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Bioecological Exchange Theory: Trading Resources for Childcare in Mate Selection

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Abstract

Bioecological exchange theory is proposed, which resolves contradictions between sexual strategies theory and social role theory. People are hypothesized to flexibly shift their mate preferences in response to the percentage of resources they can provide within a couple, but not limitlessly. Men are hypothesized to facultatively shift between 25-100% of provisioning and women from 0-75% of provisioning, as seen in foragers. Both sexes are then hypothesized to trade provisioning for a reciprocal amount of childcare in a partner. Study 1 uses a sample of undergraduate Singaporean women (n = 197) to demonstrate that the more women expect to contribute to their household income, the less important social level becomes in a long-term mate. Study 2 uses an international community sample (n = 155) to show that both men and women expect to make less than their spouses when low in income, women expect to make the same as their spouses when high in income, and men expect to make more than their spouses when high in income. Women expect greater equality of provisioning and childcare the more they make, while men expect to make more than their spouses and do less childcare the more they make. Study 3 primed Singaporean undergraduates (n = 546) to feel like they would be high-earners or low earners when they graduate, and tested the effects of these conditions on preference for relative income across five levels of homemaking. It was revealed that women want men who make more than them even when husbands are willing to do 100% of

childcare when low in income, but are willing to marry men who make less than them if husbands are willing to do 50% or more of housework and childcare when high in income. Men want potential wives to make more than them when low in income unless their wives do 100% of housework and childcare, but when high in income men find women making less than them to be acceptable across all levels of homemaking, except when women are unwilling to do any. These studies provide initial support for bioecological exchange theory, and highlight the importance of considering relative income within potential couples instead of simply between intrasexual competitors, as well as the underestimated role of parental care on human mate choice.

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Dedication

For Owen Edson who always believes in me

Chapter 1: Introduction

What determines who people choose as marriage partners? Is this choice more affected by societal gender roles or an evolved logic that shapes our decisions even when we are not aware of it? Social roles theory argues that sex differences in mate preferences occur by bartering one sex's learned gender role traits (i.e. the ability to provide resources) for the other sex's learned gender role traits (i.e. nurturing children and keeping the home), and that when sex differentiation on gender roles is smaller, sex differences in mate preferences will be too (Eagly, Eastwick, & Johannessen-Schmidt, 2009). Sexual strategies theory, on the other hand, argues that sex differences in mate preferences are innate, and that while certain contextual factors can impact preferences, sex differences in mate preferences are hypothesized to remain consistent across cultures and gender equality levels (Buss & Schmitt, 1993). Bioecological exchange theory unites these theories by offering a model of mate preferences strongly shaped by both evolution and environment.

Bioecological exchange theory differs from sexual strategies theory in two key ways: 1) it identifies intersexual status differences within long-term relationships as an important aspect of mate selection, and 2) it emphasizes the role direct paternal investment plays as a tempering factor on women's preference for status in men. Bioecological exchange theory posits that women benefit most from an equitable division of parenting and providing because it allows them to balance the need for provisioning from mates with the avoidance of dependency and the negative effects that can have on women's reproductive success. Men, however, are predicted to

benefit most from providing more than half of a couple's resources and doing less than half of childcare because it allows them to cheat and get away with it as well as maximize maternal investment. However, bioecological exchange theory also highlights the importance of the fact that humans independently evolved direct paternal care; hormonal and behavioral data suggest that men are natural fathers. Thus, men will offer this direct care to potential long-term mates when they are less able to provide indirect care (i.e. resources) to offspring.

Bioecological exchange theory agrees with social roles theory in this respect: people's ecology, their environments, enhance or hinder their ability to provide resources. People seek to trade these resources for housework and childcare in a mate. However, bioecological exchange theory differs from social role theory in that it predicts that this will happen in a sex-differentiated manner: women are expected to go from being attracted to high-status, low parenting men when low in status themselves to being attracted to medium-status, medium-parenting men when high in status themselves. Men, on the other hand, are expected to go from being attracted to medium-status, medium-parenting mates when low in status to preferring low-status, high-parenting mates when high in status. Thus, sex differences will persist even when men and women are both high in status.

In short, bioecological exchange theory offers a view of human long-term mating that is more flexible than sexual strategies theory, but less flexible than social roles theory. A world in which just as many stay-at-home parents are fathers as mothers seems unlikely given that this puts men at risk of investing whole-heartedly

and opening themselves up to a higher risk of paternity uncertainty (Lammers, Stoker, Jordan, Pollmann, & Stapel, 2011). However, one in which dual-income and even egalitarian households continue to proliferate seems more likely, particularly in strongly monogamous societies, given that this arrangement can increase within-couple fertility (Fouts, 2008; Torr & Short, 2004; Olah, 2003; Cooke, 2009; Mills et al., 2008), childhood outcomes (Sarkardi, Kristiansson, Oberklaid, & Bremberg, 2008), and marital satisfaction (Perry-Jenkins & Folk, 1994), and decrease divorce (Hendrix & Pearson, 1995). However, as with any conflict between the sexes, a compromise between men's preferred strategy (male-breadwinner, female-homemaker) and women's preferred strategy (relatively equal providing and parenting from each partner) is expected, and is what is currently typical (Pew Research Center, 2013).

