women with low second to fourth digit ratios (i.e. women with greater physical masculinisation; Wilson, 1983; Manning, 2002) and higher levels of circulating testosterone (Al-Ayadhi, 2004; Baucom et al., 1985; Grant and France, 2001; Udry and Talbert, 1988). There are also relationships between testosterone and career status in women: professional workers were found to have higher serum testosterone levels than housewives and clerical workers (Purifoy and Koopmans, 1979) and testosterone levels relate positively to professional status (Al-Ayadhi, 2004). Female testosterone levels are also negatively related to attitudes and behaviours associated with the female role. For example, testosterone has been linked to decreased broodiness and reproductive ambition in women (Deady et al., 2006) and height (as a measure of masculinisation) has been shown to relate negatively to ideal number of children, and positively to ambitiousness (Deady and Law Smith, 2006).

There is evidence that female mate preferences shift with profiles of sex hormones. For example, female preferences for sexual dimorphism in male faces vary over the menstrual cycle (Penton-Voak et al., 1999; Penton-Voak and Perrett, 2001), indicating that the relative importance of cues to good genes versus cues to favourable personality shift in response to changing levels of oestrogen and progesterone. Similarly, preferences for healthy looking male faces were found to increase during the non-fertile phase of the cycle, during pregnancy and in women using oral contraceptives (Jones et al., 2006). Given the behavioural correlates of individual differences in female testosterone levels, and relationships between hormonal profiles and mate preferences, it is possible

that testosterone may mediate or moderate relationships between resource control and mate preferences. For example, as women participate in male-typical tasks associated with control over resources (e.g. competing in the workplace), associated changes in testosterone levels may in turn influence partner preferences (i.e. testosterone is a mediator). Alternatively, it may only be women with higher basal levels of testosterone who are able to control resources (i.e. testosterone is a moderator).

7.2. *Study 1*

7.2.1. *Introduction*

Study 1 was designed to assess the mediating and moderating effects of all covariates included in analyses in Chapter 3 (i.e. own age, own income, parent's income while growing up, marital status, ideal relationship type on day of testing, and self-rated attractiveness), as well as planned reproductive strategy and endorsement of the traditional female gender role (i.e. ASI scores).

7.2.2. *Methodology*

a. *Data collection*

A subset of the sample of females described in Chapter 3 chose to complete the Ambivalent Sexism Inventory (see Appendix 10) at the end of the online test ($n = 373$, age: mean = 24.9, $sd = 5.1$). Participants also indicated their age, self-rated attractiveness, income, parents' income while growing up, marital status and ideal relationship type on the day of testing. Participants' reproductive strategy was assessed using the questionnaire item: "Ideally, how many children would you like to have?" Ideal number of children has been used as a measure of planned reproductive strategy in previous studies (e.g. Buss et al., 2000).

b. *Data processing*

There were low levels of missing values on a number of variables, which were replaced with the mean.

A factor analysis of resource control measures identical to that described in Chapter 3 was conducted.

c. Statistical analysis

Mediation and moderation effects were investigated using regression analyses (Aiken and West, 1991; Frazier et al., 2004).

i. Moderation

To test for moderation effects, the independent and moderator variables were first centred (each value was subtracted from the mean of the series). This reduces the problems associated with multicollinearity between independent and moderator variables and their interaction terms. Resource control factors were not centred, as the mean of each was already zero. Interaction terms were then created: each resource control factor (i.e. each independent variable) was multiplied by each moderator. A hierarchical multiple regression model was then constructed (Aiken and West, 1991; Cohen et al., 2003; Jaccard et al., 1990; West et al., 1996). The first level contained all centred resource control and moderator variables. Product terms were entered in the second level. All potential moderators were included in each model, as running an individual model for each moderator increases chances of a Type I error (Cohen et al., 2003).

When interpreting moderator effects, relationships are seen as “conditional” effects at the value “0” for all other variables in the model (Judd et al., 1995). Furthermore, unlike standard multiple regression results, interpretation relies on the un-standardised beta coefficients as those of interaction terms are not properly standardised (Frazier et al., 2004). The single degree of freedom F-test (which represents the change in variance explained by addition of interaction terms) was used to assess statistical significance of the moderator effects (Aiken and West, 1991; Jaccard et al., 1990; West et al., 1996).

Dependent variables were measures of mate preferences (i.e. ideal partner age, maximum partner age tolerated, minimum partner age tolerated, and preference rankings for “physical attractiveness” over “good financial prospects”). Therefore, the procedure was repeated for each mate preference measure. Preference rankings for partner characteristics were converted into a binary variable (1 = a stronger preference “physical attractiveness” over “good financial prospects”, 0 = a stronger preference “good financial prospects” over “physical attractiveness”), and binary logistic regression was used to assess both mediation and moderation effects on preferences for physical attractiveness over good financial prospects (see MacKinnon and Dwyer, 1993).

ii. Mediation

Detection of mediation followed the standard four-step procedure (Baron and Kenny, 1986; Judd and Kenny, 1981; Kenny et al., 1998), which tests for significant relationships between: the independent and dependent variables, the independent and mediator variables and the mediator and dependent variables. For a mediation effect to be detected, the strength of the relationship between the independent and dependent variables must be shown to be reduced when the mediator is added to the model. Finally, if mediation was detected, the Sobel test was conducted. This test demonstrates statistically whether the mediator carries the influence of the independent variable to the dependent variable, by comparing the effect sizes and standard errors of relationships between the independent and dependent variables with and without the mediator included in the model (MacKinnon and Dwyer, 1993). These steps were achieved with three multiple regression models, followed by the Sobel test if necessary. The first model showed effects of the independent (i.e. resource control) variables on the dependent (i.e. mate preference) variables. In the second model, each mediator was regressed against the independent variables (i.e. this step was repeated for each mediator). Finally, the dependent variable was regressed on both the independent and mediator variables. This procedure was repeated for each mate preference variable. In the case of the binary variable for preferences for physical attractiveness over good financial prospects, a binary logistic regression model was used.

7.2.3. Results

a. Resource control factor analysis

All resource control variables were entered into an identical factor analysis to that described in Chapter 3 (i.e. with Varimax rotation). Two factors were extracted. Variables that loaded highly on the first factor (Eigenvalue = 2.05, accounting for 29.25% of the variance) were: financial independence ($r = 0.74$), control of finances ($r = 0.53$), and input in decisions in the home ($r = 0.7$) and workplace ($r = 0.68$). Variables that loaded highly on the second factor (Eigenvalue = 1.35, accounting for 19.32% of the variance) were: importance of financial independence ($r = .79$) and importance of having a career ($r = 0.84$). The variables that loaded highly on both factors were identical to those in the full sample described in Chapter 3. Therefore, factors were interpreted as representing “financial independence and power” and “ambition” respectively, and matched the independent variables used in Chapter 3, thereby providing an opportunity to test for mediators and moderators of the relationships found in the earlier study.

b. Moderation

i. Ideal partner age

The addition of interaction terms did not explain significantly more of the variance in ideal partner age (F -change = 1.41, $p > 0.1$, R^2 -change = 0.02).

There was, however, a significant interaction between “financial independence and power” and own age ($\beta = 0.07$, $p = 0.05$). Figure 7.1 demonstrates that, with increasing “financial independence and power”, ideal partner age increased for younger females, but decreased slightly for older females.

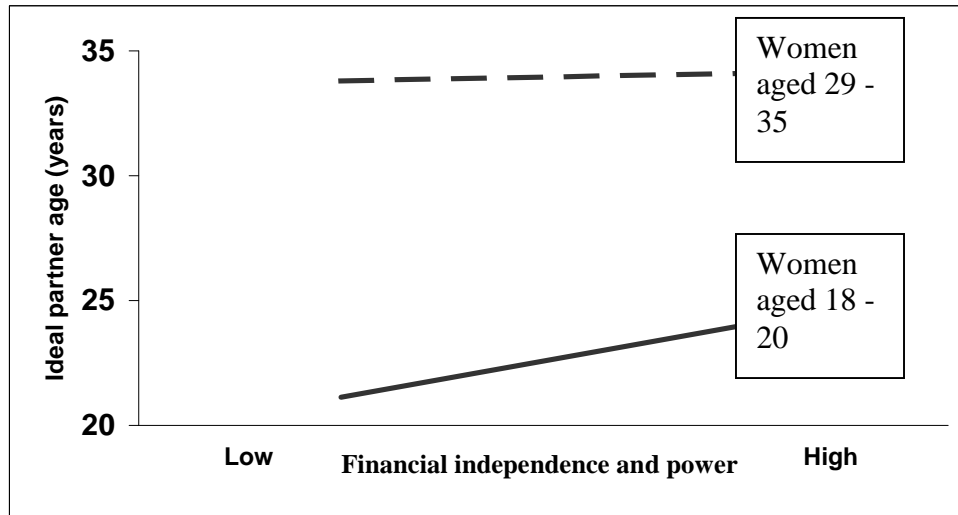


Figure 7.1 Interaction between “financial independence and power” and own age on ideal partner age.

ii. Maximum partner age tolerated

The addition of interaction terms did not explain significantly more of the variance in maximum partner age (F -change = 0.89, $p > 0.5$, R^2 -change = 0.02).

iii. Minimum partner age tolerated

The addition of interaction terms did not explain significantly more of the variance in maximum partner age (F -change = 1.43, $p > 0.1$, R^2 -change = 0.02).

There were, however, significant interactions between “financial independence and power” and: own age ($\beta = 0.11$, $p < 0.01$) and ASI scores ($\beta = 0.45$, $p = 0.04$). Figure 7.2 demonstrates that with increasing “financial independence and power”, minimum partner age tolerated increased for younger females, but decreased slightly for older females. Figure 7.3 demonstrates that minimum partner age tolerated increased at a slower rate for women who endorsed the traditional gender role more strongly.

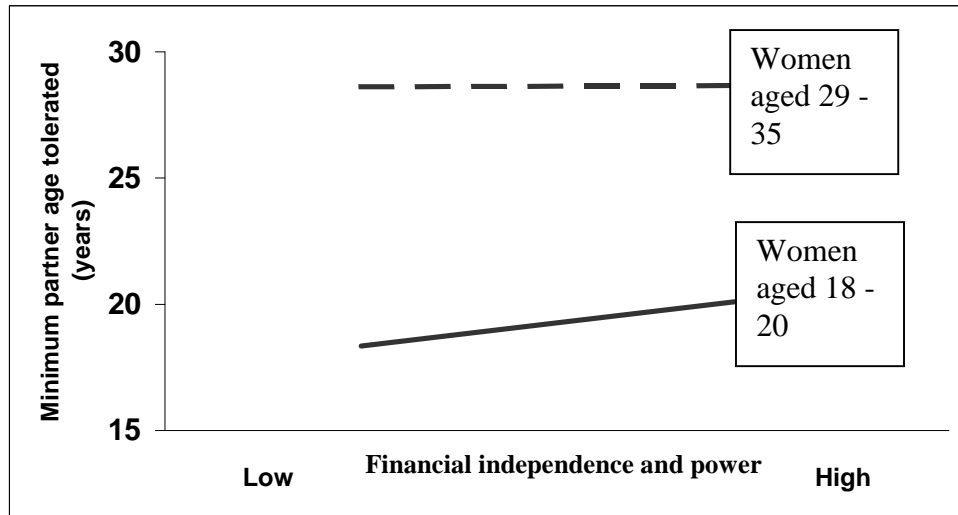


Figure 7.2 Interaction between “financial independence and power” and own age on minimum partner age tolerated

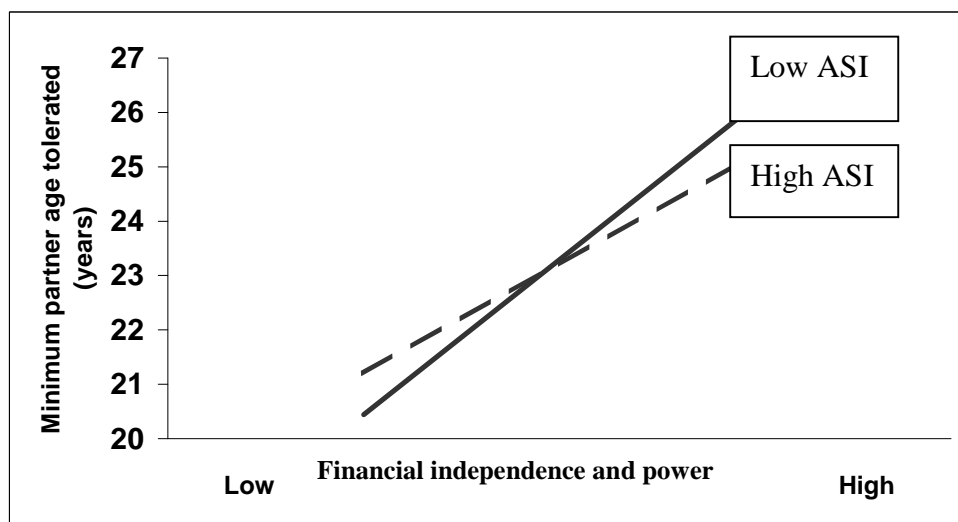


Figure 7.3 Interaction between “financial independence and power” and scores on the Ambivalent Sexism Inventory on minimum partner age tolerated.

There was also a significant interaction between “ambition” and own age ($\beta = -0.07$, $p = 0.04$). Figure 7.4 demonstrates that, with increasing “ambition”, older women demonstrated a slight increase in minimum partner age tolerated, whereas younger women demonstrated a slight decrease in minimum partner age tolerated.

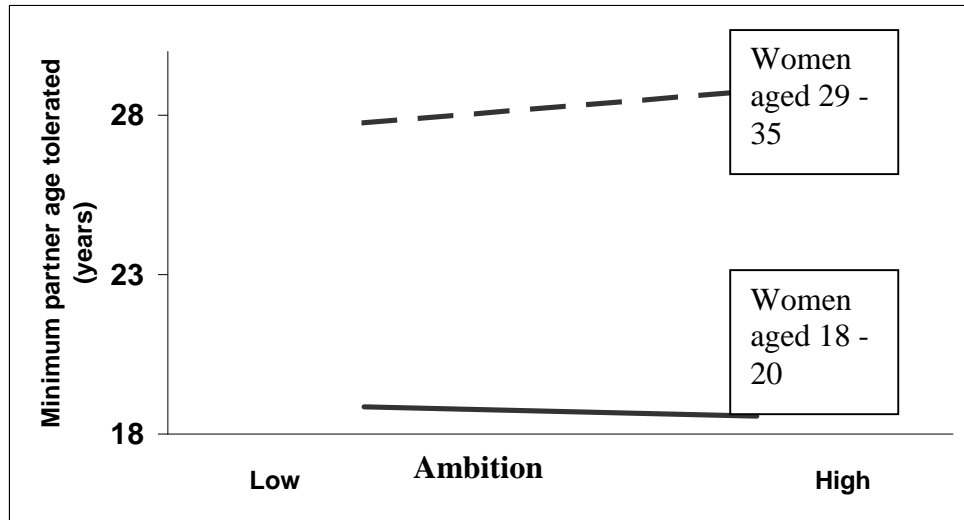


Figure 7.4 Interaction between “ambition” and own age on minimum partner age tolerated

iv. Preferences for “physical attractiveness” over “good financial prospects”

There was a significant interaction between “financial independence and power” and ASI scores ($\beta = -0.5$, $p = 0.01$). Figure 7.5 demonstrates that with increasing financial independence and power, women who strongly endorse the traditional female gender show a greater shift towards preferences for physical attractiveness over good financial prospects than women who do not endorse the traditional role as strongly.

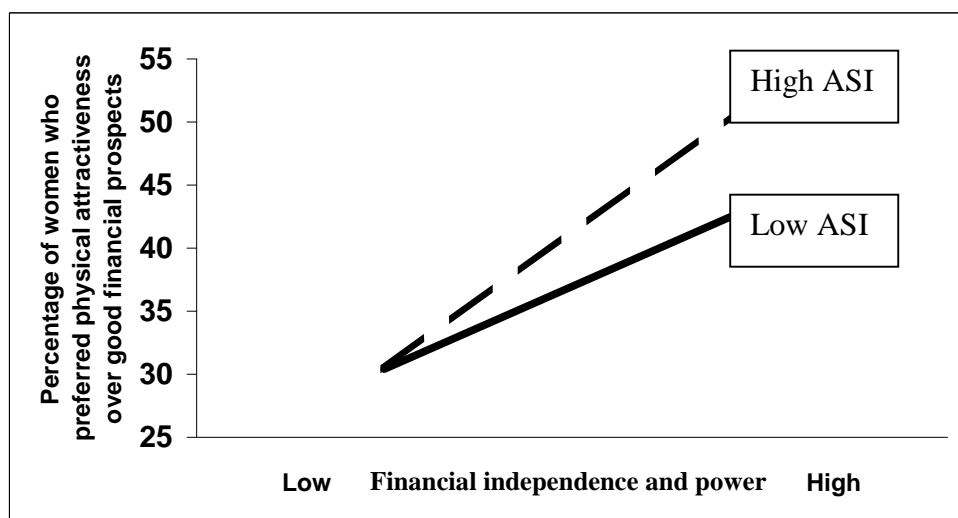


Figure 7.5 Interaction between “financial independence and power” and ASI scores on preferences for physical attractiveness over good financial prospects.

c. *Mediation*

i. *Model 1: dependent variables regressed on independent variables*

Ideal partner age

Variance in ideal partner age was significantly predicted by both “Financial independence and power” ($\beta = 0.49$, $p < 0.001$) and “ambition” ($\beta = -0.17$, $p < 0.001$).

Maximum partner age tolerated

Variance in maximum partner age tolerated was significantly predicted by both “financial independence and power” ($\beta = 0.42$, $p < 0.001$) and “ambition” ($\beta = -0.17$, $p < 0.001$).

Minimum partner age tolerated

Variance in minimum partner age tolerated was significantly predicted by both “financial independence and power” ($\beta = 0.45$, $p < 0.001$) and “ambition” ($\beta = -0.17$, $p < 0.001$).

Preferences for “physical attractiveness” over “good financial prospects”

Variance in preference for “physical attractiveness” over “good financial prospects” was not significantly predicted by resource control factors (all $ps > 0.6$).

ii. *Model 2: Mediators regressed on independent variables*

Self-rated attractiveness

Variance in self-rated attractiveness was significantly predicted by “financial independence and power” ($\beta = 0.11$, $p = 0.04$).

Own income

Variance in own income was significantly predicted by “financial independence and power” ($\beta = 0.49$, $p < 0.001$).

Parent's income while growing up

Resource control did not predict variance in parent's income while growing up (all p s > 0.2).

Marital status

Resource control did not predict variance in marital status (all p s > 0.1 - in binary logistic regression, as marital status was collapsed into a dummy variable).

Ideal relationship type on day of testing

Resource control did not predict variance in relationship type on day of testing (all p s > 0.1).

Ideal number of children

Variance in ideal number of children was significantly predicted by "financial independence and power" ($\beta = -0.15$, $p = 0.002$), and "ambition" ($\beta = -0.26$, $p < 0.001$).

Endorsement of traditional female gender role

Variance in ASI score was significantly predicted by "financial independence and power" ($\beta = -0.14$, $p = 0.008$), and "ambition" ($\beta = -0.14$, $p = 0.006$).

iii. Model 3: Dependent variables regressed on independent variables and mediators

A model was run for each dependent (mate preference) variable with each mediator variable found to relate to resource control (i.e. self-rated attractiveness, own income, ideal number of children and ASI score).

*Ideal age**Mediator1: Self-rated attractiveness*

The significance of the effects of "financial independence and power" ($\beta = 0.48$, $p < 0.001$) and "ambition" ($\beta = -0.18$, $p < 0.001$) on ideal partner age did not decrease when self-rated attractiveness was entered in to the model.