This paper is the first to explore the predictions and ramifications of bioecological exchange theory, and is the first to test its concepts in samples from the U.S. and Singapore. A survey study of Singaporean undergraduate women is used to explore whether as women expect to contribute more to their household income their preference for social status decreases. An international community sample is used to test whether real incomes affect preferences for relative income in a partner and the expected division of labor in a household. Finally, another Singaporean sample is used to prime different income levels to test whether the effect of income on mate preferences is causal rather than correlational. The final study also explores the impact of potential spouses' willingness to do housework and childcare on the relative

minimum income level required in a mate. Findings are broadly supportive of the hypotheses of bioecological exchange theory.

Chapter 2: Sexual Strategies Theory

What dictates who is attracted to whom for a long-term partnership? Sexual strategies theory (SST; Buss & Schmitt, 1993) argues that sex is one of the strongest determinants of long-term mate preferences. Sexual strategies theory (Buss & Schmitt, 1993) extends the logic of sexual selection (Darwin, 1871) and parental investment theory (Trivers, 1972) to human mating behavior. Darwin (1871) distinguishes survival advantage from reproductive advantage; surviving is only helpful from an evolutionary perspective if it is paired with reproduction. Reproductive advantage takes two forms: 1) successful intrasexual competition (e.g. one male gorilla physically defeating another for access to a harem of female gorillas) and 2) successful intersexual choice (e.g. a male Goldie's bird of paradise attracting a female by displaying his colorful feathers). Traits that aid the possessor in either effectively competing with the same sex or effectively attracting the opposite sex will become more common in the population over successive generations.

Trivers (1972) identifies the level of parental investment each sex bestows to their offspring as a key facet of sexual selection. Parental investment is anything a parent does that benefits the survival and reproduction of one offspring at the expense of decreasing the ability to invest in other offspring. Parental investment is linked to sexual selection in two important domains: 1) The sex that invests more will be more selective in choosing mates (i.e. intersexual choice) and 2) The sex that invests less will have to contend with same-sex others in order to gain access to the high-investing opposite sex (i.e. intrasexual competition; Buss & Schmitt, 1993).

Parental investment theory (Trivers, 1972) synthesizes research from across many different species to conclude that the sex with the larger, more energetically costly gametes (i.e. females) is more investing than the sex with the smaller, less energetically costly gametes (i.e. males), particularly when females experience internal gestation and lactation. Women have the more energetically costly gametes (i.e. ova), and have had to carry children for nine months and breastfeed them for several years throughout our ancestral past in order to insure their survival (Kenrick, Sadalla, Groth, & Trost, 1990). This means that the maximum number of children a woman can have is lower than the maximum number a man can have: a highly reproductively successful woman in preindustrial societies has 6-18 children, while emperors in ancient civilizations had hundreds of children (Betzig, 2012).

A woman's reproductive success is limited by the ability to reproduce and ensure the survival and reproduction of her children, while a man's reproductive success is limited by the ability to impregnate women (Kenrick, Sadalla, Groth, & Trost, 1990). Thus, according to parental investment theory, women should be more selective in choosing their mates, and men should be more competitive in intrasexual selection (Buss & Schmitt, 1993). However, men are unique among mammals in that they do invest in their children, and thus they are expected to be selective when choosing long-term mates (Buss & Schmitt, 1993).

Sexual strategies theory lays out the different problems men and women have faced when choosing a long-term partner throughout our evolutionary history, and sex-differentiated strategies are proposed that would minimize the effects of these

problems. Men have had to contend with paternity uncertainty and assessing female reproductive value, while women have had to assess the ability and willingness of men to invest in their mutual children (Buss & Schmitt, 1993).

Men's Long-Term Mating Strategy

Sexual strategies theory deduces that men have recurrently faced the problem of paternity uncertainty when choosing a long-term mate, and predicts that this problem will be ameliorated with sexual jealousy and a preference for chastity and faithfulness (Buss & Schmitt, 1993). Humans are one of less than 5% of mammalian species in which fathers invest in their offspring when females are already investing heavily (Geary, 2000). Sexual selection theory argues that selection would not have favored men who contributed so much of their time, energy, and even safety to provide, teach, and protect children of other men (Buss & Schmitt, 1993). While women are always certain of their maternity, men cannot be certain of their paternity, and cannot constantly guard their long-term mate to ensure she does not engage in extra-pair copulations (Buss & Schmitt, 1993). Men are more distressed by sexual infidelity than emotional infidelity, while the opposite is true of women (Buss, Larsen, Weston, & Semmelroth, 1992). Men value faithfulness and chastity more highly in a long-term than short-term mating context, value faithfulness more than any other characteristic, and see unfaithfulness as the most undesirable when selecting a long-term mate (Buss & Schmitt, 1993). In Buss' (1989) study of sex differences in mate preferences across 37 cultures, he found that men value chastity more than women in 62% of them. A subsequent study found that men find potential

partners who are virgins more attractive than women do, and find potential mates less desirable the more sexual partners they have had (Kenrick, Sundie, Nicastle, & Stone, 2001). By choosing a long-term relationship or marriage partner by her faithfulness and chastity, and becoming jealous in response to cues of sexual infidelity, men can increase the probability of fathering their partners' children.