Mediator2: Own income

The significance of the effects of “financial independence and power” ($\beta = 0.36$, $p < 0.001$) and “ambition” ($\beta = -0.16$, $p < 0.001$) on ideal partner age did not decrease when own income was entered in to the model.

Mediator 3: Ideal number of children

The significance of the effects of “financial independence and power” ($\beta = 0.48$, $p < 0.001$) and “ambition” ($\beta = -0.19$, $p < 0.001$) on ideal partner age did not decrease when ideal number of children was entered in to the model.

Mediator 4: Endorsement of traditional female gender role

The significance of the effects of “financial independence and power” ($\beta = 0.47$, $p < 0.001$) and “ambition” ($\beta = -0.19$, $p < 0.001$) on ideal partner age did not decrease when ASI score was entered in to the model.

*Maximum partner age tolerated**Mediator1: Self-rated attractiveness*

The significance of the effects of “financial independence and power” ($\beta = 0.42$, $p < 0.001$) and “ambition” ($\beta = -0.18$, $p < 0.001$) on maximum partner age tolerated did not decrease when self-rated attractiveness was entered in to the model.

Mediator 2: Own income

The significance of the effects of “financial independence and power” ($\beta = 0.36$, $p < 0.001$) and “ambition” ($\beta = -0.16$, $p < 0.001$) on maximum partner age tolerated did not decrease when own income was entered in to the model.

Mediator 3: Ideal number of children

The significance of the effects of “financial independence and power” ($\beta = 0.41$, $p < 0.001$) and “ambition” ($\beta = -0.19$, $p < 0.001$) on maximum partner age tolerated did not decrease when ideal number of children was entered in to the model.

Mediator 4: Endorsement of traditional female gender role

The significance of the effects of “financial independence and power” ($\beta = 0.41$, $p < 0.001$) and “ambition” ($\beta = -0.19$, $p < 0.001$) on maximum partner age tolerated did not decrease when ASI score was entered in to the model.

Minimum partner age tolerated

Mediator 1: Self-rated attractiveness

The significance of the effects of “financial independence and power” ($\beta = 0.44$, $p < 0.001$) and “ambition” ($\beta = -0.17$, $p < 0.001$) on minimum partner age tolerated did not decrease when self-rated attractiveness was entered in to the model.

Mediator 2: Own income

The significance of the effects of “financial independence and power” ($\beta = 0.31$, $p < 0.001$) and “ambition” ($\beta = -0.16$, $p < 0.001$) on minimum partner age tolerated did not decrease when own income was entered in to the model.

Mediator 3: Ideal number of children

The significance of the effects of “financial independence and power” ($\beta = 0.44$, $p < 0.001$) and “ambition” ($\beta = -0.17$, $p < 0.001$) on minimum partner age tolerated did not decrease when ideal number of children was entered in to the model.

Mediator 4: Endorsement of traditional female gender role

The significance of the effects of “financial independence and power” ($\beta = 0.43$, $p < 0.001$) and “ambition” ($\beta = -0.19$, $p < 0.001$) on minimum partner age tolerated did not decrease when ASI score was entered in to the model.

7.2.4. Discussion

The factor analysis of measures of resource control yielded two factors with identical structures to those used in Chapter 3. Therefore, mediating and

moderating effects on the relationships between resource control and mate preferences found in this sub-sample can be directly applied to the results of Chapter 3.

In Chapter 3 there was no effect of resource control on ideal partner age. Analysis of the sub-sample demonstrated that the effect of “financial independence and power” on ideal partner age was moderated by own age. That is, with increasing “financial independence and power”, ideal partner age of younger women increased, but decreased slightly for older women. Therefore, any effects of “financial independence and power” on ideal partner age in Chapter 3 may have been obscured by the differing effects for younger and older women, even within the relatively limited age profile of the sample. A possible explanation is that older women are in a position to choose younger partners relative to their own age, whereas younger women may be constrained by not wanting to settle for “immature” partners. Similarly, the positive relationship between “financial independence and power” and minimum partner age tolerated reported in Chapter 3 was found here to be moderated by own age. With increasing “financial independence and power”, younger women were less tolerant of younger partners relative to their own age, whereas older women were more tolerant. It appears that the predictions of a perspective which posits that sex differences in partner age preferences will decrease with increasing female status may be upheld in older, but not younger, women. In younger women, the effects may be constrained by a desire not to have a relationship with a partner who may be perceived as immature.

Own age also moderated the relationship between “ambition” and minimum partner age tolerated. As “ambition” increased, the minimum partner age of older women increased slightly, whereas that of younger women decreased slightly. That is, in older women, with increasing “ambition”, minimum partner age increases, in contrast to the effects of “financial independence and power”. In younger women, the opposite effects are seen. This discrepancy is difficult to account for, and implicates complexity in the construct “control of resources” as measured here. It is possible that “financial independence and power” and

“ambition” mean different things for younger and older women. Women who are financially independent while still young may be less likely to be university students, and more likely to have gone straight into employment after school, thereby earning an income and avoiding student debts. They may be surrounded by a generally older group of individuals in the work place. Young women who are ambitious may be more likely to be students, and therefore may be more likely to be surrounded by individuals similar to their own age and be less financially independent. In older women, those who are financially independent may be able to afford to prefer younger partners, whereas those who are ambitious may not yet have achieved actual resource control. There are a variety of ways in which “financial independence and power” and “ambition” may vary between the age groups, and it is these differences that may account for discrepancies in results.

Endorsement of the traditional female gender role moderated relationships between “financial independence and power” and mate preferences in unexpected ways. Women who did not endorse the homemaker role showed a greater increase in minimum partner age tolerated with increasing “financial independence and power” than those who endorsed the role more strongly. Women who are less keen to endorse the homemaker role may be younger, and therefore less willing to settle for younger partners relative to their own age than older women.

Women who strongly endorsed the homemaker role showed a greater shift towards preferences for physical attractiveness over good financial prospects with increasing “financial independence and power” than women who did not endorse the role as strongly. It may be expected that women who do not endorse the homemaker role may be better able to utilise their resource control, and therefore afford to be less concerned with a partner’s resources. It is possible that across women who endorse the homemaker role strongly, resource control has a greater impact on the partner characteristics they consider important, whereas women who have a less traditional attitude already have less traditional partner preferences.

To conclude, own age is an important moderator of relationships between resource control and age preferences. The effects of “financial independence and power” on age preferences in older women provide support for a role of economic constraints on women in the expression of sex differences in age preferences. The effects in younger women may be constrained by the immaturity of younger males relative to own age. The moderating effect of own age on the relationship between “ambition” and minimum partner age tolerated indicates complexity in the construct “control of resources” and its implications across the age groups. Endorsement of the traditional female gender role also moderates relationships between “financial independence and power” and minimum partner age tolerated and preferences for physical attractiveness over good financial prospects, albeit in unexpected ways. It is possible that relationships between ASI scores and own age, and the greater effects of resource control on women who view their role more traditionally account for these effects.

7.3. *Study 2*

7.3.1. *Introduction*

Study 2 was designed to investigate the mediating and moderating effects of self-esteem, gender-esteem, and social support.

7.3.2. *Methodology*

a. Data collection

Questionnaires were distributed to females in a class of first year undergraduate students at the University of St Andrews ($n = 64$, age: mean = 18.97, $sd = 2.06$). As well as measures of resource control, mate preferences, and personal details, participants completed the Collective Self Esteem Scale (see Appendix 7), Rosenberg’s Self Esteem Scale (Appendix 11), and the Multidimensional Scale of Perceived Social Support (Appendix 12).

b. Data processing

Low levels of missing values on all variables were replaced with the mean of the series.

c. Statistical analysis

Investigation of mediation and moderation effects was conducted as described in section 7.2.2.c. As own age was found to influence relationships between resource control and age preferences in Study 1, it was included as a covariate in regression models here.

7.3.3. Results

a. Resource control factor analysis

All resource control variables were entered into a factor analysis similar to those described in Chapter 3 and the sub-sample of the web data set described above. Unlike previous factor analyses, however, “maximum level of education” was excluded as all participants indicated equivalent levels of education. Three factors were extracted. Variables that loaded highly on the first factor (Eigenvalue = 1.69, accounting for 28.11% of the variance) were: financial independence ($r = 0.75$), control of finances ($r = 0.57$), and input in decisions in the home ($r = 0.74$). Variables that loaded highly on the second factor (Eigenvalue = 1.21, accounting for 20.22% of the variance) were: importance of having a career ($r = -0.81$) and input in decisions in the workplace ($r = 0.7$). Variables that loaded highly on the third factor (Eigenvalue = 1.13, accounting for 18.84% of the variance) were: importance of financial independence ($r = 0.87$) and control of finances (0.4). The first factor was similar to the “financial independence and power” factor in the main sample described in Chapter 3 and its sub-sample above, although in the undergraduate sample, input in decisions in the workplace did not load highly. Therefore, this factor was considered to represent “financial independence and power in the home”. Factor 2 did not resemble either of the resource control factors of previous analyses and was therefore not included in analyses here. As importance of financial independence

loaded highly on factor 3, this was used in place of the “ambition” factor, and was interpreted as representing “importance of financial independence and control of finances”.

b. Moderation

i. Ideal partner age

The F-change for addition of the interaction terms (0.75) was non-significant ($p > 0.6$). Therefore, the addition of the interaction terms did not explain significantly more of the variance in ideal partner age (R^2 change = 0.06).

ii. Maximum partner age tolerated

The F-change for addition of the interaction terms (0.32) was non-significant ($p > 0.9$). Therefore, the addition of the interaction terms did not explain significantly more of the variance in maximum partner age tolerated (R^2 change = 0.03).

iii. Minimum partner age tolerated

The F-change for addition of the interaction terms (0.57) was non-significant ($p > 0.7$). Therefore, the addition of the interaction terms did not explain significantly more of the variance in minimum partner age tolerated (R^2 change = 0.06).

iv. Preferences for physical attractiveness over good financial prospects

There were no significant interactions between resource control and potential moderators (all $ps > 0.07$).

c. Mediation

i. Model 1: dependent variables regressed on independent variables

Ideal partner age

Variance in ideal partner age was not predicted by resource control (all $ps > 0.2$).

Maximum partner age tolerated

Variance in maximum partner age tolerated was not predicted by resource control (all $ps > 0.1$).

Minimum partner age tolerated

Variance in minimum partner age tolerated was not predicted by resource control (all $ps > 0.7$).

Preferences for “physical attractiveness” over “good financial prospects”

Variance on preferences for physical attractiveness over good financial prospects was not predicted by resource control (all $ps > 0.2$).

7.3.4. Discussion

The purpose of the study was to investigate the moderating and mediating effects of self-esteem, gender-esteem, and social support on the relationships between resource control and mate preferences identified in previous analyses. The results demonstrated no mediating or moderating effects. While this may reflect a genuine lack of influence of esteem or social support on the relationships, there may be limitations to the sample and analysis that account for the lack of effects.

The sample was more limited in terms of age and education than those used previously. As all participants were first year undergraduate students, it is possible that there was insufficient variance in resource control to detect such complicated mediating and moderating effects. Indeed, resource control was found to have no effect on mate preferences in this sample. Furthermore, the factor analysis of resource control variables yielded factors that were not consistent with those used in previous analyses, perhaps partly accounting for lack of effects.

7.4. *Study 3*

7.4.1. *Introduction*

The purpose of Study 3 was to investigate the mediating and moderating effects of levels of circulating testosterone on the relationships between resource control and mate preferences in females.

7.4.2. *Methodology*

a. Data collection

Fifty-four female participants were recruited from the University of St Andrews (age: mean = 19.9, sd = 1.36). Participants deposited between 3 and 5 mL of saliva on arrival at the laboratory. The number of samples provided per participant ranged from 1 (21 participants) to 7 (2 participants). Samples were frozen at -20°C until analysis.

Participants then completed questionnaire items to assess own age, financial independence, importance placed on having a career, and preference rankings for partner characteristics (see Chapter 3 for full details of these measures).

Hormonal assays were conducted using an enzyme-linked immunosorbant assay (ELISA) based on the indirect, competitive binding technique and optimised to reduce the problems associated with low levels of testosterone in female saliva (Sharp and Al-Dujaili, 2004). Analysis was conducted at Queen Margaret University College, Edinburgh (for full procedure see Deady et al. (2006)). Mean testosterone level for the sample was 0.17 ng/mL (sd = 0.07), which falls within population norms for young females within the laboratory.

b. Statistical analysis

Statistical analysis was identical to that described in section 7.2.2.c. Age was included as a covariate in analyses. A resource control factor analysis was not conducted as only a subset of resource control measures were collected in this

sample. Therefore, single measures of “financial independence” and “importance placed on having a career” were used in place of resource control factors. Only rankings of partner characteristics were obtained as a measure of mate preferences, therefore a binary variable was created to represent preferences for “physical attractiveness” over “good financial prospects” and vice versa, and binary logistic regression models were employed.

7.4.3. *Results*

a. Moderation

Interaction terms did not significantly predict variance in preferences for “physical attractiveness” over “good financial prospects” (all p s > 0.1).

b. Mediation

i. Model 1: dependent variables regressed on independent variables

Preferences for “physical attractiveness” over “good financial prospects” were predicted by financial independence ($\beta = 0.58$, $p = 0.04$). That is, females who were financially independent had stronger preferences for “physical attractiveness” over “good financial prospects” than did those with less financial independence.

ii. Model 2: Mediators regressed on independent variables

There was a trend towards a significant effect of testosterone level on financial independence ($\beta = -0.27$, $p = 0.08$).

iii. Model 3: Dependent variables regressed on independent variables and mediators

The relationship between financial independence and preferences for physical attractiveness over good financial prospects lost significance when testosterone levels were included in the model ($\beta = 0.38$, $p = 0.25$). Therefore, testosterone levels mediated the relationship between financial independence and preferences for “physical attractiveness” over “good financial prospects” in a partner.

iv. Sobel Test

The Sobel test indicated that testosterone did not significantly mediate the relationship between financial independence and preferences for “physical attractiveness” over “good financial prospects” ($p > 0.2$).

7.4.4. Discussion

The purpose of the study was to investigate the mediating and moderating effects of levels of salivary testosterone on relationships between resource control and mate preferences in females. While testosterone did not moderate the relationships of interest, there was some evidence to suggest that it may mediate the relationship between financial independence and preferences for “physical attractiveness” over “good financial prospects” in a sample of female undergraduate students. That is, there was preliminary evidence that financial independence was positively related to levels of circulating testosterone in females, which in turn are associated with less female-typical preferences for physical attractiveness in a partner.

While the results of the Sobel test indicated that the mediating effect of testosterone was not significant, it should be noted that the test becomes more reliable with greater sample sizes. Given the small sample size, and the decrease in the significance of the relationship between financial independence and mate preference once testosterone was included in the model, it is possible to conjecture that the mediating role of testosterone may be significant in a larger sample. This preliminary finding is in accordance with the biosocial model of sex differences in mate preferences (Wood and Eagly, 2002). The model predicts that hormonal changes mediate the tasks associated with gender roles and sex-typical behaviours. The mediating effect of testosterone on the relationship between female resource control and a less traditional mate preference implicates a biological step in the process by which gender roles are translated into sex-typical behaviours. Furthermore, an association between financial independence, which has not typically been available to women in the past, and testosterone is consistent with findings that relate female testosterone to

ambitiousness (e.g. Deady et al., 2006). While it is not possible to say that men and women may become more similar in terms of hormonal responses as gender roles merge, the finding suggests that hormonal changes associated with completion of tasks associated with the male gender role may occur in females when they complete the same tasks, and may have consequences for the expression of traditional mate preferences.

7.5. *General Discussion*

The purpose of the three studies was to investigate potential mediators and moderators of relationships between resource control and mate preferences.

The results demonstrate that own age is an important moderator of relationships between resource control and age preferences. Predictions of perspectives that attribute sex differences to constraints on women may be more strongly upheld in older than in younger women. It is suggested that this may result from perceptions of the maturity of partners younger than women who are relatively young themselves. It may be useful to explore relationships in groups of women from a wider age profile.

There was some evidence that levels of circulating testosterone mediated the relationship between financial independence and preferences for physical attractiveness over good financial prospects. This provides support for the biosocial model of sex differences in mate preferences (Wood and Eagly, 2002) and indicates that male-typical hormonal responses to tasks associated with the male role in females lead to more male-typical mate preferences. Investigation of the hormonal changes in females in response to specific tasks that have been traditionally associated with the male gender role in a within subjects design may provide more information on the mediating role of hormonal changes in translating gender roles to sex-typical behaviours.

The results also implicate complexity in the construct “control of resources” as measured here, and the meanings and implications of its different dimensions

across age groups. Further investigation of the exact nature of the dimensions tapped by specific resource control measures in different age groups, and their relationships to other measures of female status may be an insightful direction for future research.

Chapter 8. Effects of control of resources on the magnitude of sex differences in mate preferences

8.1. Introduction

Thus far, I have investigated the effects of female control of resources on mate preferences in an attempt to determine the extent to which economic constraints on women may have contributed to sex differences in mate preferences. While complex, the results so far have been largely consistent with a contribution of economic constraints on women to sex differences in mate preferences: in Chapter 3, women who were financially independent and powerful, while showing lower tolerance of younger partners, preferred “physical attractiveness” over “good financial prospects” in a partner, and ambitious women were less willing to tolerate older partners; in Chapter 5, measures of female status were shown to relate to more male-typical female mate preferences in a cross section of non-industrial societies; furthermore, there was preliminary evidence in Chapter 6, that an experimental manipulation of female perceptions of their status resulted in more male-typical partner age preferences. In general, results have demonstrated that when women can control the resources needed to raise offspring, they express more male-typical mate preferences.

While the prediction that increased female status will be associated with female preferences more like those typical of males can be derived from each of the three origin theories introduced in Chapter 1, the mechanisms by which these shifts are expected to occur differ. In Chapters 3 and 4, analysis of relationships between preference rankings for partner characteristics did not yield results more consistent with either perspective. In two samples, preferences for “physical attractiveness” were positively related to preferences for putative cues to good genes (i.e. “good health” and “good sense of humour”) suggesting consistency with the evolutionary models. There were also, however, positive relationships between “physical attractiveness” and the personality characteristics “kindness” and “good communication skills”, which are consistent with the biosocial model.

The aim of the current study was to further explore the validity of each of the origin theories by investigating the effects of resource control on the magnitudes of sex differences in mate preferences. The biosocial and evolutionary models differ in the mechanisms by which they predict female preferences to shift with increasing status. In the biosocial model, the more egalitarian a society, the more similar the behaviours of men and women are expected to become. In this theory, as social changes cause the impact of biological sex differences on the allocation of tasks to each sex to lessen, sex-typical behaviours are expected to merge, and, as a consequence, so will the characteristics considered important in each sex. Therefore, the biosocial model predicts that magnitudes of sex differences in mate preferences will decrease with increasing female status: female preferences will become more male-typical and vice versa. In the evolutionary frameworks, however, convergent male and female preferences are not believed to arise from preferences for equivalent characteristics. Shifts in female preferences towards those more typical of males are not considered to reflect male and female preferences for the same characteristics. Male preferences for physically attractive, and younger, partners are believed to reflect preferences for visible cues to fertility and fecundity, whereas equivalent preferences in females reflect a shift in the trade off (unique to females) between “good genes” and resources in a partner. Therefore, evolutionary frameworks do not necessarily predict simple convergence of male and female preferences with increasing female status, and are not clear about the predicted effects of increasing female status on the preferences of males. By investigating the effects of status on male and female mate preferences, the current study provided an opportunity to further explore the validity of the biosocial and evolutionary models. While historical and social factors may implicate differences in both variation in, and implications of, “status” for men and women, it was considered necessary to explore the effects on mate preferences of the same measure of status for men and women, to control for any effects of male status on preferences. Therefore, equivalent measures of resource control were employed for male and female participants.

To summarise, by investigating the effects of resource control on the magnitudes of sex differences in mate preferences, I attempted to provide further insight into the validity of the biosocial versus evolutionary models of sex differences in mate preferences.

8.2. *Methodology*

8.2.1. *Sample*

The female dataset collected via online surveys in Chapter 3 ($n = 1851$; mean age = 24.35, $sd = 4.98$) was supplemented with the data of 1919 male participants who also completed the test (mean age = 24.70, $sd = 4.88$). All participants were aged 18 – 35 years and indicated a completely heterosexual orientation.

8.2.2. *Measures*

Questionnaire measures of resource control, mate preferences and personal details are described in Chapter 3.

8.2.3. *Data processing and statistical analysis*

All missing values were replaced with the sex-specific mean of the series. One variable generated coefficients out-with the specified parameters of normality (i.e. skewness coefficients >1 : West et al., 1995: minimum partner age tolerated), and was re-expressed using a power transformation.

The factor analysis of resource control variables described in Chapter 3 was conducted for male participants to ensure that measures of resource control grouped into comparable factors for males and females.

The effects of resource control on the magnitudes of sex differences were determined through investigation of sex as a moderator of relations between resource control and mate preferences (for description of moderation effects and

statistical analysis, see Chapter 7). All covariates identified in Chapter 3 were entered in the first level of the model (i.e. own age, self-rated attractiveness, own income, parents' income, marital status dummy variable, and ideal relationship type at time of testing). Resource control factors and sex were entered in the second level. Interaction terms of sex and resource control factors were entered in the third level. As previously, preference rankings for “good financial prospects” and “physical attractiveness” were converted to a binary code, and entered as the dependent variable in a binary logistic regression. The variables entered into each level of the model were identical to those in the linear models.

8.3. *Results*

8.3.1. *Resource control factor analysis*

Male responses to measures of control of resources were entered into a factor analysis identical to that described in Chapter 3. Two factors with Eigenvalues greater than 1 were extracted. Variables that loaded highly on Factor 1 (Eigenvalue = 2.20, accounting for 31.62% of the variance) were financial independence ($r = 0.75$), control of finances ($r = 0.54$) and input in decisions in the home ($r = 0.70$) and the workplace ($r = 0.74$). Variables that loaded highly on Factor 2 (Eigenvalue = 1.20, accounting for 17.13% of the variance) were importance of financial independence ($r = 0.68$) and importance of having a career ($r = 0.84$). The factors consisted of the same variables, in the same order of loading as those for the female participants described in Chapter 3. Therefore, factor 1 was interpreted as representing “financial independence and power” and factor 2 as “ambition” for both males and females, allowing comparison of effects of resource control factors between sexes.

8.3.2. *Effects of resource control on magnitudes of sex differences in mate preferences*

As the mean of each resource control factor was zero, these variables were not centred. Interaction terms were created by multiplying sex with each resource control factor.

a. Ideal partner age

The R^2 change associated with the interaction terms was 0.006. The F-change (31.41) was significant ($p < 0.001$). There was a significant effect of sex ($\beta = -3.9$, $p < 0.001$), demonstrating that female ideal partner age (mean = 26.89 years) is significantly greater than that of males (mean = 23.23 years).

The interaction between sex and “financial independence and power” was significant ($\beta = -0.74$, $p < 0.001$). The ideal partner ages of men and women increased with greater “financial independence and power”, but more so for women than men, resulting in a larger sex difference (see Figure 8.1).

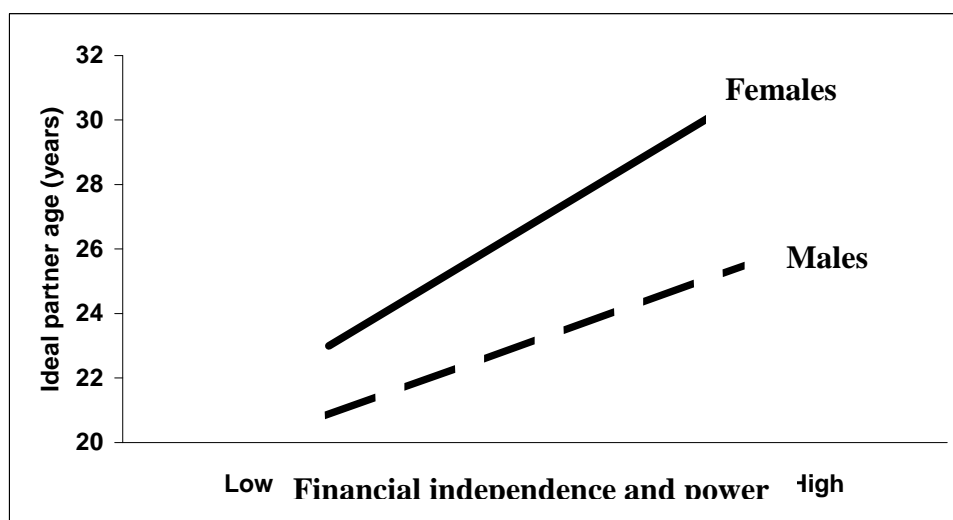


Figure 8.1 Interaction between sex and “financial independence and power” on ideal partner age.

The interaction between sex and “ambition” was also significant ($\beta = 0.2$, $p = 0.04$). The ideal partner ages of men and women decreased with “ambition”, but

more so for women, thereby decreasing the magnitude of the sex difference (see Figure 8.2).

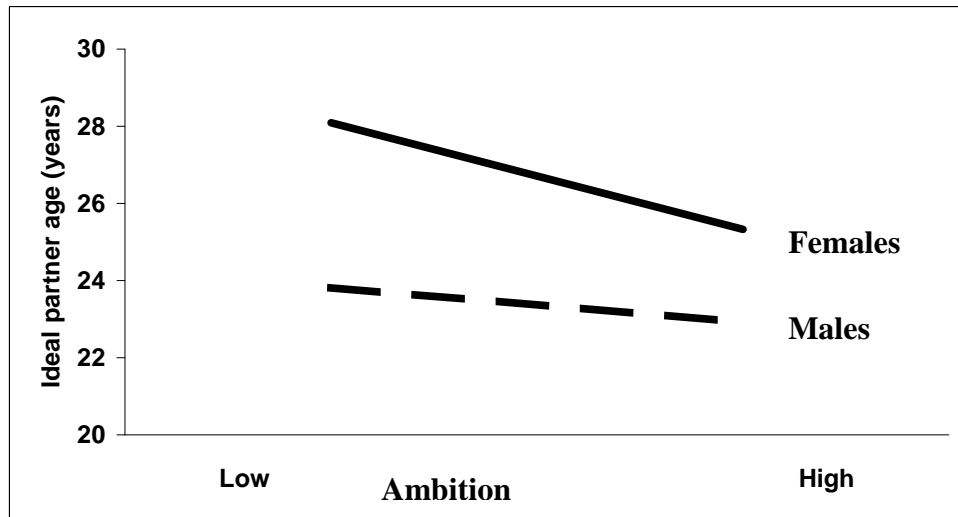


Figure 8.2 Interaction between sex and “ambition” on ideal partner age.

b. Maximum partner age tolerated

The R^2 change associated with the interaction terms was 0.002. The F-change (5.58) was significant ($p < 0.01$). There was a significant effect of sex on maximum partner age tolerated ($\beta = -3.9$, $p < 0.001$), demonstrating that female maximum partner age (mean = 33.19 years) was significantly greater than that of males (mean = 29.76 years).

The interaction term between sex and “financial independence and power” was significant ($\beta = -0.57$, $p = 0.001$). Figure 8.3 demonstrates that with increasing “financial independence and power”, the maximum partner age tolerated by females increased more than that of males, thereby increasing the magnitude of the sex difference.

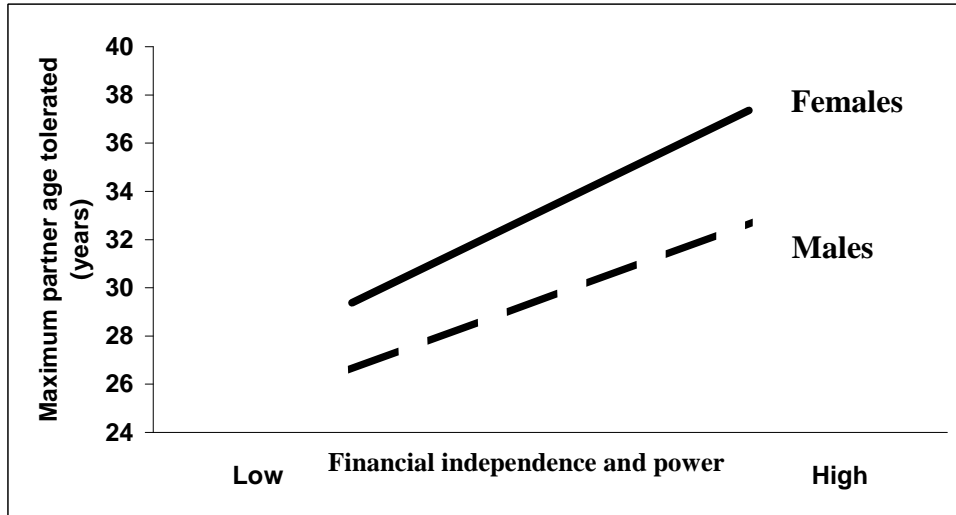


Figure 8.3 Interaction between sex and “financial independence and power” on maximum partner age tolerated.

c. Minimum partner age tolerated

The R^2 change associated with the interaction terms was 0.01. The F-change (45.08) was significant ($p < 0.001$). There was a significant effect of sex on the minimum partner age tolerated ($\beta = -3.1$, $p < 0.001$), demonstrating that the minimum partner age tolerated by females (mean = 22.62 years) was significantly greater than that of males (mean = 19.64 years).

The interaction term between sex and “financial independence and power” was significant ($\beta = -0.08$, $p < 0.001$). Figure 8.4 demonstrates that as “financial independence and power” increased, the minimum partner age tolerated by women increased more rapidly than that of men, thereby increasing the magnitude of the sex difference.

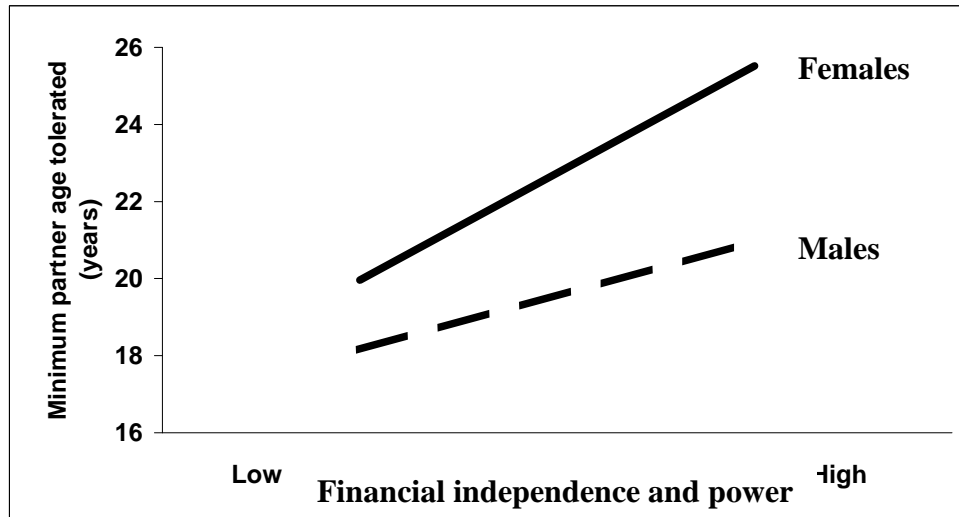


Figure 8.4 Interaction between sex and “financial independence and power” on minimum partner age tolerated.

The interaction term between sex and “ambition” was significant ($\beta = 0.03$, $p < 0.005$). Figure 8.5 demonstrates that as “ambition” increased, the minimum partner age tolerated by women decreased faster than that of men, thereby decreasing the magnitude of the sex difference.

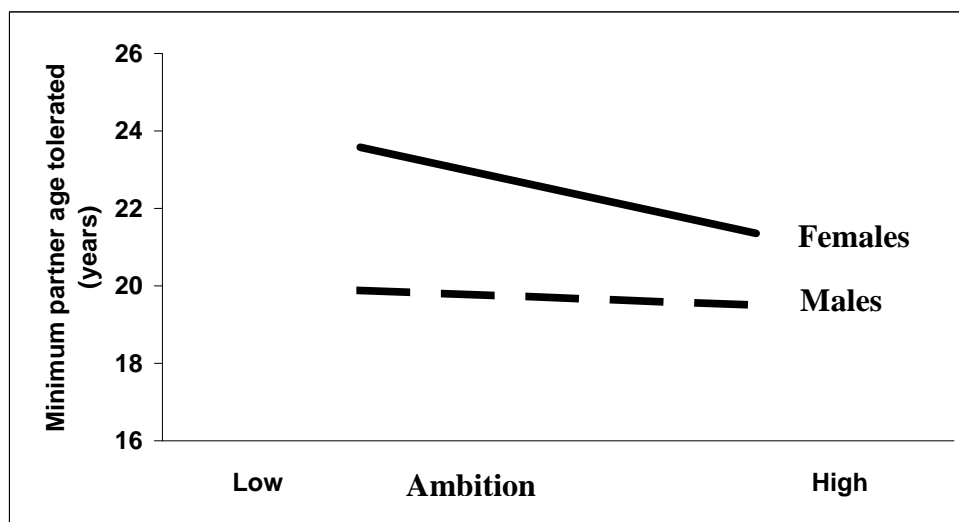


Figure 8.5 Interaction between sex and “ambition” on minimum partner age tolerated

d. Preference for “physical attractiveness” over “good financial prospects”

In a binary logistic regression (Nagelkerke $R^2 = 0.03$, $p < 0.001$), there was a significant effect of sex ($\beta = 0.52$, $p < 0.001$), such that a greater number of males than females preferred “physical attractiveness” over “good financial prospects”.

There was a significant interaction between sex and “financial independence and power”. Figure 8.6 demonstrates that as “financial independence and power” increased, the percentage of males who preferred “physical attractiveness” over “good financial prospects” remained the same, while the percentage of females increased, removing the sex difference.

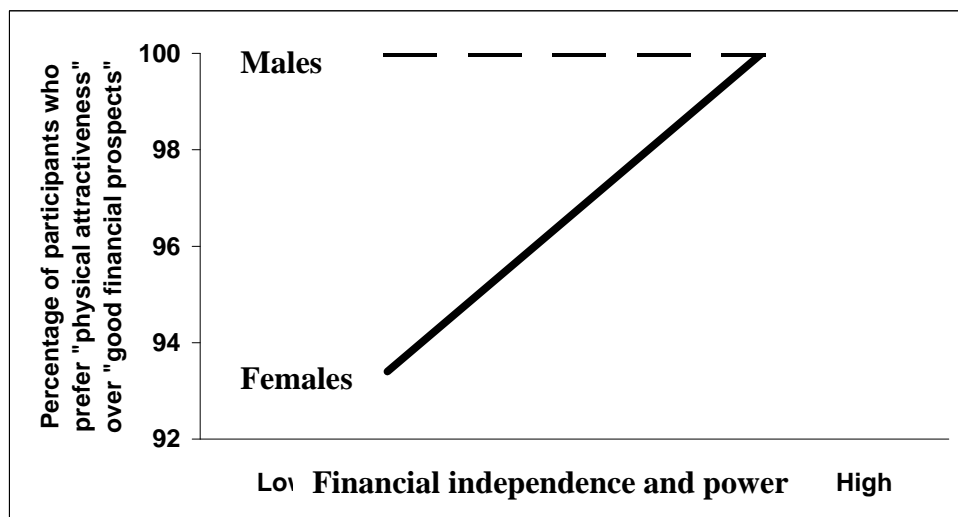


Figure 8.6 Interaction between sex and “financial independence and power” on the percentage of participants who prefer “physical attractiveness” over “good financial prospects”

8.4. Discussion

The effects of control of resources on the mate preferences of male and female participants were compared. There were significant sex differences in age

preferences and in preferences for “physical attractiveness” over “good financial prospects” concordant with those reported in previous studies (e.g. Buss, 1989a). In the current analysis, “financial independence and power” related to increased magnitudes of sex differences in age preferences, but completely removed the sex difference in preferences for “physical attractiveness” over “good financial prospects”. “Ambition” was found to result in decreased magnitudes of sex differences in ideal partner age and minimum partner age tolerated. Effects on the magnitudes of sex differences in age preferences were found to arise from equivalent effects of resource control on male and female preferences, with stronger effects for females. While male preferences for “physical attractiveness” over “good financial prospects” remained stable despite level of resource control, female preferences reached parity with that of males with high levels of “financial independence and power”. As the effects of both dimensions of resource control were greater for females than males on each mate preference, the results are perhaps suggestive of the sex-specific nature of historical economic constraints: the stronger response of female preferences to resource control may reflect the greater novelty of ability to control resources for women than men.

The biosocial model predicts that the effects of merging gender roles will influence mate preferences differently for men and women, such that preferences converge. In no instance did male and female preferences converge in this way. Rather, male and female age preferences were similarly influenced by resource control, resulting in both increased and decreased magnitudes of sex differences depending upon the measure of resource control employed. Neither did male and female preferences for “physical attractiveness” over “good financial prospects” converge through a merging of the preferences of both sexes, rather male preferences remained stable while those of females shifted. As such, despite some evidence for diminishing sex differences in preferences with female status, results are not entirely consistent with the biosocial model. The effects of status on male and female preferences for “physical attractiveness” over “good financial prospects” are more consistent with the evolutionary frameworks, which posit a female-specific shift in the trade off between “good genes” and

resources. That is, the underlying meaning of preferences for “physical attractiveness” differs for men and women. It may always be beneficial for men to seek partners with visible cues to fertility, regardless of their status, whereas the relative importance of “good genes” to resources to females may vary with status.

Similar effects of status on age preferences for males and females may arise from differing processes. The effects of “ambition” on female age preferences, for example, may arise from the predicted effect of resource control on female preferences, but for men, may reflect “condition dependence”: men who are ambitious anticipate being able to secure a younger partner (as they expect to possess the partner characteristics traditionally sought by women). While removing the sex difference in preferences for attractiveness over resources, “financial independence and power” led to increased sex differences in ideal partner age and maximum partner age tolerated. It seems unlikely that these results can be attributed to assortative mating: financially independent, powerful women are unlikely to prefer older partners with similar levels of status and power, as these same women ranked “physical attractiveness” over “good financial prospects”. Neither can the result be attributed to the older age of financially independent women, as age was controlled for in analyses. Perhaps it is of relevance here that the effects of both measures of resource control on all age preferences are in the same directions for men and women. While effects are always greater for females than males, these concordant effects on the preferences of both sexes suggest that there are general partner characteristics associated with age that become more attractive to both sexes with increasing resource control. For example, financially independent individuals of both sexes may be more mature with greater responsibilities, and desire older partners with similar attitudes and responsibilities. This would explain why financially independent and powerful members of both sexes prefer older partners, and why the effect is stronger for females given the stereotype that males mature more slowly than females.