The second problem men are hypothesized to have faced throughout our evolutionary past when choosing long-term mates is identifying reproductively valuable women, and it is solved by prioritizing physical attractiveness and youth (Buss & Schmitt, 1993). Physical attractiveness is posited to be a cue to age and health, which are associated with reproductive value (Buss & Schmitt, 1993). Buss (1989) found that men thought good looks were significantly more important when choosing a mate than women in 92% of the 37 cultures tested. Men were also found to prefer marriage partners younger than themselves in each of the same 37 countries (Buss, 1989). These findings were conceptually replicated in a nationally representative sample in the U.S. which demonstrated that men are less willing to marry physically unattractive partners and more willing to marry younger partners than women (Sprecher, Sullivan, & Hatfield, 1994). A more recent survey of over 200,000 participants in 53 nations similarly found that men ranked good looks and facial attractiveness more highly than women did, and that gender development and gender empowerment indices were not related to this sex difference (Lippa, 2007). Survey data supports the assertion that men prefer younger, more physically attractive women as long-term mates.

Women's Long-Term Mating Strategy

Women, on the other hand, have faced the problem of assessing whether men are able to invest in future children, and are predicted to do so by valuing ambition, good earning capacity, professional degrees, and wealth in potential long-term mates (Buss & Schmitt, 1993). Women value good financial prospect more than men in 36 out of the 37 cultures sampled, and in 78% of sample countries women value ambition-industrious more than men (Buss, 1989). In a nationally representative U.S. sample these results were conceptually replicated: women were found to be more willing to marry someone who earns more than them and has more education than them, and less willing to marry someone who earns less than them and has less education than them compared to men (Sprecher, Sullivan, & Hatfield, 1994). Similarly, women were found to value earning capacity more than men at every level of involvement (dating, sexual relations, steady dating, and marriage; Kenrick, Sadalla, Groth, & Trost, 1990). Women seem to value qualities in a mate which indicate the ability to provide resources more than men do.

Do women always need men's resources? Buss and Schmitt (1993) outlined the structural powerlessness hypothesis as an alternative hypothesis to SST's explanation of the sex difference in valuing resource-acquisition traits in a long-term mate. The structural powerlessness hypothesis is that women only prefer resources in a mate because they cannot access substantial resources any other way (Buss & Barnes, 1986). Furthermore, the structural powerlessness hypothesis assumes that men and women have identical information-processing systems when it comes to

mate selection, but different inputs, and thus different results (Buss & Schmitt, 1993). SST on the other hand argues that men and women have distinct information processing systems in the domain of mate selection, and that women with more resources will desire even more resources in a potential mate (Buss & Schmitt, 1993).

Several studies have provided evidence that the structural powerlessness hypothesis might be incorrect. Townsend (1989) surveyed medical students to see if sex differences in income preferences persisted amongst this potentially high-earning contingent. He found that they did: 60% of men wanted their spouses to make less than them, while 100% of women wanted their spouses to make as much or more than them. Furthermore, he found that 60% of women and 95% of men agreed with the statement, "Men stress physical attractiveness; women stress status and income". Similarly, Wiederman and Allgeier (1992) found a positive correlation between female undergraduates' expected personal income and the importance they gave to good financial prospect, indicating that the more these women expect to make, the more important earning potential is to them. This positive relationship between women's own socioeconomic status and their preference for resource-provisioning traits in a partner has been replicated in Jordan (Khallad, 2005) and Serbia (Todosijevic, Ljubinkovic, & Arcancic, 2003). Additionally, an internet survey of nearly 2,000 participants found that women's incomes predict preferring good financial prospect over physical attractiveness (Moore, Cassidy, Law Smith, & Perrett, 2006). Women seem to maintain or even increase the value placed on resources in a long-term mate as they rise in status.

Necessities and Luxuries of Mate Preferences

Studies have shown that there are sex differences in preferences for physical attractiveness and status for long-term mates, but these traits are often not rated very highly. For example, Lippa's (2007) large-scale, international study found that women ranked ambition 10th, industriousness 17th, money 20th, and social status 21st. Similarly, Powers (1971) found that good looks received a mean rank of 12 out of 14 traits for men across mate preference studies between 1939 and 1967. However, this could be because most college students are surrounded by healthy, fertile, and highly educated peers, and thus assume sufficiency in social status and physical attractiveness (Li, Bailey, Kenrick, & Linsenmeier, 2002). In ranked items, too, people might rank those traits they think about obtaining over traits that are essential, but taken for granted: if asked to rank the importance of oxygen, food, and water, people might rank food first because it is the resource that requires the most thought even though people cannot live without oxygen for more than a couple of minutes (Li, Bailey, Kenrick, & Linsenmeier, 2002). Physical attractiveness and social status for men and women respectively may be necessities in long-term mates — valued when scarce, but once sufficient levels are obtained diminish in value; other traits may be luxuries - unimportant when basic needs are unmet, but increasingly desirable once they are (Li, Valentine, & Patel, 2011). To investigate these issues, people need to consider potential mates while possessing high and low mating budgets.

Li and colleagues (2002) established in a series of studies in the U.S. that physical attractiveness is a necessity for men, and social status is a necessity for

women. Men spent most of their low budget on physical attractiveness and kindness, and significantly less of their high budget on these two traits, indicating that these are necessities for them. Women spent most of their low budget on social level and kindness, and significantly less of their high budget on social level, indicating that it is a necessity for them. Similar results were found in a cross-cultural study of the U.S. and Singapore, which found that men in both cultures prioritize physical attractiveness over kindness, liveliness, social level, and creativity, and women in Singapore prioritize social level over all other presented traits when considering a long-term partner with a low mate budget (Li, Valentine, & Patel, 2011). These results support SST's predictions that physical attractiveness is an essential selection criterion for men and social status an essential selection criterion for women when choosing long-term mates due to recurrent sexually dimorphic problems.