To summarise, there was some evidence that the magnitudes of sex differences in partner preferences declined with increasing resource control, providing support for a role of sex-specific economic constraints on sex differences in preferences. The results, however, were complex and did not show consistent declines in the magnitudes of sex differences in mate preferences with increasing resource control, with sex differences in age preferences increasing with “financial independence and power”. It was hypothesised that concordant effects of resource control on age preferences for males and females may reflect an underlying general preference for both sexes relating to partner age. The effects of resource control were greater for females than males, as would be expected given the sex difference in economic constraints: male mate preferences have evolved/developed under greater variation in economic status than those of females. In general, the results were more consistent with an evolutionary framework than the biosocial model: there was some evidence that sex differences declined, but in no case was this due to a merging of male and female preferences. Rather, resource control had equivalent effects on the age preferences of men and women, although to a greater extent for women. While demonstrating that certain female preferences approach parity with that of males in general with increasing female status (albeit while controlling for variation in equivalent measures of male status), the results do not show how male preferences shift with increasing *female* status. This could potentially be achieved using longitudinal or cross-cultural methodologies. Furthermore, results from such studies may provide a more comprehensive measure of the extent to which gender roles remain distinct, thereby providing a more adequate test of the biosocial model.

Chapter 9. Apparent intelligence and femininity in female faces

9.1. Introduction

I have discussed evolutionary and social role origin theories of sex differences in mate preferences. I have demonstrated that the extent to which women can provision independently influences the expression of sex-differentiated preferences. I have also argued that control of resources represents one dimension of female status, a construct likely to relate to women's attitudes towards, and endorsement of, gender roles. The purpose of the current study was to explore the effects of gender role stereotypes on attractiveness in female faces, through investigation of relationships between visible cues to a characteristic consistent with the traditional male gender role (i.e. intelligence) and perceived femininity.

In social role theory, the sexes develop traits concordant with their gender role, through which stereotypes are perpetuated (Eagly, 1987). In most modern societies, the division of labour partitions men into "breadwinner", and women into "homemaker" gender roles (Eagly and Wood, 1999). Male and female stereotypes in our society are highly compatible with this social structure, with the "feminine" ideal characterised as submissive and nurturing and the "masculine" as dominant and aggressive (e.g. Kalof, 1993, 1999). It is possible, therefore, to predict that "intelligence" may be more closely associated with the masculine ideal (e.g. resource acquisition characteristics), and less compatible with the feminine ideal (e.g. submissive behaviour). Therefore, it may not be as socially desirable for a female to look "intelligent".

There is evidence that there are reliable cues to intelligence in the face based on IQ scores (see Zebrowitz et al., 2002 for a meta-analysis). A potential complication, however, is the well documented attractiveness "halo effect", whereby attractive individuals are attributed with socially desirable qualities such as intelligence (Zebrowitz et al., 2002). A number of studies have reported a

positive relationship between perceived intelligence and attractiveness of faces of both sexes (e.g. Eagly et al., 1991; Feingold, 1992b; Langlois et al., 2000; Zebrowitz et al., 2002). Evidence for a relationship between actual intelligence scores and attractiveness is varied, with some studies reporting a positive relationship (Zebrowitz et al., 2002) and others finding no relationship (Feingold, 1992b; Langlois et al., 2000). Thus, it cannot be assumed that attractiveness is an accurate facial cue to actual intelligence. In a meta-analysis, attractiveness has been found to mediate relationships between apparent and actual intelligence only in children's faces (Zebrowitz et al., 2002). Given the evidence for relationships between apparent intelligence and attractiveness, however, it is necessary to control for a halo effect when attempting to assess relationships between apparent intelligence and femininity in female faces.

The aims of the study were first to define cues to apparent intelligence independent of attractiveness in female faces, then to determine whether any residual cues to apparent intelligence relate to a sex typicality judgement – femininity. It was predicted that, if such cues exist, “apparent intelligence” will relate to decreased judgements of femininity. To test the prediction, I attempted to manipulate apparent intelligence in female faces while parametrically controlling for an attractiveness halo effect.

9.2. *Methodology*

9.2.1 *Stimuli creation*

Full face photographs of 194 female undergraduate students at the University of St Andrews were collected under standardised diffuse flash lighting conditions with a digital camera (resolution set at 1200 x 1000 pixels). Hair was pulled back from the face, expression was neutral and make-up and spectacles were removed. Images were normalised on interpupillary distance.

Eight males (age: range = 21 – 35, mean = 25.6) and 11 females (age range = 20-24, mean = 20.45) rated each face for apparent intelligence, attractiveness and femininity, and estimated the age (in years). Ratings were made on 1 – 7 scales (where 1 = very low and 7 = very high). To ensure judgements of apparent intelligence were based on the same construct across participants, a list of traits an intelligent individual may be expected to possess was provided at the start of the experiment (“traits associated with intelligence: knowledgeable, analytic and rational, adaptable, independent in opinion and solves problems”). All images were masked to disguise clothes and hair style. Inter – rater reliability was high for each characteristic (all Cronbach’s Alpha > 0.7). All faces were perceived as being within the age range 18 to 29.

In order to identify faces that differed in apparent intelligence, but were matched on attractiveness, femininity and perceived age, apparent intelligence ratings were entered as the dependent variable in a multiple linear regression model. Mean attractiveness and femininity ratings and perceived age were entered as the independent variables. Attractiveness was the only variable to significantly predict ratings of apparent intelligence (see Table 9.1).

	Attractiveness	Femininity	Perceived age
Female faces	0.69*	-0.02	0.05

Table 9.1 Results of multiple regression of attractiveness, femininity, and perceived age on apparent intelligence, showing regression coefficients (β) for effects of each on apparent intelligence

* $p < 0.001$

The standardised residuals of the regression model were used to identify two groups of ten faces: the ten faces whose apparent intelligence was lower than predicted by the model (i.e. the largest negative residuals) and the ten faces whose apparent intelligence was higher than predicted by the model (i.e. the

largest positive residuals). Analysis of variance revealed no significant differences between the groups of faces in perceived age, femininity, or attractiveness (all p s > 0.26). Apparent intelligence differed significantly between groups ($F_{(1, 19)} = 146.45$, $p < 0.001$).

One hundred and seventy-four pre-defined points were marked out on each face, providing a map of corresponding points between faces (e.g. one on the tip of the nose and one at the inner corner of each eye). Composite faces were generated by averaging the shape, colour, and texture of the faces in each group (see Benson and Perrett, 1993 and Tiddeman et al., 2001 for details). Thus, a pair of composite faces was created, constructed to differ in apparent intelligence but to be constant in attractiveness, femininity and age (figure 9.1).



Figure 9.1 Composite faces containing cues to high (left) and low (right) apparent intelligence, matched for attractiveness, femininity and age.

Nine base faces were created (three from each of three image sets), by averaging together five to six faces selected at random (perceived age range: 18-25). The high and low apparent intelligence composites provided the end points of a continuum along which each base face was transformed 50% towards the high

apparent intelligence face and then 50% towards the low apparent intelligence face (see Tiddeman et al., 2001 for details). This process applies 50% of the difference in shape, colour and texture between the high and low apparent intelligence composites to each base face, in each direction. Thus, nine pairs of faces were created, each consisting of two faces manipulated such that one version was higher, and one lower, in apparent intelligence while controlling for attractiveness, femininity and age.

9.2.2. *Experimental procedure*

a. Participants

One hundred and twelve female (mean age = 26.45 sd = 6.93) and 115 male (mean age = 26.94, sd = 6.1) participants were recruited via the Perception Lab website. All participants were heterosexual (sexual orientation ≥ 5) and aged between 16 and 40. Participants completed the online test on remote computers. Duplicate responses were detected using a random number allocated to each participant at the start of the test, and removed.

b. Procedure

Participants reported their age, gender and sexual orientation (1 to 7 scale where 1 = homosexual, 4 = bisexual, 7 = heterosexual). Each face from each pair was then displayed (masked) in random order with a Java applet. Participants were asked to rate each face for apparent intelligence on 1-7 scales displayed below the faces (where 1 = very low and 7 = very high). The procedure was then repeated for ratings of attractiveness and femininity.

9.3. *Results*

Mean apparent intelligence, attractiveness and femininity ratings were calculated for the nine faces transformed to look more intelligent, and then the nine faces

transformed to look less intelligent. No variable differed significantly from a normal distribution (Kolmogorov Smirnov, all p s > 0.05).

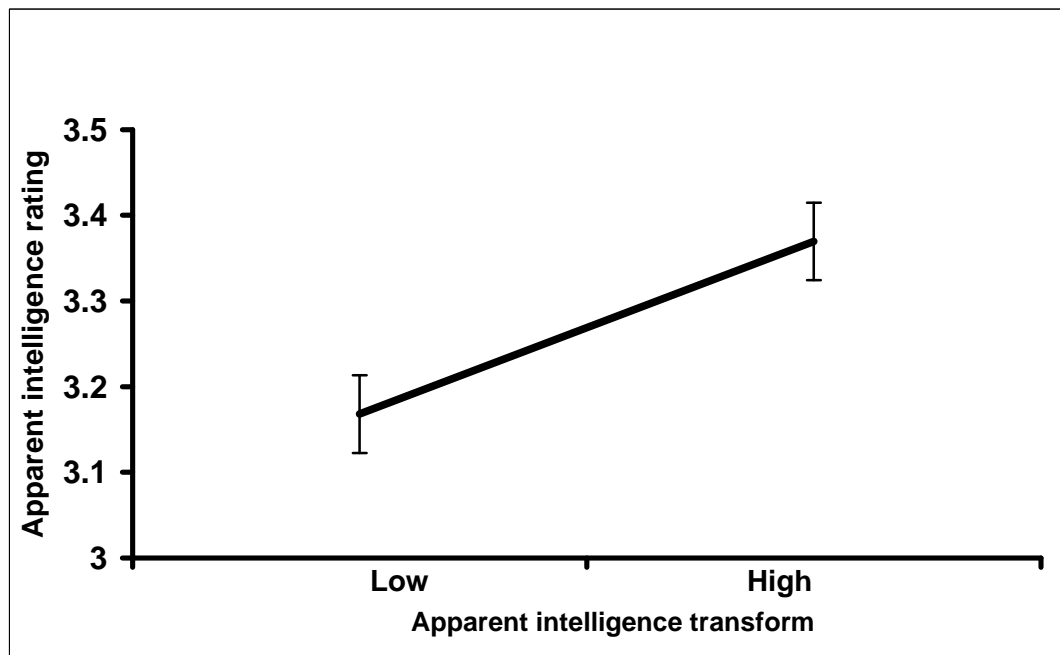
Was the attractiveness halo controlled for?

Analysis of variance for repeated measures (within subjects factor: intelligence manipulation – 2 levels; between subjects factor: gender of rater – 2 levels) with mean attractiveness ratings as the dependent variable, was used to test whether the transformed faces differed in attractiveness.

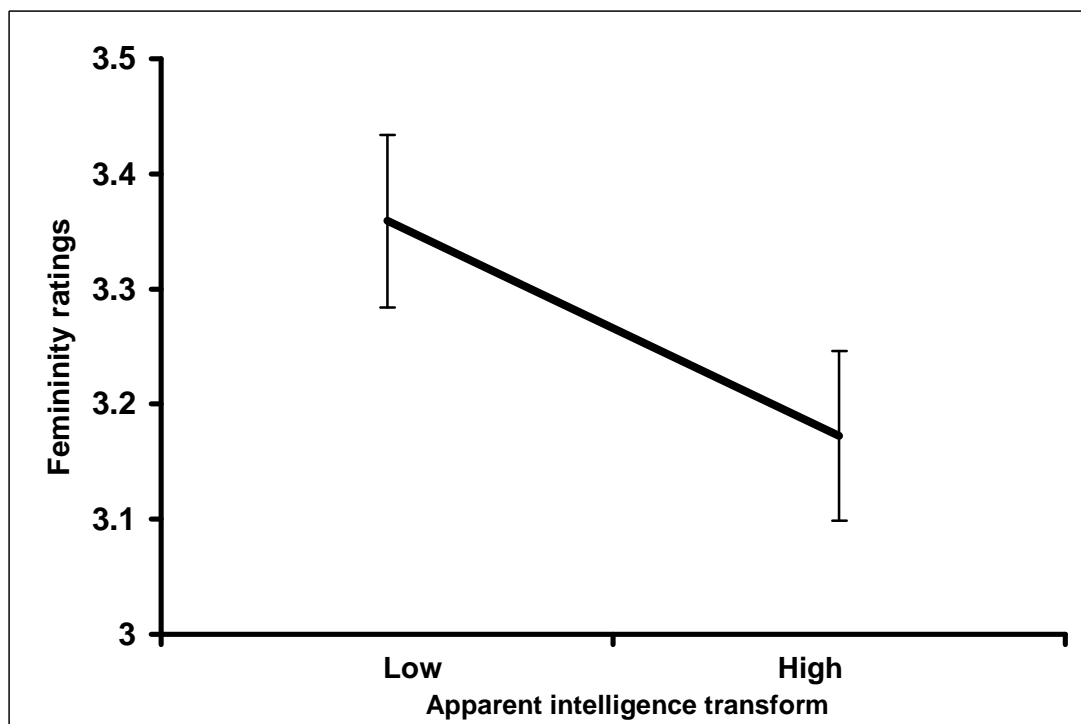
There was no effect of apparent intelligence transform on attractiveness ratings ($F_{(1, 188)} = 0.01$, $p = 0.91$), demonstrating that the attractiveness halo had been controlled for. There was no significant effect of gender of rater or interaction between gender of rater and intelligence transform on attractiveness ratings, indicating that the apparent intelligence transform did not influence the attractiveness ratings of male or female raters differently.

Does apparent intelligence remain in the face once attractiveness is controlled for?

Apparent intelligence ratings were entered as the dependent variable in the model. There was a significant main effect of intelligence transform ($F_{(1, 225)} = 40.8$, $p < 0.001$) on intelligence ratings, indicating that the transform had successfully manipulated apparent intelligence (see Figure 9.2a). There was no effect of gender of rater, and no significant interaction between gender of rater and intelligence transform, indicating that both sexes detected differences in faces transformed to look more or less intelligent.



a.



b.

Figure 9.2 Effect of apparent intelligence transform on (a) perceived intelligence of female faces ($F_{(1, 225)} = 40.8$, $p < 0.001$), and (b) femininity ratings ($F_{(1, 145)} = 26.16$, $p < 0.001$).

Does apparent intelligence influence femininity ratings of faces?

Femininity ratings were entered as the dependent variable in the model. There was a significant effect of apparent intelligence transform on femininity ratings ($F_{(1, 145)} = 26.16, p < 0.001$). That is, female faces manipulated to look more intelligent have lower perceived femininity (see Figure 9.2b). There were no significant effects of gender of rater, or interaction between gender of rater and intelligence transform on femininity rating.

9.4. Discussion

The results confirm that apparent intelligence was successfully manipulated in female faces once an attractiveness halo effect had been controlled for. Thus, apparent intelligence in female faces cannot be attributed simply to an attractiveness halo effect. It was found, however, that residual cues to apparent intelligence did not influence attractiveness judgements and was associated with decreased femininity ratings.

Once the attractiveness halo is controlled for, apparent intelligence may be associated with qualities inconsistent with the female gender role and the “feminine” stereotype. The implications of looking “intelligent” may differ between the sexes due to the traditional division of labour and segregation of the sexes. Social role theory posits that individuals acquire skills and behaviours that facilitate accommodation of a gender role (Eagly, 1987). Characteristics such as motherliness, youthfulness or submissiveness may be considered more important in females, whereas “intelligence” may be associated with masculine qualities, such as competitiveness and ambition. The results suggest that some cues that contribute to apparent intelligence in female faces are perceived as “masculine”, perhaps providing support for the importance of gender roles and stereotypes in the characteristics considered desirable in males and females.

In conclusion, the results demonstrated that apparent intelligence is not considered a feminine trait in female faces once an attractiveness halo effect is

controlled for. As femininity is strongly positively associated with attractiveness in female faces (e.g. Perrett et al., 1998), this implicates an effect of the social structure on the desirability of apparent intelligence in female faces. Further research could assess the effect of male endorsement of traditional gender roles on ratings of attractiveness of female faces manipulated on apparent intelligence.

Chapter 10. Effects of female reproductive strategy on preferences for masculinity in male faces

10.1. Introduction

I have presented evidence that female mate preferences vary with level of female resource control. I have argued that this has implications for the role of economic constraints on women in sex differences in mate preferences, and for the ability of individuals to adjust their partner preferences in response to social constraints. The purpose of the current study was to investigate the effect of a further social change on the trade offs made in female mate preferences: changes in planned reproductive strategy. By so doing, I attempted to further investigate the social cues to which individuals adjust their partner preferences, and to explore the relationships between women's reproductive strategy and partner preferences.

Over the last 150 years, there has been a trend towards decreased fertility and mortality in many societies, including the UK (i.e. the demographic transition). Regardless of the cause of the fertility decline, women are choosing to have fewer children in our society now than historically. While this trend corresponds with increasing female participation in the workforce, I found that desired number of children did not mediate or moderate relationships between female resource control and mate preferences (Chapter 7). Therefore, the purpose of the current study was not to further investigate relationships between resource control and behaviour, but rather to investigate the effect of this further social change (decreasing fertility) on female mate preferences.

The energetic costs of raising human offspring are high (Kaplan and Lancaster, 2003). Humans are typically bi-parental (Trivers, 1985) as males benefit from providing paternal investment that increases offspring success (Dunbar, 1995). As discussed in Chapter 1, paternal investment may involve direct provision of resources/care and contribution of heritable qualities (Trivers, 1972) and males may be likely to provide one or the other (Waynforth, 1999). Thus, females may

be forced to trade off the relative importance of obtaining indirect heritable benefits and paternal care for offspring (e.g. Gangestad and Simpson, 2000). Female preferences for sexually dimorphic male facial characteristics may inform as to the outcome of this trade off as masculine and feminine male face shapes are associated with divergent costs and benefits. Masculine faces may signal heritable benefits such as immunocompetence at the cost of decreased provisioning of parental care, whereas feminine faces may signal greater paternal investment at the cost of lower immunocompetence (e.g. Perrett et al., 1998). Therefore, variation in female preferences for sexually dimorphic male facial characteristics may arise from individual differences in the trade offs made in the relative importance of securing a partner with “good genes” versus favourable personality characteristics (DeBruine et al., in press). Female planned reproductive strategy may be an important predictor of female preferences for sexual dimorphism in male faces. It was predicted that ideal number of children (a measure of reproductive strategy used by Buss et al., 2000) would be negatively related to preferences for masculinisation of male face shapes, as the relative importance of paternal care over indirect heritable benefits is expected to increase with the costs of raising larger numbers of children. That is, women who desire high numbers of children will trade off the importance of “good genes” in a partner for cues to willingness and ability to invest parental care.

Male reproductive strategy relates to preferences for age in a partner. Men who desire greater numbers of children prefer younger partners (Buss et al., 2000). This result was argued to reflect context-specific male mate preferences in response to pursuit of “quantity” versus “quality” reproductive strategies (Buss et al., 2000). A “quantity” strategy involves low levels of parental investment in a large number of children, whereas high levels of investment in a smaller number of children comprises a “quality” strategy (Pianka, 1970). As such, men pursuing a “quantity” strategy were assumed to possess a psychological mechanism that enabled success at this strategy, thereby preferring younger partners with the reproductive capacity to produce high numbers of offspring. This result, however, may be expected to arise only amongst men pursuing a

“quantity” strategy with a single partner: it is only if a male desires more than one child with a single partner that her reproductive capacity becomes a limiting factor. While it would benefit a man who seeks to father offspring with multiple women to find fertile and fecund partners, her future reproductive potential is irrelevant. A correlation between ideal number of children and partner age would only hold if a male desired to continue having children with the same partner. Having high numbers of children with a single partner, however, is unlikely to allow for decreased investment by the male. While some studies have shown that larger numbers of offspring are associated with lower offspring survival rates (e.g. Hill and Kaplan 1999), survival of Kipsigis and Ache children to age five years is positively related to number of siblings (Borgerhoff Mulder 1998). Additionally, the high costs of raising human offspring imply that larger numbers of children may not be associated with lower investment overall. As there may not be a clear trade off between number of offspring and parental investment for males who choose to reproduce with a single partner, it is not possible to conclude that male partner age preferences arise from pursuit of “quantity “ versus “quality” reproductive strategies. Male adjustment of partner age preferences in response to ideal number of children may be more consistent with an HBE interpretation of flexibility in preferences, which argues for optimisation of preferences in response to current demands, than an EP perspective that there are set alternative strategies.

To summarise, I predicted that women’s ideal number of children would be associated with decreased preferences for masculinised male face shapes. In Study 1, I tested the prediction in a sample of undergraduate students. In Study 2, I obtained a broader sample via online tests and related explicit preferences for partner characteristics to face preferences and ideal number of children. Both studies controlled for a known positive relationship between female condition (self-rated attractiveness) and preferences for masculine male face shapes (i.e. condition dependence: Little et. al. 2001), and for the potential effects of own age on ideal number of children and mate preferences.

10.2. Study 1

10.2.1 Methodology

a. Participants

Eighty-eight heterosexual female undergraduate students (age: mean = 19.91 years, sd = 1.34) were recruited from the University of St Andrews.

b. Stimuli

Preference for masculinity in male faces was assessed with 6 interactive male face sequence trials (4 Caucasian, 1 African-Caribbean, and 1 East-Asian). Participants manipulated each face along a masculinity/femininity face shape continuum by moving the mouse over the image (from 50% feminised to 50% masculinised). The interactive sequences have been used in previous studies (Perrett et al. 1998; Penton-Voak et al. 1999). For example end-points of a trial, see Figure 10.1.



a.

b.

Figure 10.1. Study 1. (a) 50% masculinised and (b) 50% feminised male face shapes

c. Procedure

Participants reported age, sexual orientation (1 to 7 scale: 1 = completely homosexual, 4 = bisexual, 7 = completely heterosexual), self-rated attractiveness (1 to 7 scale: 1 = not at all attractive, 7 = extremely attractive) and ideal number of children.

Participants completed the questionnaire and then the face preference test. The 6 face sequence trials were displayed in random order. Participants were asked to indicate when they had made the face most attractive from the range available, by clicking the mouse. Masculinity preference was calculated as the mean preference across 6 trials.

10.2.2. Results

Preferences for masculinity in male faces ranged from preferences for feminised to preferences for masculinised faces (range -33.5% to +37.5%, mean = 1.5% , sd = 17.5%). Ideal number of children ranged from 0 to 6 (mean = 2.74, sd = 1.29). All variables generated coefficients within the specified parameters of normality (i.e. skewness coefficients $< \pm 1$ or kurtosis coefficients $< \pm 3$: West et al. 1995).

Relationships between all variables were explored with Pearson's Product Moment correlations (Table 10.1). There was a marginally significant relationship to suggest that women who desire a greater number of children prefer feminised male face shapes ($r = -0.20$, $p = 0.07$). There was a significant positive correlation between age and ideal number of children ($r = 0.30$, $p < 0.01$), demonstrating that older women desired a greater number of children. There was no effect of self-rated attractiveness on masculinity preference ($p > 0.1$).

	Preference for masculinity in male faces	Ideal number of children	Self-rated attractiveness
Age	-0.08	0.30**	-0.11
Self-rated attractiveness	0.16	0.09	
Ideal number of children	-0.20*		

Table 10.1 Study 1. Pearson's product moment correlations between female preferences for masculinity in male faces, ideal number of children, own age and self-rated attractiveness (n = 88).

* $p < 0.07$

** $p < 0.01$

As bivariate analysis hides covariance, I tested the prediction using multiple linear regression models. Ideal number of children, age, and self-rated attractiveness were independent variables, and masculinity preference the dependent variable. The model was marginally significant ($\text{Adj } R^2 = 0.04$, $F_{(3, 84)} = 2.23$, $p = 0.09$). Ideal number of children predicted variance in preferences for masculinity in male faces ($\beta = -0.23$, $p = 0.05$). Women who desired a greater number of children preferred more feminine male face shapes. There was a marginally significant relationship between self-rated attractiveness and masculinity preference ($\beta = 0.19$, $p = 0.08$), such that women who considered themselves attractive had greater preferences for masculine faces than did women who considered themselves less attractive. Own age did not significantly predict masculinity preference ($p > 0.9$).

10.2.3. Discussion

Reproductive strategy predicted preferences for masculinity in male faces. Women who desired greater numbers of children preferred more feminine male face shapes - a preference for a potential cue to willingness and ability to invest in offspring over cues to heritable immunocompetence. The stimuli used in this

study have been calibrated in previous studies, such that the feminised male faces are associated with warmth and the likelihood of making a good parent, and the masculinised faces are perceived as being more likely to be cold and dishonest (Perrett et al. 1998).

Study 1 had a number of limitations. Ideal number of children, and preferences for masculine face shapes, may be influenced by the relationship status of participants which was not controlled for here. Women in a stable relationship may be more likely to be considering having children than single women. Additionally, partner characteristics associated with paternal care may be of less importance to single women who are looking to start a new relationship, the time span of which (and the prospects for having children) are not yet known. A further limitation is the narrow age profile of the sample - women in their late teens/early twenties may not yet be seriously considering how many children they desire, or considering partners with the prospect of having children. To ensure that the relationship between ideal number of children and masculinity preference was not a spurious effect for a young age group, or driven by overrepresentation of single or attached females, I tested the prediction in a sample of women with a wider age profile and controlled for marital status in Study 2. I also assessed whether preferences for masculinity in male faces reflect preferences for the partner characteristics assumed by assessing explicit preferences for partner characteristics.

10.3.Study 2

10.3.1. Methodology

a. Participants

Two hundred and twenty-four heterosexual females (age: mean = 24.35 years, sd = 5.01) were recruited to an online experiment. All participants were residents of the UK and Caucasian. Participants completed the online test on remote computers. Duplicate responses were detected using a random subject code

allocated to participants at the start of the test and removed.

b. Stimuli

The creation of pairs of male faces differing in masculinity at each five-year age bracket from 20 to 50 is described in Appendix 1.

c. Questionnaire

Participants reported age, country of residence, ethnicity, marital status (single, casual relationship, serious relationship – living apart, serious relationship – living together, married), sexual orientation and ideal number of children.

Participants were then asked to rank 13 partner characteristics in order of importance in a potential partner for a long-term relationship. Such a partner was defined as “someone you would be willing to commit to in a serious relationship and would consider marrying, or entering a relationship with on grounds similar to marriage”. The 13 characteristics were those described in Chapter 4 and included resource acquisition characteristics, personality and the target characteristics: putative cues to heritable immunocompetence (physical attractiveness and good health) and willingness and ability to invest paternal care (fondness of children, willingness to commit to relationship, and good parenting abilities). Composite scores of preference rankings for cues to immunocompetence and investment of paternal care were computed as the mean rank of each set.

d. Procedure

The questionnaire and ranking of partner characteristics were followed by the face preference test. Face pairs were presented in a forced-choice paradigm. Participants indicated which face they preferred and the strength of their preference from face pairs on a 0-7 scale displayed below the images (0 = strongly prefer left, 1 = prefer left, 2 = slightly prefer left, 3 = guess left, 4 = guess right, 5 = slightly prefer right, 6 = prefer right, 7 = strongly prefer right). Both the order in which pairs were displayed, and the side on which each face

was displayed were fully randomised. Masculinity preference was calculated as the mean preference for the seven pairs. A preference of less than 3.5 indicates a preference for feminine male faces, a preference of greater than 3.5 indicates a preference for masculine male faces, and a preference of 3.5 indicates no preference.

10.3.2. *Results*

Masculinity preferences ranged from preferences for feminine male faces to preferences for masculine faces (range 1.43 – 5.14, mean = 3.4, sd = 0.75). Ideal number of children ranged from 0 to 9 (mean = 2.22, sd = 1.18). Marital status was collapsed into a dummy variable (single or casual relationship = 0, serious relationship or married = 1). All variables generated coefficients within the specified parameters of normality.

Non-parametric (Spearman's) correlational analysis was used to explore relationships due to use of ranked data (see Table 10.2). There was a significant negative correlation between ideal number of children and facial masculinity preference ($r = -0.18$, $p < 0.005$), and a positive correlation between ideal number of children and preference ranking for cues to investment of paternal care ($r = 0.23$, $p < 0.005$). Females who desire greater numbers of children consider cues to willingness and ability to invest in offspring more important, both in faces and in explicit partner characteristics. There was also a significant positive correlation between age and self-rated attractiveness ($r = 0.23$, $p < 0.005$), which suggests that older women perceived themselves as more attractive than younger women. There were no significant correlations between explicit mate preferences and face preferences.

	Preference ranking for cues to heritable immunocompetence	Preference ranking for willingness and ability to invest paternal care	Preference for masculinity in male faces	Ideal number of children	Self-rated attractiveness
Age	0.1	0.06	0.001	-0.04	0.23**
Self-rated attractiveness	0.09	0.05	0.01	-0.01	
Ideal number of children	-0.09	0.23*	-0.18*		
Preference for masculinity in male faces	0.04	-0.06			

Table 10.2 Study 2. Spearman's correlations between mean preference rankings for cues to heritable immunocompetence and willingness and ability to invest paternal care, preferences for masculinity in male faces, ideal number of children, age, and self-rated attractiveness (n = 224).

* $p < 0.005$

** $p < 0.001$

The effects of ideal number of children, own age, relationship status and self-rated attractiveness on mate preferences were tested using regression models.

Masculinity preference was entered as the dependent variable in a multiple linear regression model. Ideal number of children, self-rated attractiveness, marital status and own age were independent variables. The model itself was non-significant ($\text{Adj } R^2 = 0.011$, $F_{(4, 174)} = 1.48$, $p = 0.2$). Within the model, however, ideal number of children significantly predicted variance in preferences for masculinity in male faces ($\beta = -0.18$, $p = 0.02$). That is, higher ideal numbers of children are associated with decreased preferences for masculine shaped male faces. There were no significant effects of covariates on masculinity preferences.

Due to the non-independent nature of ranked data, binary logistic regression was used to assess preferences for explicit cues to immunocompetence over paternal investment. For this model, the composite score for cues to immunocompetence was subtracted from the composite score for cues to paternal care and recoded as

“0” (preference for immunocompetence over paternal care) and “1” (preference for paternal care over immunocompetence). This binary variable was entered as the dependent variable, and all independent variables were the same as those described above. The model was significant (Nagelkerke $R^2 = 0.10$, $p < 0.01$). Ideal number of children significantly predicted variance in preferences for cues to paternal investment over cues to immunocompetence ($\beta = 0.52$, $\text{Exp}(\beta) = 1.68$, $p < 0.005$). That is, women who desire greater numbers of children have an increased preference for cues to investment of paternal care over cues to immunocompetence.

10.3.3. *Discussion*

Women who desired a greater number of children preferred more feminine male face shapes and had stronger preferences for partner characteristics associated with paternal care over cues to immunocompetence. Therefore, the results suggest that the positive relationship between preferences for feminine male face shapes and ideal number of children may reflect the greater importance placed on cues to parental care (i.e. feminine face shapes) than cues to immunocompetence (i.e. masculine face shapes). The results were evident once covariates (e.g. relationship status) were controlled for, demonstrating that relations between reproductive strategy and face preferences are not driven by current relationship status.

10.4. *General Discussion*

The aim of the studies was to determine whether female reproductive strategy influenced preferences for masculinity in male faces. I predicted that women who desire larger numbers of children would prefer cues to direct investment of parental care to cues of indirect heritable qualities (manifested as a preference for feminine face shapes) due to the increased costs of raising larger numbers of offspring. The prediction was supported by the results of both studies: there were negative relationships between ideal number of children and preferences for

masculine male face shapes. The results were interpreted as increased female preferences for cues to willingness and ability to invest parental care. This interpretation is supported by a positive relationship between ideal number of children and preference rankings for cues to paternal care over cues to immunocompetence in Study 2.

The results seem intuitive: the importance of paternal care shifts in response to requirements for raising offspring. Women who desire a large number of children would suffer greater costs of the reduced paternal care associated with masculine male faces than women who desire fewer children. Similarly, women who desire fewer offspring suffer lower costs of reduced paternal care and can afford to reap the benefits of a partner who can provide indirect benefits such as immunocompetence. Planned reproductive strategy may contribute to individual- and group-level differences in preferences for sexually dimorphic male facial characteristics.

Feminine male face shapes are associated with the likelihood of providing paternal care (Perrett et al., 1998). Despite concordant effects of reproductive strategy on preferences for facial cues to, and explicit partner characteristics associated with, paternal investment, I found no significant relationships between face preferences and preferences for explicit partner characteristics. It is possible that the partner characteristics included in the study were not specific enough to elicit relationships between face preferences and preferences for stated characteristics. Alternatively, sexual dimorphism in male faces may signal multiple cues (e.g. personality, immunocompetence, dominance and investment) that may obscure or complicate relationships.

The relationship between ideal number of children and preferences for masculinity in male face shape remained across two sets of male face stimuli, two participant age profiles (student age and 18 to 35 years), and after relationship status was controlled for. That is, when women desire a high number of children, the relative importance of securing a partner who is willing

and able to provide parental care outweighs that of securing a partner who can contribute “good genes”. As women in post-industrial societies are having fewer children than in the past, the results have implications for the effects of large-scale social change on female preferences. While demonstrating further flexibility in female mate preferences, the results are consistent with both an EP explanation of variation in mate preferences, in which preferences are seen as “context-specific” (i.e. planned reproductive strategy may be a “context”), and an HBE approach which argues that individuals are able to optimise the outcome of complex trade offs in response to the demands of the current environment.

Chapter 11. General Discussion

11.1. Summary of key findings

The principal aim of the thesis was to investigate the effects of a comprehensive measure of female status on sex differentiated mate preferences in order to explore the validity of three origin theories of sex differences in mate preferences. In Chapter 2, previous measures of female status were evaluated, and a new, multidimensional construct was developed that was not limited to measures of female “income”.

In Chapter 3, female “financial independence and power” was associated with increased preferences for “physical attractiveness” relative to those for “good financial prospects” in a long-term partner. “Ambitious” women were less willing to tolerate older partners. “Financial independence and power”, however, was also associated with a higher minimum partner age tolerated. With the exception of the latter finding, results were consistent with a shift in female preferences towards those more typical of males. I have suggested that the effect of “financial independence and power” on minimum partner age tolerated may reflect an unwillingness of financially independent women to support a younger partner, or, alternatively, assortment for personality characteristics associated with obtaining independence and power. As such, results were largely consistent with the hypothesis that economic constraints on women contribute to sex differences in preferences for age, physical attractiveness, and resources in a partner.

In Chapter 4, I attempted to replicate the findings of Chapter 3 in a sample of women from a wider socio-economic status profile. Due to the difficulties of collecting data, however, the sample size was too small, and the age profile too wide to enable comparison of results, and resource control was not found to relate to mate preferences.

In Chapter 5, I tested predictions in a sample of non-industrial societies (i.e. a sub-sample of the odd-numbered Standard Cross Cultural Sample). Using Whyte's (1978) codes of female status, I found that women in societies with high female domestic authority had stronger preferences for physical appearance relative to male status than in those with lower female domestic authority. In societies with high levels of ritualised female solidarity, however, preferences for male appearance relative to status were lower. Results implicate complexity in the effects of female status on mate preferences. Concordant effects of a measure of female status associated with power on mate preferences with previous findings, however, implicates the applicability of effects of female status on preferences to the human community beyond undergraduate populations.

In Chapter 6, I attempted to experimentally manipulate female perceptions of their status in society, and to investigate the effects of this on mate preferences. The most successful manipulation involved causing women to think about the costs and benefits experienced by women as a result of their gender. The manipulation influenced ideal partner age and minimum partner age tolerated in the ways predicted, and in accordance with the effects of "ambition" on age preferences reported in Chapter 3: women who thought about the benefits of being female preferred younger partners than women who thought about the costs. Concordant effects of an experimental manipulation and individual differences in resource control on age preferences add support to the argument for a contribution of economic constraints on women to sex differences in preferences. That is, results of the manipulation allowed the causal direction of relationships in Chapters 3 and 5 to be established with greater confidence.

In Chapter 7, I investigated potential mediators and moderators of relationships between resource control and mate preferences. I found own age to be an important moderator of relationships: the predicted effects of resource control on preferences may be more likely to be seen in "older" women, who have had the time to accumulate resources and control. Levels of circulating testosterone mediated relationships between financial independence and preferences for

physical attractiveness in a partner. More generally, the use of covariates throughout the thesis ensured that relationships between resource control and mate preferences did not arise from a number of other variables.

In Chapter 8, I investigated the effects of resource control on the magnitudes of sex differences in mate preferences. The results were complex. In some cases, the magnitudes of sex differences decreased with increasing resource control (i.e. sex differences in ideal partner age and minimum partner age tolerated decreased with increasing “ambition”, and sex difference in preferences for “physical attractiveness” over “good financial prospects” disappeared with “financial independence and power”). In other cases, however, the magnitudes of sex differences increased (i.e. with “financial independence and power”, magnitudes of sex differences in age preferences increased). In the majority of cases, the effects of resource control on mate preferences were comparable for men and women.

In Chapter 9, I explored relationships between attributions of apparent intelligence to female faces and perceived femininity. I predicted that apparent intelligence would not be considered “feminine” in female faces, as it is a characteristic traditionally more consistent with the male gender role. Results supported the prediction.

In Chapter 10, I investigated the effects of another individual difference on the female mate preference trade off between “good genes” and material resources in a partner: planned reproductive strategy. Women who desired a greater number of children had weaker preferences for masculine male face shapes, and ranked characteristics associated with parenting more highly in a potential partner. The results provide support for the ability of women to shift the outcome of the genes/resources trade off optimally in response to individual differences in reproductive strategy.

11.2. *Female status and resource control*

The first objective of the thesis was to address the discrepancies in reported effects of alternative measures of female status on mate preferences. I argued that, while female status is a complicated multi-dimensional construct, the ability to control the resources necessary for survival is central to autonomy. As such, female control of resources provided the primary measure of female status throughout the thesis. In accordance with previous attempts to assess female status, my measures of resource control did not group together as a single factor (e.g. Whyte 1978, 1979). In Chapter 3, resource control variables were found to group together into factors representing “financial independence and power” and “ambition”. This grouping of measures remained in a sub-sample of the dataset (Study 1 of Chapter 7), and also in a sample of male participants of equivalent age (Chapter 8). In other samples, however, resource control variables did not group into comparable factors (e.g. Study 2 of Chapter 7, Chapter 4). This may be due to differences in the age profiles of samples.

The effects of resource control on mate preferences were largely concordant with the effects of Whyte’s (1978) codes of female status on mate preferences in non-industrial societies (Chapter 5), as well as with relationships reported in previous studies between mate preferences and: cross-cultural measures of female empowerment (Eagly and Wood, 1999), individual level measures of endorsement of traditional gender roles (Johanessen-Schmidt and Eagly, 2001), and feminist attitudes (Koyama et al., 2004). Thus, resource control appears to be a representative measure of female status. The effects of resource control on mate preferences differed considerably from those of income, thereby supporting the argument that income does not tap autonomy, and is an inadequate measure of female status. On inspection, relationships between resource control measures and socio-economic status revealed that control over resources is largely unrelated to the amount of resources to which an individual has access: it appears that it is the actual control over resources that enables women to shift their mate preferences away from those typically considered “female”. The

results also imply complexity in the construct “control of resources” as measured here, and the meanings and implications of its different dimensions across age groups.