Mate Selection in Hunter-Gatherers

Given that SST claims that humans' sex-differentiated long-term mate preferences are a result of recurrent challenges faced throughout evolution, similar mate preferences should be found in modern foragers, who live as human ancestors did during the evolution of species-typical traits. Marlowe (2004) asked Hadza foragers about their mate preferences and found that women name foraging as the most important trait in a partner, while men name character. Furthermore, intelligence is more important to women than men, while men place more importance on fertility than women. Among the Tsimane forager-horticulturalists of Bolivia, men with community-wide influence have higher intra-marital fertility, and lower offspring

mortality, suggesting that marrying a high-status man would confer reproductive benefits to women (von Rueden, Gurven, & Kaplan, 2011). Additionally, at the societal level among foragers, the higher male contribution to diet is, the higher female reproductive success is (Marlowe, 2001). More studies need to be done investigating mate preferences of foraging populations, but the extant literature confers some credence to SST.

Mate Selection in the Real World

Some researchers have argued that stated mate preferences in surveys reflect people's a priori theories about the characteristics they think inspire interest in a potential romantic partner, but do not reflect real world mate choices (Eastwick & Finkel, 2008). There are three research paradigms that have addressed this issue: 1) personal advertisements, 2) marriage data, and 3) speed-dating studies. Personal advertisements allow researchers to see what people are really asking for and offering when soliciting a romantic partner, marriage data conveys who ends up with whom and how satisfied they are with those relationships, and speed-dating studies enable researchers to compare stated to actual preferences and observe the initial courtship process (Valentine & Li, 2012).

Evidence from personal advertisements has provided support for SST. Wiederman (1993) used a large (N = 1111) sample of personal advertisements to demonstrate that men are more likely than women to offer financial resources, and to seek attractiveness, appealing body shape, a photograph, and youth. Conversely, women offer appealing body shape, and seek financial resources more than men.

Furthermore, women's mating market value is highest when most fecund, in the late 20s, and women's market value predicts the number of traits demanded in personal advertisements (Pawlowski & Dunbar, 1999). Men's mating market value is shaped by income and the likelihood of staying married for 20 years (highest in the late 30s), and men's market value predicts the number of traits demanded in personal advertisements as well (Pawlowski & Dunbar, 1999). Online dating studies also provide support for SST: educational homophily increases with women's, but not men's increasing educational level (Skopek, Schulz, & Blossfeld, 2010); additionally, men are more influenced than women by physical attractiveness when choosing whether to request a date, while women are more affected than men by their own physical attractiveness (Lee, Loewenstein, Ariely, Hong, & Young, 2008). Real dating advertisements and dating choices support the predictions of SST.

There seem to be sex differences in mate choice based on superficial profiles, but what about when people choose mates based on live interactions, as has occurred throughout human evolutionary history? Eastwick and Finkel (2008) published a speed-dating study suggesting that while when asked in surveys how important physical attractiveness and earning prospects are men report valuing physical attractiveness more than women and women report valuing earning prospects more than men, men and women do not differ in how much these traits affect romantic interest when assessing real potential partners through speed-dating. However, the authors had limited variation in these traits because they used a college sample. By recruiting participants of average and low social status as well as average and low

physical attractiveness to take part in speed-dating events, we were able to demonstrate that stated sex-differentiated mate preferences do reflect actual romantic interest when sufficient variability is present (Li et al., 2013). Men prioritize physical attractiveness, while women prioritize social status when choosing long-term mates in a live-interactive context (Li et al., 2013).

Marriage data offer another lens through which to test SST predictions. Elder (1959) showed that women's physical attractiveness positively predicts her chances of marrying a high-status mate, and Udry and Eckland (1984) demonstrated that women's attractiveness is positively related to household, but not own, income (cf. McClintock, 2014). These findings support the assertion that women trade physical attractiveness for social status in a mate, and vice versa. Furthermore, female homemaker-male breadwinner couples are less likely to divorce (Heckert et al., 1998), while employed wives experience more thoughts of divorce (Huber & Spitze, 1980), and couples in which wives are employed are higher in marital instability (Booth, Johnson, White, & Edwards, 1984). American and Chinese wives are happier when their husbands' make more than them (Lucas et al., 2004) and husbands stay satisfied with their marriages over time to the extent that they have attractive wives (Meltzer, McNulty, Jackson, & Karney, 2014). In short, support for SST can be found in the literature on actual marriages and divorces.

Chapter 3: Social Role Theory

How flexible is human behavior? Do men and women really have evolved psychological mating strategies that have been shaped over millennia or are sex-differentiated cognitions, feelings, and behaviors merely a byproduct of male and female bodies interacting with local environmental factors? Social roles theory (SRT) claims that the division of labor between the sexes and resultant gender roles lead to sex differentiated thoughts, affect, and actions (Wood & Eagly, 2002). This division of labor is thought to be caused by 1) variations in the local culture, ecology, and economy, and 2) physical sex differences, particularly women's childbearing and lactation, and men's greater physical strength, larger size, and speed (Wood & Eagly, 2012).

Social role theorists argue that people choose long-term mates who minimize the costs and maximize the benefits of a cooperative dyadic alliance (Eagly, Eastwick, & Johannessen-Schmidt, 2009). The ideas behind SRT are drawn from Becker's (1976) economic analysis of mating decisions as utility-maximizing functions of men and women who exchange things of value such as men's income for women's work in the domestic sphere (Eagly & Wood, 1999). Becker (1985) demonstrates that returns for specialized human capital are maximized by a division of household labor - one individual focusing on market activities, the other on housework - but acknowledges that the traditional gendered division of labor may not be necessary to receive these returns. Social role theorists identify the existence of marital roles wherein men tend

to be breadwinners and women tend to be homemakers as the root of sex-differentiated mate preferences (Eagly & Wood, 1999).

According to SRT, anticipated marital roles lead people to choose long-term mates with characteristics that enhance the reciprocal marital role (Eagly, Eastwick, & Johannesen-Schmidt, 2009). To the extent that men tend to occupy a resource-provisioning role and women a caregiving role in a society, boys are socialized to be competitive and girls are socialized to be nurturant (Wood & Eagly, 2002). Thus, when it is time to consider who to marry, women find themselves falling more naturally into a homemaker or secondary earner role while preferring a mate who would be successful in an income-earning role, while men fall more naturally into a breadwinner role and prefer a mate who would be more successful in a domestic role (Eagly & Wood, 1999). The male preference for younger women and female preference for older men is explained similarly because couples in which the man is older than the woman will be more likely to perceive a male breadwinner-female homemaker division of labor as maximizing the family's utility (Eagly & Wood, 1999).

Eagly, Eastwick, and Johannessen-Schmidt (2009) provided experimental support for SRT in two studies which manipulated people's future marital roles, and then measured their mate preferences. Participants were asked to write a paragraph imagining their day-to-day life as the family's sole breadwinner, their family's secondary breadwinner, a stay-at-home parent, or simply being married with children (the control condition), and then rated four traits pertaining to a provider, and four

traits pertaining to a homemaker on how important each is in a spouse as well as preferred age difference. Participants rated provider traits as more important when they envisioned themselves as homemakers (compared to providers), and rated homemaker traits as more important when they envisioned themselves as providers (compared to homemakers). Women had a greater preference for provider characteristics than men; this was strongest in the control condition, and still persisted in the sole provider condition, though it was significantly reduced. People increased their preference for an older mate the less they anticipated providing, and women preferred an older mate than men. Participants were asked to keep their future self in mind as they indicated their mate preferences, which may have created demand characteristics; however, these studies do lend some support to the notion that people's expected marital roles influence their mate preferences.

What other types of studies could support SRT? Several levels of evidence would bolster the claim that people's mate preferences change dependent on their own expectations for themselves in society: 1) If in countries where there is more gender equality in the working world there are also smaller sex differences in mate preferences; 2) If over time as women gain more economic independence their preferences for older, more economically successful men decreases; 3) If marriages tend to occur and remain more stable between people with complementary roles apart from solely male breadwinner-female homemaker; and 4) If individuals within a society who have more egalitarian sex role beliefs have different mate preferences

from those with less egalitarian sex role beliefs (Eagly, Eastwick, & Johannessen-Schmidt, 2009). These four types of evidence are examined below.

Mate Preferences Across Cultures

Several studies have examined sex differences in mate preferences across cultures, and the potential moderating role of gender equality. Eagly and Wood (1999) reanalyzed Buss and colleagues' (1990) study of sex-differentiated mate preferences in 37 cultures, examining the effect of the Gender Empowerment Measure (GEM) and Gender-Related Development Index (GDI) on the importance of good earning capacity, good housekeeper, and physically attractive to men and women, and the effect of these measures on the sex difference on preferences for these traits. They also tested the effect of the GDI and GEM on age difference preferences. The Gender Empowerment Measure increases as: women's percentage share of professional, administrative, managerial, and technical jobs increases; women's share of parliamentary seats increases; and as men's and women's share of earned income becomes more equal (Eagly & Wood, 1999). The gender-related development index increases as access to healthcare, educational attainment, literacy, and wealth become more equal between the sexes (Eagly & Wood, 1999).

The results of Eagly and Wood's (1999) reanalysis of Buss and colleagues (1990) 37 nation mate selection study provided support for the notion that sex differences in the importance of good earning capacity and good housekeeper, as well as age preferences decrease the more gender equality there is across cultures. The higher countries were on the GEM, the smaller the sex differences were on the

rankings of good earning capacity and good housekeeper, and the smaller the sex difference in preferred age difference between self and spouse was. The relationships were weaker for the GDI and when looking at importance ratings instead of rankings, but still in the same direction. Increasing levels of gender equality did not affect the sex difference in importance of physical attractiveness; men think physical attractiveness is more important than women even in more gender egalitarian countries. Additionally, the sex differences in rankings of good earning capacity and good housekeeper were correlated across cultures, as were the sex differences between preferred spousal age and ranking of good earner. Taken together, these findings suggest that in countries where women are looking for older husbands with good financial prospects men are looking for younger women with good housekeeping skills, but in countries with more women in high-status roles men and women have more similar preferences.