11.3. *Mediators and moderators*

In Chapter 7, I investigated the potential mediating and moderating effects of psychological, attitudinal, and hormonal variables on relationships between resource control and mate preferences. By so doing, I attempted both to further understand the complex relationships between resource control and mate preferences and to explore the ways in which the proximate mechanisms proposed by the biosocial model by which gender roles are translated to sex-specific behaviour related to relationships between resource control and mate preferences. The results demonstrated own age to be an important moderator of relationships between resource control and age preferences. Predictions of perspectives that attribute sex differences to constraints on women may be more strongly upheld in older than younger women. This may arise from perceptions of the maturity of younger partners by young women, or from shifts in ambition and resource control over the life span.

Levels of circulating testosterone were found to mediate the relationship between financial independence and preferences for “physical attractiveness” over “good financial prospects”. This provides support for the biosocial model’s proposal that the translation of gender roles to sex-typical tasks is mediated by hormonal changes (Wood and Eagly, 2002): financially independent women may have to perform tasks associated with the male role, and have higher levels of the hormone proposed to mediate translation of the male gender role to male-typical tasks. This suggests that women are not only able to adjust their behaviour in accordance to their changing role in society, but also that there may be biological underpinnings or changes associated with the shifting female role.

11.4. *Methodological issues*

I addressed a number of methodological issues associated with mate preference research. The vast majority of mate preference studies have been limited by their use of populations of undergraduate students. I accessed participants from wider age and socio-economic profiles by setting up a website with links on a variety of other sites and media (Chapter 3) and by using a mail-shot survey (Chapter 4). To address criticisms of reliance on self-report data, I tested predictions in a sample of ethnographic data (Chapter 5). I also assessed whether “preferences” related to the characteristics women said were important in their current partner (i.e. actual mate choice; Chapter 4). Finally, I attempted to address the issue of attributing preferences for “physical attractiveness” to preferences for “good genes” by assessing female preferences for sexually dimorphic male facial characteristics (Chapters 3 and 10), and investigating relationships between preference rankings for partner characteristics. Effects of female status on self-reported mate preferences were concordant with those on ethnographic measures of mate preferences. Inter-relationships between preference rankings of partner characteristics and self-reported characteristics that attracted participants to their most recent partner suggest that there is validity to using preference rankings and self-reported age preferences. In Chapter 10, ranking of partner characteristics supported the results of preferences for sexually dimorphic male faces.

11.5. *Implications of results for origin theories*

To recap, EP’s sexual strategies theory places sex differences in mate preferences in the context of sex-specific constraints faced in the EEA, resulting in psychological mechanisms that predispose women to preferences for a mate with resources, and men to preferences for a fertile mate with a long residual reproductive lifespan. Intra-sexual variation in mate preferences is believed to result from alternative outputs of these mechanisms under differing “contexts”: partner characteristics are traded off differently depending upon the context. HBE places greater emphasis on intra-sexual variation through adaptive trade

offs, arguing that individuals are able to exhibit optimal behaviour under varying conditions through general-purpose decision rules. According to the biosocial model, men and women are allocated to different gender roles as a result of interactions between biological sex differences and prevailing social conditions. Hormonal changes associated with gender-typical tasks are believed to mediate relationships between gender roles and behaviour.

Predicted effects of female status on sex-differentiated mate preferences can be derived from each of the origin theories: with increasing female status, female preferences are expected to become more like those typical of males. In the EP model, these effects are argued to reflect shifts in the output of the trade off between a partners' resources and his genetic quality, such that women will exhibit more "male typical" preferences (i.e. prefer cues to heritable quality over resources), through the context-specific outputs of psychological mechanisms. From the HBE perspective, the optimal solution to the trade off will be determined by domain-general decision rules. In the biosocial model, shifts in preferences are seen as responses to merging gender roles and associated behaviours. Additionally, the biosocial model attributes preferences for physical attractiveness to an underlying preference for the favourable personality characteristics associated with the female gender role, rather than preferences for "good genes".

Despite their complexity, the data presented in the thesis implicate a contribution of economic constraints on women to sex differences in mate preferences. When women had higher status, preferences were more like those typically associated with males. These effects were evident in samples from a post-industrial society, and across non-industrial societies. In the cases where female status led to more "female-typical" preferences, it is possible to argue that the relationships arose from use of measures of female status too closely related to socio-economic status, or from the unwillingness of high status women to support a younger partner.

I attempted to determine whether the effects of female status on mate preferences were consistent with shifts in the outcome of the mate preference trade off in the importance placed on cues to “good genes” versus material resources (i.e. EP and HBE), or with the merging of gender roles and the associated characteristics considered desirable in the opposite sex (i.e. biosocial model). In Chapter 3, I investigated the effects of female control of resources on preferences for masculine versus feminine male faces. If resource control were associated with an increased preference for masculine male faces, it could be concluded that changes in preferences reflected an increased preference for cues to “good genes” (thereby providing support for an evolutionary perspective). If resource control were associated with an increased preference for feminine male faces, it could be concluded that changes in preferences reflected a merging of gender roles and associated increased female preferences for favourable personality characteristics (thereby providing support for the biosocial model). As there were no effects of resource control on preferences for male facial masculinity, face preferences did not inform as to the validity of the origin theories. Intercorrelations between female preference rankings for “physical attractiveness”, favourable personality characteristics, and cues to heritable quality (such as “good health”) in two samples (Chapters 3 and 4), however, provide some insight into the validity of the origin theories. In Chapter 3, preference rankings for “physical attractiveness” were positively related to preference rankings for putative cues to both “good genes” (i.e. “good health” and “good sense of humour”) and favourable personality characteristics associated with the female gender role (i.e. “good communication skills” and “kindness”). In Chapter 4, preference rankings for “physical attractiveness” were positively related to those for “good health”. While results are not strictly consistent with either model, the relationships are more supportive of an evolutionary perspective than of the biosocial model.

In Chapter 8, I investigated the effect of resource control on the magnitudes of sex differences in mate preferences. The biosocial model predicts that magnitudes of sex differences in mate preferences will decrease with increasing female status through convergence of male and female preferences. In the

evolutionary models, shifts in female preferences towards those more typical of males are not considered to reflect male and female preferences for the same characteristics, therefore such convergent preferences are not predicted. Results demonstrated that “financial independence and power” related to increased magnitudes of sex differences in age preferences, but completely removed the sex difference in preferences for “physical attractiveness” over “good financial prospects”. “Ambition” was found to result in decreased magnitudes of sex differences in ideal partner age and minimum partner age tolerated. Effects on the magnitudes of sex differences in age preferences were found to arise from equivalent effects of resource control on male and female preferences, with stronger effects for females. As such, the predicted effects of the biosocial model were not upheld: preferences did not shift towards sex-general means. As such, the results were more consistent with an evolutionary framework as they suggested sex-specific trade offs in mate preferences. I argued that in order to more adequately test the predictions of the biosocial model, however, it may be necessary to assess the distinction between male and female gender roles as well as the resource control dimension of female status, and to investigate how male preferences shift with increasing female status.

While it is not possible to provide a thorough test of the three origin theories without demonstrating sexual selection in humans, and expression of adaptive behaviour in modern populations, the results presented here do demonstrate greater consistency with one model than the other two. In general, the effects of resource control on mate preferences were more consistent with those expected from an evolutionary perspective that posits flexibility in preferences as the optimal solutions to adaptive trade offs, rather than to the merging of gender roles and associated partner preferences. Preference rankings for “physical attractiveness” were more often positively associated with preferences for putative cues to “good genes” than to personality traits, and the effects of resource control on sex differences were more consistent with evolutionary perspectives than the biosocial model. Furthermore, evidence for a shift in the mate preference trade off in response to another current social pressure (i.e.

planned reproductive strategy) provides further support of the ability to trade off partner characteristics optimally.

I have argued that EP's explanations for sex differences in behaviour in modern populations that rely on estimates of past selection pressures are dubious, and attempts to account for intra-sexual variation are limited by the narrow range of contexts considered. The complexity of the results presented here seems too great to be made sense of by context-specific mechanisms specific to differing levels of resource control for each mate preference, while simultaneously dealing with all the other demands of the environment. Furthermore, in order for the EP origin theory to fit the data presented in the thesis, it is necessary to assume that there was variation in the extent to which women controlled resources over evolutionary history, of which there is little evidence (e.g. Hrdy, 1997). It is perhaps more parsimonious to assume that humans can adjust their behaviour adaptively in response to the complex demands of current environments. While the results are not opposed to any of the three perspectives, I argue that they are most consistent with the HBE perspective.

While the data were more consistent with the HBE model, as I argued in Chapter 1, integration of the biosocial model and an HBE approach can provide greater explanatory power when exploring human behaviour. An acceptance by the biosocial model of the vast and mounting evidence for the ability of humans to adapt their behaviour in ways that increase fitness as evidence for an ultimate function of behaviour can add a distal dimension to the model. Similarly, incorporation of investigation of the proximate mechanisms emphasised by the biosocial model into an HBE perspective can vastly increase the explanatory power of HBE models and investigations. As such, an integrated model could provide a powerful tool for investigating behaviour in complex, modern, environments that HBE has largely failed to tackle.

The results of the thesis demonstrate that female mate preferences become more like those typical of males with increasing female status. Therefore, it can be

concluded that economic constraints on women contribute to at least one behavioural sex difference in humans. When men and women had equal resource control, one sex difference disappeared, whereas others decreased or increased depending upon the measure of resource control. As such, it is not possible to conclude that when men and women are economically equal, sex differences in preferences will completely disappear. The extent to which such sex differences arise from biological versus cultural constraints remains to be seen: investigation of sex differences in preferences in a society with complete sexual equality would provide the ultimate test of the roles of biology and culture. Perhaps the increasing number of men's magazines and the rapidly developing male cosmetics industry point to increasing similarities in the behaviour of the sexes, and reflect shifting demands of women on potential mates. It is difficult to imagine a time, however, in which the investment of men and women in childcare will be truly equal, both in terms of amount and type of investment. It seems likely, therefore, that men and women will always differ somewhat in their partner preferences, but the extent to which we adjust our behaviour with increasing sexual equality, both as individuals and as a society, remains to be seen.

11.6. Limitations

There were a number of limitations both to data collection and to the ability to base conclusions on the data. Use of online questionnaires provided a large sample size with a limited socio-economic profile. The questionnaire was quite long, and it may be that women with an interest in psychological research, or women who are conscientious completed the surveys to the end. The nature of the research also led to difficulties in obtaining an adequate sample through mail-shot questionnaires or distribution of surveys in workplaces, placing constraints on access to participants from a broad socioeconomic profile.

The studies relied heavily on self-report data, which may be prone to problems such as provision of socially desirable answers. By investigating relationships

between female status and preferences in ethnographic data, it was possible to establish greater confidence in the results of self-report data. In the case of assessment of mate preferences, it may also be argued that preferences do not reflect mate choice in real life. This is a problem associated with much human mate preference research, and could be alleviated by investigation of the characteristics that attracted individuals to their current partners, or independent ratings of participants' partner characteristics.

Long-term research is required to investigate the effects of mate choice in current populations on reproductive and social success. Without this information, it is not possible to conclude that any current behaviour is adaptive.

Finally, the measure of female status employed was developed from previous literature which suggests that "resource control" is an important dimension of overall status, and provided the most efficient test of the predictions of the evolutionary frameworks. While the distinctions between male and female gender roles are expected to correlate with general female status, and resource control, it may be necessary to examine the effects of changes in gender roles, either longitudinally or cross-culturally to adequately test the predictions of the biosocial model.

11.7. Future research

It would be interesting and relevant to explore female status and empowerment in terms of the ways in which women balance family and a career. As the largest constraint on women's ability to provide for themselves independently may be the lack of support provided to women with children in our society (e.g. limited maternity and paternity leave, and expensive childcare), even women who have pursued education and a career may benefit from not returning to work after having children, due to the high costs of childcare. Thus, it may pay to seek a partner with resources, even for women who do desire a career. Therefore, investigation of interactions between reproductive and career ambition, and the effects of these interactions on mate preferences may prove insightful.

Increasing sexual equality is also likely to influence other behavioural sex differences. If women are now competing more equally with men in the work place, it may be interesting to investigate the effects of this on sex differences in aggression and assertiveness. Furthermore, as the role of women has changed, so must have that of men. It would be interesting to further explore how interactions and relationships between men and women in the home and at work have altered.

In terms of the three origin theories, it would be insightful to begin to investigate how mate choice influences reproductive success (or a reliable proxy) in modern populations. Investigation of the hormonal changes in females in response to specific tasks that have been traditionally associated with the male gender role in a within subject design may provide more information into the mediating role of hormonal changes on translating gender roles into sex-typical behaviours.

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Appendix 1. Resource control questionnaire

1. How financially independent are you (i.e. how comfortably could you survive without the assistance of others such as a partner, your parents or benefactors)? Responses on 1 – 7 scale (1 = completely dependent on others, 7 = completely independent).
2. How important do you consider your own financial independence to be? Responses on 1 – 7 scales (1 = not at all important, 7 = extremely important).
3. Please indicate your maximum level of education. Responses chosen from following options: primary/grade school, secondary/high school, college, university – undergraduate degree, university – postgraduate degree.
4. How important is having a career to you? Responses on 1 – 7 scales (1 = not at all important, 7 = extremely important).
5. How much control do you have over your earnings/wealth? Responses on 1 – 7 scales (1 = no control, 7 = complete control).
6. How much input do you have in decisions made in the home? Responses on 1 – 7 scales (1 = no input, 4 = equal input with everyone else at home, 7 = I am the primary decision maker).
7. How much input do you have in decisions made in the workplace? Responses on 1 – 7 scales (1 = no input, 4 = equal input with everyone else at work, 7 = I am the primary decision maker). Participants who do not work were asked to leave the question blank.

Appendix 2. Creation of masculinity and age facial stimuli

1. Rationale

To assess face preferences of females from a wide age profile, pairs of male faces that differed in either age or masculinity were created at intervals from perceived ages 20 to 50.

2. Images

Four hundred and thirty-seven male and 496 female facial photographs were collected under standardised lighting with neutral expression against a black background. Each image was aligned to a symmetrical image and normalised on inter-pupillary distance. Faces were presented in random order to ten participants (mean age = 23.29, sd = 2.29; females $n = 8$) who estimated the age of each face. Mean perceived age was used to identify sets of 15 male and 15 female Caucasian faces at each 5-year age bracket from 20 to 50, such that the mean age of each set was approximately the desired age (see Table 1).

Desired age	20	25	30	35	40	45	50
Mean age of male face set	22.45	25.61	29.24	35.29	39.82	44.29	51
Mean age of female face set	20.01	25.61	30.26	35.34	39.84	45.35	49.89

Table 1. Mean perceived ages of male and female faces in sets of 15 faces at 5 – year age brackets from 20 to 50.

One hundred and seventy-four predefined points were marked out on each face, to provide a map of comparable features between faces (e.g. the tip of the nose and the inner corner of each eye). Composite male and female faces, containing the average shape, colour, and skin texture of the faces in each age set were generated by calculating the mean position of corresponding points and warping each face into this average face shape (for details of the averaging process see Benson and Perrett, 1993 and Tiddeman, et al., 2001). Each composite was averaged with its mirror reflected image to remove variation in symmetry.

3. Age stimuli

3.1. Rationale

Pairs of male faces differing in age by 5 years were generated at 2.5-year intervals from ages 20 to 50.

3.2. Stimuli creation

Using the composite faces created in Section 2, pairs of male faces that differed in age by 5 years were generated at each 2.5-year interval from 20 to 50. Each pair was generated by transforming each composite face 50% towards the composite face one decade older (i.e. theoretically aging the face by 5 years). Face pairs differing by 5 years at intervening 2.5 year age brackets were created by transforming each composite face 25% towards the next youngest composite (i.e. theoretically removing 2.5 years) and then 25% towards the next oldest composite (i.e. theoretically adding 2.5 years). The transform process calculates differences in face shape, colour, and texture between the source face and the destination face and applies a proportion of these differences to the source face (Tiddeman et al., 2001). Consequently, 11 pairs of male faces were generated (for an example face pair, see Figure 1).



Figure 1. Face pair consisting of a composite 20 year-old image (left) and the same image transformed to look 5 years older (right).

3.3. *Stimuli validation*

Twenty-two male and 59 female students of the University of Colorado were recruited (males: mean age = 20.64, sd = 5.21; females: mean age = 20.12, sd = 4.77). The images were displayed as part of an online test, in which participants were asked to enter the estimated age of each face in a text box below the face. Inter-rater reliability for perceived age was high (Cronbach's Alpha > 0.8).

Analysis of variance for repeated measures (within subjects factors: face pair (11 levels) and face age (2 levels)) showed a significant main effect of face pair on the perceived age of faces ($F(10, 75) = 461.58, p < 0.001$). This indicates that the age of the face pair influences the perceived age of faces: perceived age increases with the age of the face pair (see Figure 2). There was a significant main effect of face age on perceived age ($F(1, 75) = 190.78, p < 0.001$) indicating that, across pairs, the age transform was successful. There was a significant interaction between face pair and face age ($F(10, 75) = 31.52, p < 0.001$), however, indicating that the success of the transform varied across face pairs (see Figure 2). On inspection, in the face pair at ages 30 and 35, the face manipulated to look older was perceived as younger than its partner (see Table 2).

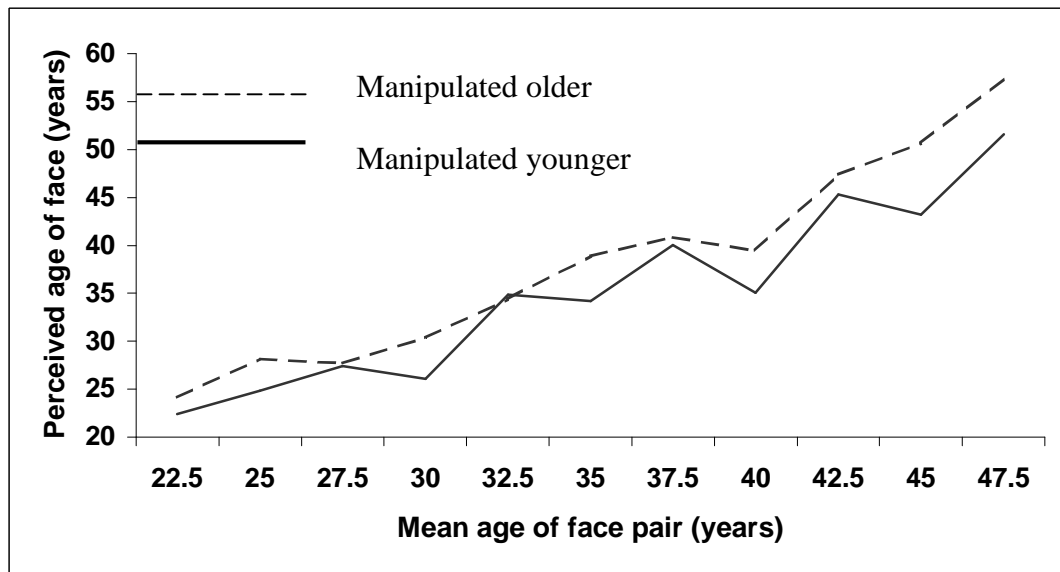


Figure 2. Perceived ages of face pairs manipulated to differ by 5 years at 2.5-year intervals from 20 to 50.