These findings were called into question by Gangestad, Haselton, and Buss (2006) who showed that when latitude from the equator and nation's affluence were controlled all effects became non-significant except the decreased sex difference in preference for domestic skills, which seemed to be due to women's increasing preference for domestic skills in countries with more women in high-status positions. Fortunately, more studies have been conducted examining this issue. Zentner and Mitura (2012) gathered new data using internet samples (as opposed to the undergraduate samples previously used) in 10 nations with varying levels of gender equality according to the Global Gender Gap Index (GGI), and reanalyzed

Buss' (1989) cross-cultural data from 31 nations. The GGI is a new aggregate measure of gender equality across nations which takes economic, political, educational attainment, and health measures into account, and is not as influenced by countries' affluence as the GEM and GDI were. The 10 nation study found that as GGI increased, sex differences in mate preferences decreased even after controlling for latitude from the equator and gross domestic product. When looking at the mate traits individually, the sex difference for good financial prospect and education and intelligence decreased as GGI increased. Similarly, the higher the gender parity the lower the sex differences in ideal age difference, chastity, ambition/industriousness, and good financial prospect in Buss'(1989) data. Gender equity had the opposite effect on good looks: the more equal a nation was, the larger the sex difference in preference for good looks with men valuing this trait more than women. However, overall, the effect of GGI on the sex differences in evolutionarily relevant domains was significant and negative even after controlling for latitude from the equator, gross domestic product, and religion. These results indicate that gender equity does decrease sex differences in mate preferences on all traits identified as relevant by both SST and SRT except physical attractiveness.

As discussed above, Lippa (2007) also found sex differences in prioritization of physical attractiveness in a large-scale (over 200,000 participants) mate preference study in 53 nations; he also investigated the moderating effect of gender equality on sex differences. He had participants indicate the most important traits in a partner by selecting the three most important from a list of 23 traits and ranking them. The top

nine traits for both men and women were intelligence, humor, honesty, kindness, overall good looks, face attractiveness, values, communication skills, and dependability. All social status related traits except intelligence were not among the top nine. Women ranked honesty, humor, kindness, dependability, and communication skills more highly than men. These five traits were averaged to create a "niceness" variable for examinations of gender equality as a moderator of sex differences in mate selection. The GDI and GEM had no relationship with sex differences in the importance of physical attractiveness. Gender development and empowerment were associated with valuing "niceness" more in both men and women, but the sex difference also increased with increasing levels of equality. Intelligence told a different story. Women valued intelligence more than men in countries low on gender development, but men valued intelligence more than women in countries high on gender development. Lippa concludes that the male prioritization of physical attractiveness is likely evolved because of its consistency across cultures. Given the consistency of this finding across three cross-cultural studies, this is a valid conclusion. Women's greater preference for "niceness" in more egalitarian nations is difficult to interpret within the SRT framework because it could be beneficial in both a provider and a homemaker. The finding that women value intelligence more in low gender development countries, but men value intelligence more in high gender development countries goes against Eagly and Wood's (1999) prediction that sex differences would decrease with increasing gender development, but does correspond

with their notion that when women have higher status in a society their status is valued more by men when selecting mates.

Looking across these international studies of mate preferences, three things become evident. First, the sex difference in prioritization of physical attractiveness is stable across countries even after controlling for various measures of gender equity. Second, provider-related characteristics do seem to be less important to women and more important to men in countries that are more equal. Third, sex differences in homemaker characteristics do seem to be smaller in more equal nations. Overall, these findings suggest that men's prioritization of physical attractiveness is evolved, but women's prioritization of social status may be more influenced by environmental factors.

Mate Preferences Over Time

Over the past 50 years the roles of men and women in society have changed as more women have entered the workforce. Between 1980 and 2012, men's labor force participation has declined from 78% to 70%, and women's labor force participation has increased from 52% to 58% (Pew Research Center, 2013). The roles of mothers and fathers have been converging as men take on more housework and childcare and women take on more paid work (Parker & Wang, 2013). Fathers still do less domestic work than mothers (17 hours per week versus 32) and more paid work (37 hours per week versus 21; Parker & Wang, 2013). However, men did 6.5 hours of domestic work and women did eight hours of paid work per week in 1965, so both have more than doubled their contribution to the domain that used to involve little participation

(Parker & Wang, 2013). The pay gap between men and women has also decreased: among workers between the ages of 25 and 34, women's hourly earnings were 93% that of men, and these women were more likely to have a bachelor's degree than men (Pew Research Center, 2013). Compare this to 1980 in which young women earned two-thirds of men's hourly earnings and were two-thirds as likely to complete a bachelor's degree (Pew Research Center, 2013). Furthermore, college-educated women are now just as likely as those with less than a college education to marry, which was not the case as recently as 1990 (Fry, 2010), and while in most couples both spouses have the same level of education, mothers are now more likely to be more highly educated than their spouses, and over one fifth of mothers now make more than their husbands (Wang, Parker, and Taylor, 2013).

If mate preferences are sensitive to people's expected societal roles, then a shift in mate preferences should be apparent over time, specifically in men's preference for provider characteristics in women and women's preference for homemaker characteristics in men. Buss, Shackelford, Kirkpatrick, and Larsen (2001) examined the cultural evolution of mate preferences from 1939 to 1996 in the U.S using six cross-sectional samples in six decades. Sex differences persisted in that men valued good looks, good health, and good cook and housekeeper more than women, and women valued ambition and industriousness, good financial prospect, and similar educational background more than men across all six samples. However, overall sex differences did become smaller over time. They found overall increases in the valuation of mutual attraction and love, education and intelligence, sociability, and

good looks, and decreases in the valuation of chastity, refinement, and neatness in both sexes over time. Women decreased their valuation of ambition and industriousness, while men decreased their valuation of good cook and housekeeper and increased their valuation of good financial prospect and similar educational background over time. These findings suggest that people's expected roles in society may indeed impact their selection of a partner who complements their role.