Face pair	Target age	Perceived age
1	20	22.42
	25	24.19
2	22.5	24.80
	27.5	28.15
3	25	27.39
	30	27.75
4	27.5	26.08
	32.5	30.42
5	30	34.85
	35	34.42
6	32.5	34.18
	37.5	38.90
7	35	40.04
	40	40.89
8	37.5	35.08
	42.5	39.47
9	40	45.32
	45	47.45
10	42.5	43.18
	47.5	50.66
11	45	51.61
	50	57.38

Table 2. Manipulated age (target age) and perceived age of faces.

3.4. Discussion

Eleven pairs of male faces were created, manipulated to differ in age by 5 years at 2.5-year intervals from ages 20 to 50. In general, the transform was successful, although the degree of success differed between pairs. In all but one

case, the face manipulated to look older was perceived as older than the face manipulated to look younger. In a number of cases, the perceived age of faces in pairs differed only slightly. A greater degree of success may have been achieved if a larger transform (e.g. ten years) had been applied to each pair.

4. Masculinity stimuli

4.1. Rationale

Pairs of male faces differing in masculinity were generated at five-year intervals from ages 20 to 50.

4.2. Stimuli creation

Male base faces from each of six age brackets (i.e. five year brackets from 20 to 50) were generated by averaging together five to six faces selected at random from each of the age brackets of the image set described in Section 2. The composite male and female faces at each age bracket provided the end points of age specific transforms. Each base face was transformed 25% towards the age relevant composite female (i.e. the face was feminised) and 25% towards the composite male (i.e. the face masculinised). This provided a pair of male faces at each five-year interval from 20 to 50 that differed in masculinity. For an example face pair see Figure 3.



Figure 3. Face pair (age = 25), consisting of the same face feminised (left) and masculinised (right).

4.3. *Stimuli validation*

Sixty-four female (mean age = 20.17, sd = 4.64) and 41 male (mean age = 19.73, sd = 2) students at the University of Colorado completed the online validation experiment. Composite faces were presented with a java applet, and participants were asked to rate each face for masculinity on 1 – 7 Likert scales (1 = very low, 7 = very high). The order in which faces were displayed was fully randomised.

Mean masculinity ratings for each of the masculinised and feminised faces were calculated (masculinity ratings of masculinised faces: mean = 4.04, sd = 0.86; masculinity ratings of feminised faces: mean = 3.83, sd = 0.87). Inter-rater reliability was high (Cronbach's Alpha > 0.9).

The effect of masculinity manipulation was calculated using analysis of variance for repeated measures (within subject factors: age of face pair (7 levels) and masculinity (2 levels)). A main effect of masculinity manipulation ($F(1, 79) = 23.621$, $p < 0.001$) indicated that in general the manipulation was successful (Figure 4). A main effect of age of face pair ($F(6, 79) = 35.068$, $p < 0.001$) demonstrated that perceived masculinity varied with the age of face pairs: older faces were perceived and masculinity manipulation on masculinity ratings ($F(6,$

79) = 3.557, $p < 0.005$), indicated that the success of the manipulation differed significantly across pairs: the transform was less successful in older faces (see Figure 4). In two pairs, the masculinised face was perceived as less masculine than the feminised face (i.e. pairs at ages 40 and 45; see Table 3). For one pair, there was no difference in perceived masculinity (i.e. pair at age 50; see Table 3).

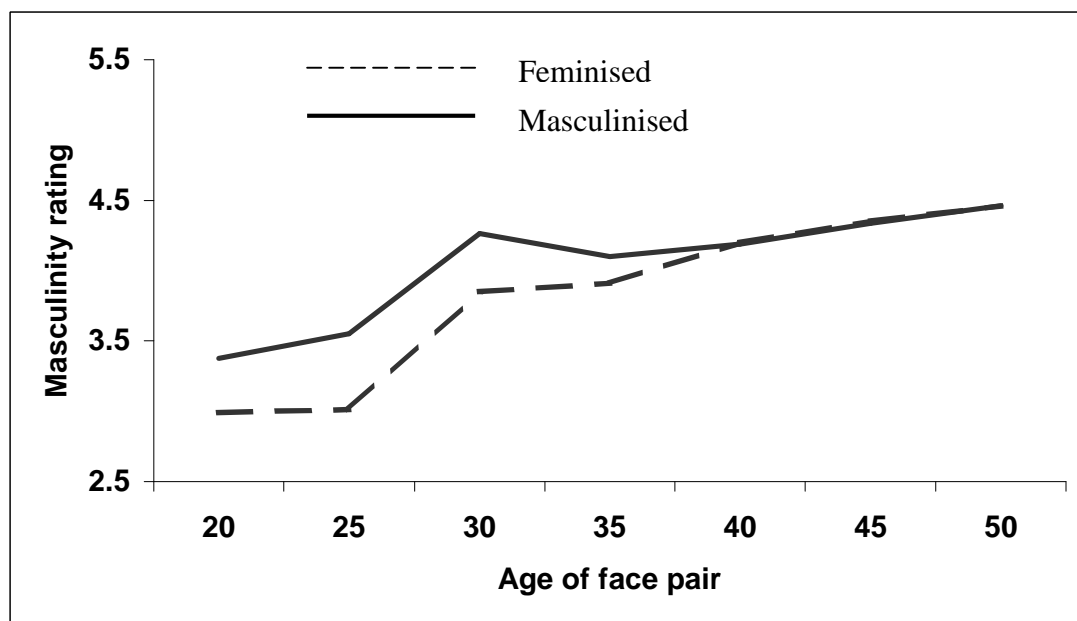


Figure 4. Masculinity ratings of face pairs manipulated to differ in masculinity at 5-year intervals from ages 20 to 50.

Age of pair	Face	Mean masculinity rating
20	Feminised	2.99
	Masculinised	3.38
25	Feminised	3.01
	Masculinised	3.55
30	Feminised	3.85
	Masculinised	4.26
35	Feminised	3.91
	Masculinised	4.10
40	Feminised	4.20
	Masculinised	4.19
45	Feminised	4.35
	Masculinised	4.34
50	Feminised	4.46
	Masculinised	4.46

Table 3. Masculinity ratings of face pairs manipulated to differ in masculinity at 5-year intervals from ages 20 to 50.

3.4. Discussion

Across all pairs, masculinised male faces were rated as significantly more masculine than feminised male faces. In four of the face pairs, the masculinised face was perceived as more masculine than the feminine face. In two of the pairs, the feminised face was perceived as more masculine, and in one pair there was no difference in ratings. This may be due to a small magnitude of manipulation (25%). Greater success may have been achieved from a 50% transform.

While the effect of masculinity manipulation decreased with age of face pair, masculinity ratings in general increased with age of face pair. One possible

explanation for this finding is that older male faces are perceived as more masculine in general due to continued apparent masculinisation of the face over time, as cartilage continues to grow and skin darkens (Enlow, 1990).

Appendix 3. Cover letter and questionnaire distributed in mail shot survey
(Chapter 4)

1. Cover letter

University of St Andrews

School of Psychology

Dear Sir/Madam,

We are contacting you from the School of Psychology at the University of St Andrews. We are researchers who are interested in the effects of changes in society on the kind of partners people choose.

In our current study, we are interested in understanding the effects of social factors on the characteristics people consider important in a long-term partner. We are attempting to reach people in Scotland who may be willing to complete a short questionnaire about their partner preferences. We have sent questionnaires to a number of households in Scotland, as well as distributing them in waiting rooms in doctor's surgeries. The questionnaire takes 10 minutes to complete, and your participation would be extremely helpful.

If you decide that you are interested in helping out with this study, we have enclosed a copy of the questionnaire. The only requirement is that we ask that participants be over the age of 16. Whether you are currently in a relationship or not, your participation will help us with our research. Although your answers are valuable to us, if you are not comfortable answering any of the questions please feel free to leave them out. All the information you provide is completely confidential and anonymous, and will not be disclosed to anyone other than the researchers. Once we receive your completed questionnaire, your responses will be transferred to a computer and kept in locked files that can only be accessed by the researchers. By completing and returning the questionnaire, you are agreeing to participate in the study. Thank you for taking the time to read this letter, if you have any questions or comments about the study, please feel free to contact at us at the address below.

St Mary's Quadrangle, St Andrews, Fife, KY16 9JP, Scotland, frm2@st-andrews.ac.uk

2. *Survey*

Social attitudes and partner preferences study

Our society is changing - male and female roles are changing in the home and at work. We are researchers at the School of Psychology of the University of St Andrews who are interested in the effects of changes in society on the reproductive decisions people make. Our current study aims to explore the links between changes in society and partner preferences.

We are asking people in Dundee to fill in a questionnaire to help with our research. The questions will ask you about your age, gender, and marital status, the kind of partner you prefer and your social background and attitudes. If you would like to help with our research, please read the following information before completing the questionnaire.

You will remain anonymous throughout the study.

If you are uncomfortable answering any of the questions, please leave them blank.

You may withdraw from the experiment at any time.

All your answers are completely confidential.

Only the experimenters have access to any of the information you provide us, and we will not disclose this information to anyone else.

Section 1 – Your partner preferences

By “partner” we mean a romantic partner (e.g. boyfriend or girlfriend, husband or wife).

For questions 1 to 4, please write your response in the box to the right of the question.

1. *What is your ideal partner age (in years)?*

2. What is the maximum partner age you would tolerate (in years)?

3. What is the minimum partner age you would tolerate (in years)?

4. How old (in years) is your current (or most recent) partner?

5. Please list 5 characteristics that attracted you to your current (or most recent) partner. Please try to list these in the order of how important they were in attracting you to your partner (where 1 = the most important and 5 = the least important).

Please enter the characteristics in order of importance in the numbered text boxes below.

1.

2.

3.

4.

5.

6. Please rank the following characteristics in order of desirability in someone you would wish to have a long-term relationship with (i.e. someone you would be willing to commit to in a serious relationship and would consider marrying, or entering a relationship with on grounds similar to marriage). Please give the most desirable characteristic a rank of "13" and the least desirable characteristic a rank of "1". Please try not to give more than one characteristic the same rank.

Please enter the rank in the box to the right of each characteristic

Fondness of children.....

Good parenting abilities.....

Good domestic skills.....

Favourable social status.....

Good financial prospects.....

Ambition and industriousness...

Kindness.....

Physical attractiveness.....

Willingness to commit.....

Dependability.....

Good health.....

Good sense of humour.....

Good communication skills.....

Section 2 – Social information

For questions 7 to 16, please indicate your answer by circling the relevant point on the scale below the question.

7. How financially independent are you (i.e. how comfortably could you survive without the assistance of others such as a partner, your parents or benefactors)?

Completely dependent
on others

Completely
independent

1 2 3 4 5 6 7

8. How important do you consider your own financial independence to be?

Not at all
important

Extremely
important

1 2 3 4 5 6 7

9. How important is having a career to you?

Not at all
important

Extremely
important

1 2 3 4 5 6 7

10. How much control do you have over your earnings/wealth?

No control

Complete
control

1 2 3 4 5 6 7

11. How much input do you have in decisions made in the home?

Zero
primary
maker

Equal with everyone
at home

I am the
decision

1 2 3 4 5 6 7

12. How much input do you have in decisions made in the workplace?

If you do not work, please leave this question blank

Zero
primary
maker

I am the
decision

1 2 3 4 5 6 7

13. How attractive do you consider yourself to be?

Not at all
attractive

Extremely
attractive

1 2 3 4 5 6 7

14. What is your maximum level of education?

Please tick the relevant box.

Primary School..... ☐

Secondary School..... ☐

College..... ☐

Undergraduate..... ☐

Postgraduate..... ☐

15. Are you currently employed?

Please tick the relevant box.

Yes..... ☐

No..... ☐

16. The following questions refer to your current main job, or (if you are not working now) to your last main job. Please tick only one box per question.

a. Employee or self-employed

Do (did) you work as an employee or are (were) you self-employed?

Employee.....☐

Self employed with employees.....☐

Self employed without employees (go to question 18d).....☐

b. Number of employees (Employees)

For employees: indicate below how many people work (worked) for your employer at the place where you work (worked).

For self-employed: indicate below how many people you employ (employed).

Go to question 18d when you have completed this question.

1 to 24.....☐

25 or more.....☐

c. Supervisory status

Do (did) you supervise any other employees?

A supervisor or foreman is responsible for overseeing the work of other employees on a day-to-day basis.

Yes.....☐

No.....☐

d. Occupation

Please tick the box to show which best describes the sort of work you do. (If you are not working now, please tick a box to show what you did in your last job).

PLEASE TICK ONE BOX ONLY

Modern professional occupations

such as: teacher – nurse – physiotherapist – social worker – welfare officer –
artist – musician – police officer (sergeant or above) – software designer ☐

Clerical and intermediate occupations

such as: secretary – personal assistant – clerical worker – office clerk –
call centre agent – nursing auxiliary – nursery nurse ☐

Senior managers or administrators

(usually responsible for planning, organising and co-ordinating work and
for finance) ☐
such as: finance manager – chief executive

Technical and craft occupations

such as: motor mechanic – fitter – inspector – plumber – printer –
tool maker – electrician – gardener – train driver ☐

Semi - routine manual and service occupations

such as: postal worker – machine operative – security guard – caretaker –
farm worker – catering assistant – receptionist – sales assistant ☐

Routine manual and service occupations

such as: HGV driver – van driver – cleaner – porter – packer – sewing
machinist – messenger – labourer – waiter/waitress – bar staff ☐

Middle or junior managers

such as: office manager – retail manager – bank manager – restaurant ☐

manager – warehouse manager – publican

Traditional professional occupations

such as: accountant – solicitor – medical practitioner – scientist –
civil/mechanical engineer

☐

Section 3 – Personal details

For questions 17 to 20, please tick the relevant box.

17. What is your gender?

Female.....☐

Male.....☐

18. What is your ethnicity?

White British.....☐

Carribean.....☐

White other European.....☐

Indian.....☐

White American.....☐

Pakistani.....☐

Other white.....☐

Chinese.....☐

African.....☐

Other.....☐

19. What is your marital status?

Single.....☐

Casual relationship.....☐

Serious relationship, living apart.....

Serious relationship, living together.....☐

Married.....☐

Other.....☐

20. What is your sexual orientation?

Heterosexual.....☐

Bisexual.....☐

Homosexual.....☐

21. How old are you (in years)?

22. How many children do you have?

You have now finished the questionnaire.

Thank you for taking the time to help with our research.

If you have any questions or queries, please contact me at frm2@st-andrews.ac.uk

Appendix 4. Characteristics that attracted participants to current or most recent partner (Chapter 4)

A. Physical attractiveness

1. Looks
2. Good looking
3. Pleasant to look at
4. Looks/face
5. Looks/appearance
6. Height
7. Physical appearance
8. Attractive
9. Good looks
10. Eyes
11. Nice figure
12. Physically attractive
13. Smile
14. Nice smile
15. Nice eyes
16. Attractive appearance
17. Fit body
18. Brown eyes
19. Good looking attractive
20. General physical appearance
21. Gorgeous looking
22. Physique
23. His bum
24. Dark hair
25. Dark eyes
26. Muscular

27. Face-eyes
28. Broad shoulders
29. Handsome
30. Good physique and sporty

B. Status

1. Upbringing
2. Is stable – car/house/job
3. Educated
4. Financially stable
5. Hard working
6. Money
7. Job/occupation/finance
8. Good financial prospects
9. Good social status
10. Ambition
11. Career
12. Hardworking and dependable
13. Good at managing finances

C. Personality

1. Smart
2. Kind
3. Mild mannered
4. Intelligence
5. Tolerant
6. Polite
7. Diplomatic
8. Likes the same things
9. Interested
10. Easy to talk to

11. Talkative
12. Same social circle
13. Knowledge
14. Accent
15. Dependable
16. Perseverance
17. Outgoing personality
18. Caring
19. Devotion
20. Honest
21. Kind and fun
22. Helpful
23. Honest and truthful to me/no lies
24. Similar interests
25. Talkativeness
26. The way he is so thoughtful
27. Fun/outgoing
28. Can be serious
29. Decisive
30. Kind and considerate
31. High integrity
32. Fun to be with
33. Very reliable
34. Very forthwith
35. Always discusses all aspects
36. Individuality
37. Maturity
38. Intellect
39. Confidence
40. Level headed
41. Good dancer
42. Personality

- 43. Compassion
- 44. Similarities
- 45. Likes/dislikes
- 46. Uniqueness
- 47. Dress sense

Appendix 5. Passages comprising positive and negative conditions for Chapter 6, Pilot Study 1.

Instructions: *Please read the following passage. After you have finished reading, please click to continue.*

[Positive condition]

“The UK offers equal opportunities for men and women in the work place, and provisions for maternity and paternity leave more successfully than many other countries. In the UK, young women now out perform men in educational qualifications (e.g. GCSE, A-levels and NVQs) and in 2000, UK women gained more first class degrees than men for the first time. Women are represented in all spheres of work (e.g. academic, professional, technical, and administrative).

The Equal Pay Act (1970) enforces that individuals have the right to the same contractual pay and benefits as a person of the opposite sex in the same employment, where the man and woman are doing equivalent work. This was amended in 2003, such that the previous 2-year limit on back pay was replaced with a six-year limit. The Framework Agreement, currently being implemented across the UK, ensures equal pay for women in all areas of work.

To provide truly equal opportunities, mothers and fathers must be provisioned for fairly, especially for maternity and paternity leave. In the UK, all women employees are entitled to legal rights to protect their health and job during and after pregnancy. Employers may not dismiss or treat women unfairly because they are pregnant or taking maternity leave. All employees (including part time workers), have a legal right to 26 - 52 weeks maternity leave. Pay during maternity leave is provided by Statutory Maternity Pay, a weekly payment of 90% of average salary, which is offered whether or not women intend to return to work. Women who are self-employed are provided with a Maternity Allowance

(MA). All fathers are also entitled to two weeks paternity leave at a set weekly rate.

Furthermore, an increasing number of employers are now introducing a range of family friendly policies that allow their employees to balance having a career and a family. Flexible working practices include: part-time working, flexi-time, job-sharing, term-time working, school hours working and working from home. There is now a legal right to request flexible work arrangements, and the Sex Discrimination Act takes into account the fact that more women than men have childcare responsibilities, and therefore have a greater need for flexible working patterns - a refusal to allow such arrangements is indirect sex discrimination.

Therefore, there are equal opportunities for women in the UK. Women can participate in all areas of work, and are legally protected. Women with families are provisioned for with maternity and paternity leave and increasing flexible working practices.”

[Negative condition]

“Women's career chances are still being blighted by employers' failure to adopt more flexible working practices and recognise women's responsibilities away from the workplace. A total overhaul of family policies is essential if Britain is to stop losing out on women's talent. Even allowing for marginal improvements (1%) in women's position in business, the police and senior legal posts during the last 12 months, British public life remains firmly locked in the past and unrepresentative of society. There is also evidence that women pay a big penalty for being seen as the principal home maker and child carer. Around 20% of women face dismissal or financial loss as a result of a pregnancy.

Women are highly underrepresented in many professions such as law, academic positions, medicine and engineering. At school, girls outperform boys in the

relevant GCSE and A-level courses, yet in the IT workforce men outnumber women by almost five to one. In addition, the gender pay gap currently stands at 18%, which means that women who work full time are paid on average just 82% of men's hourly earnings. This 'pay gap' isn't just bad news for women. It means that women's abilities and skills are not being fully utilised in businesses and in the economy. Even women who have been to university, within five years of graduation, are earning 15% less than men who have the same qualifications. We are still far from achieving the principle of equal pay for work of equal value.

Furthermore, the UK is still lagging behind other European countries in terms of the numbers of women getting to the top in politics. The UK comes 14th out of the EU member states for female representation in its national parliament. While 45% of Sweden's parliament is made up of women in the UK the figure is just 18% and 52% of Sweden's Cabinet members are female but here, just 27%."