Marriage data also supports this idea. Sweeney (2002) examined the relationship between own income and marriage formation across two age cohorts, and found that the positive relationship between earnings and marriage formation has increased over time in women, but not in men. The likelihood of marrying now increases the more a person earns, regardless of sex in the U.S.. This provides further support for the idea that as women's status in society is increasing, men are increasingly finding higher status more attractive in a mate.

Sex Role Beliefs and Mate Preferences

SRT can also be tested by investigating whether people with more egalitarian sex role beliefs have different mate preferences than people with more traditional gender role beliefs. More traditional gender role beliefs should be associated with men preferring women with homemaker traits and women preferring men with provider traits, while more egalitarian sex role beliefs should be associated with men and women having more similar mate preferences. Koyama, McGain, and Hill (2004) found that women with more feminist attitudes about marriage rank good earning potential lower and kindness higher than women with less feminist attitudes. Men's

feminist attitudes did not affect their mate preferences, and women's feminist attitudes did not impact their rankings of physical attractiveness or good housekeeper.

Eastwick and colleagues (2006) also tested whether gender ideology has any effect on men's preference for younger mates with homemaker qualities and women's preference for older mates with provider qualities across nine nations. Having a more traditional gender ideology was associated with a stronger preference for older mates in women and younger mates in men. Both men and women valued good financial prospects more the higher they were in traditional gender ideology, but this effect was stronger for women than men. Similarly, the higher the traditional gender ideology, the more both men and women valued good cook and housekeeper, but this effect was stronger for men than women. Finally, women higher in traditional gender ideology valued good financial prospect more, and men higher in traditional gender ideology valued good cook and housekeeper more in comparison to 19 other traits. These findings, in combination with those of Koyoma, McGain, and Hill (2004) support the notion that people's mate choices are affected by their gender ideology in a manner consistent with SRT.

Sex Role Beliefs, Relationship Satisfaction, and Divorce

Men and women may not always realize how their partners or spouses expect the household division of labor to occur until they are already living together, married, or have children. If gender ideology is an important determinant of relationship expectations, then relationship satisfaction should be negatively impacted

by mismatched gender ideologies and divorce should be more common in mismatched marriages. Several studies have supported this prediction.

Vanyperen and Buunk (1991) examined the effects of egalitarian sex role beliefs, relational equity, and referential equity on relationship satisfaction in a Dutch sample of 694 people who were either married (91.1%) or cohabitating (8.9%). Relational equity is defined as both members of a couple getting as much out of the relationship as they put into it. Referential equity is having as good of a give-and-take relationship as same-sex friends, colleagues, and brothers or sisters. Women in traditional relationships (male breadwinner-female homemaker) spent more time taking care of the children and doing domestic tasks than women in egalitarian relationships, and women spent more time on childcare and housework than men, even in egalitarian relationships. Men had more traditional sex role attitudes than women, and were more satisfied in their relationships. Both relational equity and referential equity were more strongly related to relationship satisfaction among egalitarian women than traditional women or egalitarian men. These results suggest that sex roles do have an effect on relationship satisfaction, as would be expected by SRT, but women are more affected than men. This may be because men benefit more from having a traditional division of labor than women do, even if they espouse egalitarian gender roles.

Brennan, Barnett, and Gareis (2001) examined the effects of wives' incomes and gender ideology on marital quality and dissolution in a national longitudinal sample of 4,353 couples. Several studies have found a relationship between wives'

income and marital disruption (e.g. Ross & Sawhill, 1975; Spitze & South, 1985), but several other studies using similarly large, representative data sets have found no relationship (e.g. Greenstein, 1990, 1995; South & Lloyd, 1995). This inconsistency in findings may be the result of not considering the effect of gender ideology on the relationship between wives' incomes and marital satisfaction and divorce (Brennan, Barnett, & Gareis, 2001). Brennan, Barnett, and Gareis (2001) found in their sample as well that wives who contribute larger proportions of the couples' incomes are twice as likely to divorce between waves one and two than wives who contribute smaller proportions of the couples' incomes. However, once gender ideology is entered into the model, wives' relative income contribution no longer affects likelihood of divorce. When husbands have a more egalitarian gender ideology the risk of divorce decreases. Marital commitment and satisfaction were better predictors of marital dissolution than women's relative contribution to couples' incomes.

So what leads to marital satisfaction? A subset of a nationally representative sample looking at married couples in which both spouses were working full time found that wives' (but not husbands') perceptions of household task equity led to higher marital satisfaction (Perry-Jenkins & Folk, 1994). Wives' perceptions of equity were related to an actual 50/50 division of labor when women were in order-giving professions, but not when they were in order-taker professions (Perry-Jenkins & Folk, 1994). Also, wives' higher proportion of income led to more conflict when both spouses were in order-giver professions, but had a non-significant relationship in the opposite direction when wives were in order-giver and husbands in order-taker

professions (Perry-Jenkins & Folk, 1994). Another study examining the division of labor and marital satisfaction in a large sample of couples with more diversity in family arrangements (male breadwinner, dual earner, and female breadwinner) similarly found that both spouses' marital quality was most strongly influenced by wives' perception of father-child relationship quality; thus, wives' perceptions of husbands' participation in child-rearing affected both husbands' and wives' marital quality (Galovan, Holmes, Schramm, & Lee, 2014). Both spouses are more satisfied with their marriage when they are more satisfied with the division of labor (Galovan, Holmes, Schramm, & Lee, 2014).

Taken together, these studies suggest that relationship dissatisfaction and divorce become more likely when women with gender egalitarian views or high-status jobs are paired with men who are not participating in housework and childcare. These findings support the notion proposed by SRT that people's expectations for long-term mates are shaped by expectations for their own role as a homemaker, equal partner, or breadwinner.