Appendix 6. Questionnaires for Chapter 6, Pilot Study 1*1. Session 1*

Instructions: Mate preferences study

The aim of the study is to investigate how female partner preferences vary over time. You will be asked to answer some questions about your partner preferences and your personal details (such as age and ethnicity).

Section 1: Partner preferences

By “partner” we mean a romantic partner (e.g. boyfriend or girlfriend, husband or wife).

1. What is your ideal partner age (in years)?

2. What is the maximum partner age you would tolerate (in years)?

3. What is the minimum partner age you would tolerate (in years)?

4. You are now asked to “design” your ideal long-term partner. You have 25 “mate choice points” which you are asked to distribute amongst 5 partner characteristics in order to design your ideal partner. Please distribute the points amongst the characteristics in accordance with how important each is to you. That is, the more important a characteristic is to you, the more points you should allocate it. If you don’t consider a particular characteristic important in a long-term partner, don’t allocate any points to it. If you consider one of the characteristics to be the only important characteristic in a potential partner, please allocate all 25 points to this characteristic. If you find a number of the characteristics important, please distribute the points to these characteristics in accordance with the relative importance of each. When you are finished, you should have allocated a total of 25 points.

Physical attractiveness.....

Willingness to work hard.....

Educational attainment.....

Being the preferred age.....

Being a good companion.....

Section 2: Personal details

1. What is your ethnicity?

White British..... <input type="checkbox"/>	Asian..... <input type="checkbox"/>
White other European... <input type="checkbox"/>	South East Asian..... <input type="checkbox"/>
White American..... <input type="checkbox"/>	Other Asian..... <input type="checkbox"/>
Other white..... <input type="checkbox"/>	Mixed..... <input type="checkbox"/>
Afro-Caribbean..... <input type="checkbox"/>	Other..... <input type="checkbox"/>

2. What is your relationship status?

Single.....☐

Casual relationship.....☐

Serious relationship, living apart.....☐

Serious relationship, living together....☐

Married.....☐

3. What is your sexual orientation?

Heterosexual.....☐

Bisexual.....☐

Homosexual.....☐

4. How old are you (in years)?

2. *Session 2*

Study 1 – Memory Task

Instructions

The aim of the study is to explore how easy it is to recall facts presented in a passage of text. We are interested in whether the content and structure of a passage containing information about the status of women in the UK influences how easy it is to remember facts contained in the passage. You will be asked to read a passage. Please read the passage carefully. You will then move on to a set of simple questions designed to assess whether you can remember certain facts contained in the passage. This is not a test of your memory. It is a test of the effectiveness of different presentation styles of text.

On clicking to continue you will be presented with a passage. Please read the passage carefully. Once you have read the passage, click to continue. You will not be able to return to the passage once you have clicked to continue. You will then be asked to answer a few simple questions about information contained in the passage.

[Participant is presented with the positive or negative passage]

Questions

[Positive passage]

1. In what year did women gain more first class degrees than men for the first time?
2. What act enforces that men and women must have equal pay for equivalent work?
3. What is the weekly pay for maternity leave?

[Negative passage]

1. What percentage of women face dismissal or financial loss as a result of pregnancy?
2. How many times more men than women are there in IT jobs?
3. What is the current gender pay gap?

Study 2 – Partner preferences study

[Mate preference questionnaire from Session 1]

1. How confident are you that you can provide for yourself independently (financially) at present? That is, without support from others such as your family or partner.

Not at all
confident

Extremely
confident

1 2 3 4 5 6 7

2. How confident are you that you could provide for yourself independently (financially) in the future? That is, without support from others such as your family or partner.

Not at all
confident

Extremely
confident

1

2

3

4

5

6

7

Appendix 7. Manipulation and gender esteem measure (Chapter 6, Pilot Study 2)

1. Manipulation

Partner Preferences Survey

This study aims to explore gender roles and partner preferences. Specifically, I am interested in how the way women view their role in society influences the kind of partner they choose.

You will be asked to complete questions that assess some of your social attitudes and your partner preferences. You will also be asked to give some personal details such as your age and gender. The study takes about 10 minutes.

Section 1

1.

[Positive condition]

We would like you to think about and consider the ways that you have received *privileges or are advantaged* because of your *gender*. Below we would like you to write down *as many different ways* as you can think of that you have *benefited or are advantaged* because of your gender.

[Negative condition]

We would like you to think about and consider the ways that you have not received *privileges or have been disadvantaged* because of your *gender*. Below we would like you to write down *as many different ways* as you can think of that you have not *benefited or have been advantaged* because of your gender.

Please spend a full 2 minutes on this question – try not to go over two minutes.

2. *Gender Esteem Scale (Luhtanen and Crocker, 1992)*

We are all members of different social groups or social categories. Some of such social groups or categories pertain to gender, race, religion, nationality, ethnicity, and socioeconomic class. We would like you to consider your membership in your **gender group**, and respond to the following statements on the basis of how you feel about your **gender group** and your membership in it. There are no right or wrong answers to any of these statements; we are interested in your honest reactions and opinions. Please read each statement carefully, and respond by using the following scale from 1 to 7:

1. I am a worthy member of my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

2. I often regret that I belong to my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

3. Overall, my gender is considered good by others.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

4. Overall, my gender has very little to do with how I feel about myself.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

5. I feel I don't have much to offer my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

6. In general, I'm glad to be a member of my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

7. Most people consider my gender group, on the average, to be more ineffective than the other gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

8. My gender is an important reflection of who I am.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

9. I am a cooperative participant in my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

10. Overall, I often feel that my gender group is not worthwhile.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

11. In general, others respect my gender.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

12. My gender is unimportant to my sense of what kind of a person I am.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

13. I often feel I'm a useless member of my gender group.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

14. I feel good about my gender.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

15. In general, others think that my gender is unworthy.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

16. In general, belonging to my gender group is an important part of my self image.

Strongly agree

Strongly disagree

1 2 3 4 5 6 7

Appendix 8. Thoughts listed in response to manipulation in Chapter 6, Pilot Study 2

A. Negative condition

1. Can't play certain sports
2. Prevented from playing sports
3. Girls can't always show their true potential because of restrictions of being a female
4. Less positive reinforcement in the academic arena
5. Couldn't play football in primary school p.e.
6. Wasn't allowed out to pubs or to stay at friends houses as much as my brother when he had been that age
7. Not allowed to visit certain churches/monasteries in Ethiopia
8. Not allowed to join sports teams
9. Not allowed to play rugby
10. Feel uncomfortable in male dominated societies/groups
11. Asked to do different tasks from male e.g. the boys are ordered to lift heavy things while girls are asked to do other things
12. Not allowed to play rugby at school, girls did hockey and netball, boys did football and rugby
13. I have a sense that boys should be the aggressor, and that if I am interested in a guy, if I pursue him, I feel like a predator. I prefer, or feel it almost necessary to be "preyed" upon! At the same time, if I was not interested in a guy pursuing me, I would just be annoyed. I don't like feeling that way because I felt like I am not given as much choice, and I feel less empowered.
14. Some people (older men usually) don't take me seriously/don't believe I'm right even though I know I am
15. Stereotyped as not as smart, not as strong, certain duties i.e. cooking, cleaning etc..
16. Receive jokes about being the 'inferior' sex

17. In general, people think I'm less capable than my male counterparts - even though I got the same or better exam grades as many guys my age, people still think they're cleverer and rely on them more
18. Considered incapable of certain tasks
19. People thinking less of you
20. General hypocritical opinions and stereotypes
21. It's hard to join a group of boys without being thought of in sexual way
22. Sexual harassment from members of the public at work
23. Treated as not really a friend by guys in a pub - just someone they can try to pull
24. Disadvantage of being called on in class
25. Less positive reinforcement in the academic arena
26. Tendency to be expected to work harder/do better than boys academically, although that may have been advantageous!

B. Positive condition

1. Girls tended to be treated with more respect
2. Got a bigger discount at the coffee shop at work than the males
3. Boys tend to be generous towards girls, e.g. buying drinks etc
4. Bags carried for me
5. Drinks bought for me
6. Doors held open for me
7. Simple things like doors held open, bags carried and drinks bought etc
8. Being served (by men) eg in a bar
9. More drinks
10. Treated nicer
11. Free stuff - drinks, food etc
12. Moved to front of queues
13. Doors held open
14. Free repairs
15. General help

16. When being out a bar or nightclub bar staff and bouncers are friendlier
17. Get served quicker and get access to bars etc easier
18. Taxi drivers stop more for women at end of night
19. I receive more care as I'm a girl
20. Get doors opened for me
21. Gets away with walking into everyone in a crowded pub/club
22. Gets to jump queues sometimes
23. Gets to go first for almost everything
24. Doors held open for me
25. I pay for things less drinks or not as often
26. Don't have to buy drinks at bar
27. When my car breaks down, people offer help fast
28. Lower car insurance
29. Free entry to clubs/events
30. Free drinks
31. Women are often given preferential treatment eg ladies first
32. In jobs - au pairing, seen as trustworthy and reliable because of my female gender
33. Considered less intimidating/threatening
34. Allowed to show emotions
35. Trusted to babysit
36. Teachers look to me and give me bigger responsibilities
37. When I do good in typical male oriented areas I get more credit than a guy
38. Retail - more likely to be employed because of my appearance in a job where image is of high importance
39. I'm less likely to be hit by a male
40. Usually boys do not tend to be physically violent towards girls - my experience (in school/friendship context)
41. at school some teachers were more understanding about lateness
42. got out of detention more because of safety in going home alone
43. I'm not required to register for a draft number in the army

- 44. live longer
- 45. More relaxed attitudes from agents of social control
- 46. Less severe punishments

Appendix 9. Thoughts listed in response to manipulation in Chapter 6, Pilot Study 3.

A. Positive condition

1. Help with heavy objects if seen struggling
2. Let off or bigger discounts due to looks etc.
3. More sympathy
4. Doors being held open
5. Bus seat when pregnant
6. Days off for/when menstruating
7. Maternity leave
8. Cheaper car insurance
9. Let off more than men with pulling sickie from work
10. More support if you have a child
11. Pregnant women get houses easier
12. Women have more choice of clothes shops
13. Maternity leave (is this a privilege?)
14. Freedom in choice of fashions/hair styles
15. Women usually have more rights to custody of children
16. They can receive childcare benefits and housing
17. They may be let off a bus first
18. A male employer may be less harsh on a woman for fear of tears/upset
19. Are able to have children and have maternal bond
20. May have partner going out to work giving them opportunity to stay at home or work part time.
21. Media products aimed towards women
22. Some jobs are mainly done by women, e.g. nurse
23. Viewed as not being as physically strong as men, advantageous if heavy lifting or tasks that require strength are needing done
24. If a woman is thought of as attractive, it can work to her advantage in many settings i.e. work marriage

25. The friendship women have is stronger than the relationship men have with their friends
26. It's ok for women to cry
27. Women can get what they want by using their sexuality
28. People sometimes show more kindness and better manners towards women
29. People are more eager to help women they don't know than men
30. women have more choice in different kinds of clothing and beauty products which it is not socially acceptable for men to take part in (though this is changing constantly)
31. It is more acceptable for women to show emotions
32. Socially, getting a lot of attention, doors opened, repairing help
33. Computer assistance
34. Paid meals and drinks
35. Viewed as incompetent practically and therefore helped with various stuff (car)
36. Women considered warm and safe, positively evaluated
37. Skip lines in queues
38. Get into clubs underage
39. Not usually having to be breadwinner
40. Having children
41. Easier to take time out of work to raise children
42. Women are thought of as more intuitive, regarded as having better psychology or social skills
43. Easier to get into certain professions because of certain stereotypes such as childcare, nursing
44. reverse sexism, it may look good in companies to give women higher power positions
45. Can do more than one thing at a time (well)
46. Fulfillment of motherhood
47. Men still tend to receive a higher rate of pay
48. High status jobs still tend to go to men

- 49. Being a woman and therefore “likely” to become pregnant, can reduce your chance of getting certain jobs
- 50. You are more likely to be the target of sexual attacks
- 51. You are more likely to be the gender affected by domestic abuse and bullying and sexual harassment and discrimination in the workplace

B. Negative condition

- 1. Single mums – more responsibility /childcare costs
- 2. Lower wages
- 3. In married couples, women generally bear most of the child rearing responsibilities and is the one who has to work school hours giving them less job opportunities
- 4. Loose foot on career ladder when they stop to have children
- 5. Family always have to come first
- 6. Women have many roles to juggle
- 7. Can very often only work part time due to commitments therefore miss out on promotion
- 8. Pay scale
- 9. Men would take advantages in situation ie. Car going to garage to be fixed, building work undertaken, electrical work, painting and decorating
- 10. Sporting events – women become veterans before men
- 11. Wages
- 12. Certain jobs
- 13. Used and abused by men
- 14. Seen as the weaker sex
- 15. We are less well paid
- 16. We have to do most of the childcare
- 17. Women have to hold down a job and manage the home and cooking
- 18. We are ripped off by tradesmen that come to the house and mechanics
- 19. We are discriminated against when it comes to applying for jobs
- 20. Women are often paid less than men for the same job

21. Women can be ripped off by male mechanics when they take their cars to the garage
22. Women are seen as tarts if they sleep with many partners, men are dubbed heroes if they do the same
23. Men tend to be paid more
24. Women may be treated differently in situations where they are maybe seen as inferior, e.g. in garages by male mechanics
25. Lower rate of pay than men
26. Low pay for the same job
27. May still be paid less in some jobs
28. Often unable to achieve all of their career goals due to maternity leave or rearing children
29. Society's focus on women's appearance erodes the confidence of less physically attractive women and places them in a position where they could be disadvantaged or receive less privileges
30. Pregnancy can be used not to employ/promote
31. Unfair pay
32. Sexual harassment
33. Certain jobs that require lifting. People feel that women are suitable for the position.
34. Career wise women are perhaps disadvantaged due to the maternity time they need
35. Women can sometimes be seen as more fragile than men, therefore less able to carry out physically demanding work which they may enjoy
36. Women are seen as the child rearers – they are the ones expected to take the children to playgroup, school etc.
37. Women are discriminated against in the workplace – jobs will often be given to men instead of a woman who is of child bearing age
38. Women are seen as housewives – to cook, clean, telephone the relatives, get the kids up etc
39. Most sexual harassment is towards female co-workers.

40. Women are often labelled as caregivers at home so they may not be offered promotions as often
41. In primarily male environments women may be labelled incapable, or as second best.
42. They are viewed as physically weaker sex
43. Some occupations pay women less
44. Where employing firms will take on the best candidate which may not include women planning on starting families, e.g. taking maternity leave
45. Some sports played by women not as popular, in terms of coverage etc., as the male equivalents
46. Women may need increased effort e.g. gaining strength in comparison with men for some occupations etc.
47. Women may be thought of as easier targets for criminals
48. Job opportunity and variation. High powered jobs are viewed as characteristically masculine
49. Get accused of being feminist if want more equality
50. Cannot join certain areas of armed forces
51. Prejudice in work place
52. Get blamed for child problems and illnesses more than father
53. Work- employers worry about need for maternity leave
54. Women seen as weaker (willed) may be overlooked
55. Sex-opinions about women much more critical when it comes to multiple partners etc.
56. Health – many things attributed to hormones or PMT, dismissive attitude
57. Social – women constrained by roles e.g. ‘mother’ and ‘wife’

Appendix 10. The Ambivalent Sexism Inventory (Glick and Fiske, 1995)

Please indicate your agreement with the following statements on the scales provided.

1. No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman.

Disagree strongly 1 2 3 4 5 Agree strongly

2. Many women are actually seeking special favors, such as hiring policies that favor them over men, under the guise of asking for "equality."

Disagree strongly 1 2 3 4 5 Agree strongly

3. In a disaster, women ought not necessarily to be rescued before men.

Disagree strongly 1 2 3 4 5 Agree strongly

4. Most women interpret innocent remarks or acts as being sexist.

Disagree strongly 1 2 3 4 5 Agree strongly

5. Women are too easily offended.

Disagree strongly 1 2 3 4 5 Agree strongly

6. People are often truly happy in life without being romantically involved with a member of the other sex.

Disagree strongly 1 2 3 4 5 Agree strongly

7. Feminists are not seeking for women to have more power than men.

Disagree strongly 1 2 3 4 5 Agree strongly

8. Many women have a quality of purity that few men possess.

Disagree strongly 1 2 3 4 5 Agree strongly

9. Women should be cherished and protected by men.

Disagree strongly 1 2 3 4 5 Agree strongly

10. Most women fail to appreciate fully all that men do for them.

Disagree strongly 1 2 3 4 5 Agree strongly

11. Women seek to gain power by getting control over men.

Disagree strongly 1 2 3 4 5 Agree strongly

12. Every man ought to have a woman whom he adores.

Disagree strongly 1 2 3 4 5 Agree strongly

13. Men are complete without women.

Disagree strongly 1 2 3 4 5 Agree strongly

14. Women exaggerate problems they have at work.

Disagree strongly 1 2 3 4 5 Agree strongly

15. Once a woman gets a man to commit to her, she usually tries to put him on a tight leash.

Disagree strongly 1 2 3 4 5 Agree strongly

16. When women lose to men in a fair competition, they typically complain about being discriminated against.

Disagree strongly 1 2 3 4 5 Agree strongly

17. A good woman should be set on a pedestal by her man.

Disagree strongly 1 2 3 4 5 Agree strongly

18. There are actually very few women who get a kick out of teasing men by seeming sexually available and then refusing male advances.

Disagree strongly 1 2 3 4 5 Agree strongly

19. Women, compared to men, tend to have a superior moral sensibility.

Disagree strongly 1 2 3 4 5 Agree strongly

20. Men should be willing to sacrifice their own well being in order to provide financially for the women in their lives.

Disagree strongly 1 2 3 4 5 Agree strongly

21. Feminists are making entirely reasonable demands of men.

Disagree strongly 1 2 3 4 5 Agree strongly

22. Women, as compared to men, tend to have a more refined sense of culture
and good taste.

Disagree strongly 1 2 3 4 5 Agree strongly

Appendix 11. Rosenberg Self-Esteem Scale (1979)

Below is a list of statements dealing with your general feelings about yourself. If you strongly agree, check SA. If you agree with the statement, check A. If you disagree, check D. If you strongly disagree, check SD.

1. On the whole, I am satisfied with myself.

SA A D SD

2. At times I think I am no good at all.

SA A D SD

3. I feel that I have a number of good qualities

SA A D SD

4. I am able to do things as well as most other people.

SA A D SD

5. I feel I do not have much to be proud of.

SA A D SD

6. I certainly feel useless at times.

SA A D SD

7. I feel that I'm a person of worth, at least on an equal plane with others.

SA A D SD

8. I wish I could have more respect for myself.

SA A D SD

9. All in all, I am inclined to feel that I am a failure.

SA A D SD

10. I take a positive attitude toward myself.

SA A D SD

Appendix 12. Multidimensional Scale of Perceived Social Support (Zimet et al., 1988)

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

1. There is a special person who is around when I am in need.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

2. There is a special person with whom I can share my joys and sorrows.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

3. My family really tries to help me.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

4. I get the emotional help and support I need from my family.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

5. I have a special person who is a real source of comfort for me.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

6. My friends really try to help me.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

7. I can count on my friends when things go wrong.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

8. I can talk about my problems with my family.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

9. I have friends with whom I can share my joys and sorrows.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

10. There is a special person in my life who cares about my feelings.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

11. My family is willing to help me make decisions.

Very strongly disagree

Very strongly agree

1 2 3 4 5 6 7

12. I can talk about my problems with my friends.

Very strongly disagree

Very strongly agree

1

2

3

4

5

6

7

Appendix 13. Publications in press