Chapter 4: Bioecological Exchange Theory

Social roles theory argues that people "prefer mates with attributes that complement their own anticipated marital role" (Eagly, Eastwick, & Johannessen-Schmidt, 2009, p. 405). Sexual strategies theory, on the other hand, "predicts that the evolved preference mechanisms are, in some cases, sexually dimorphic, and that as women and men get more resources they are in a better bargaining position and hence may expect even more from a prospective mate" (Buss & Schmitt, 1993, p. 224). Persuasive research has been offered in support of both theories. Both theories, however, have failed to distinguish between women's preferences for inter vs. intrasexual status in a mate, and have underestimated a fact that has a tremendous impact on the human mating system: humans are primates with paternal care (Hrdy, 2009).

Buss and Schmitt (1993) recognize that both men and women might value parenting skills in a mate, but they fail to fully acknowledge that paternal investment across species and in humans does not consist solely of resource provisioning. Bioecological exchange theory highlights the tradeoff between direct childcare and resource provisioning as valuable forms of paternal investment, both of which are attractive to women seeking long-term mates (e.g. Brase, 2006). Social roles theory, on the other hand, fails to recognize that while humans are unique primates, humans are still the product of evolution. It seems highly unlikely that humans developed the ability to be infinitely flexible in terms of psychological sex differences, just to replicate sex differences found in non-human primate species through social learning

(Stewart-Williams & Thomas, 2013). Bioecological exchange theory delineates a model of human mate preferences that is more flexible than that offered by sexual strategies theory, but less flexible than social roles theory. It predicts that both men and women trade resources for housework and childcare, but most women will prefer a man who can provide some resources because of women's recurrent provisioning needs during lactation.

A Third Way: Mate Preferences Are Not Infinitely Flexible, but Are Sensitive to Ecological Factors

During our evolution into modern homo sapiens, there was a large amount of climactic variability, which seems to have led to the evolution of adaptability in humans to many different ecologies (Potts, 2002). Potts (2002) put forward the variability selection hypothesis which posits that, "when a lineage of organisms encounters inconsistent conditions of survival and reproductive success, genetic variations that bestow adaptive versatility may be retained" (p. 50). Humans seem to be one such species (Richerson & Boyd, 2000).

Examining the behaviors of modern foraging populations can provide insights into evolutionary pressures which have shaped our behavioral predispositions across time. Looking at the variance in the division of labor across foraging societies can indicate the variance that might be expected across individuals in post-industrial societies. Men contribute anywhere from 25-100% of food across foraging societies, with a mean of 64% (Marlowe, 2001). Ecology has a significant impact on provisioning patterns: women are largely constrained to gathering because of infant

care (including nursing, which cannot be done by the fathers), so when plant-life is sparse or non-existent, as in arctic habitats, women contribute less than 10% of the food (Marlowe, 2007). However, when women can gather food for their families, they do: the average female contribution to diet is 45% among foraging groups who live in environments with effective temperatures over 13^{o}C, which has been more typical throughout our evolutionary past (Marlowe, 2001). Given the distribution of provisioning seen in foraging societies (25-100% for men, and thus 0-75% for women), women living in post-industrial societies might similarly be expected to want to provide between 0-75% of their household income and men 25-100% (Marlowe, 2001).

Technology as ecology.

Just as climate influences the patterns of division of labor in foraging societies, technology alters the way people divide household labor in post-industrial societies, which in turn changes social norms, thus facilitating further changes. For example, the use of infant formula increased the labor force participation of married women with children between 1920 and 1950, and the diffusion of household appliance and birth control pill use increased women's labor force participation rates and hours worked in the 1960's (Albanesi & Olivetti, 2007; Coen-Pirani, León, & Lugauer, 2010; Bailey, 2006). Social norms responsively shift as a consequence of more women entering the workforce, not the other way around (Rindfuss, Brewster, & Kavee, 1996). For example, a recent Pew Research survey (2013) found that 51% of respondents think children are better off with the mother at home even though 71%

of mothers with children under the age of 18 engage in paid work, and 65% of mothers with very young children have jobs. This suggests that changes in household division of labor precede attitude changes about men's and women's roles. These social changes can then feed back into the development of subsequent technologies that enable further increases in women's labor force participation. We thus hypothesize that when the local ecology permits women to work they will. While most women are hypothesized to prefer to provide around 50% of their household's resources, only those with higher-paying jobs will expect to be able to do so.

A Paradox: Increases in Women's Status at the Societal Level Change Mate Preferences, but at the Individual Level Do Not?

The cross-cultural studies discussed above repeatedly show that in societies where women's status is more equal to men's women value provider traits in a mate less and homemaker traits more than in societies where women's status is below men's (Kasser & Sharma, 1999; Zentner & Mitura, 2012; Lippa, 2007; Eagly & Wood, 1999). Similar effects were found when looking at mate preferences across time as women gained more equality with men in the U.S. (Buss, Shackelford, Kirkpatrick, & Larsen, 2001). However, multiple studies have shown that women who make more money still indicate that provider characteristics are important to them (Townsend; 1989; Wiederman & Allgeier, 1992; Khallad, 2005; Todosijevic, Ljubinkovic, & Arcancic, 2003; Moore, Cassidy, Law Smith, & Perrett, 2006). Does this mean that increases in women's status at the societal level change their mate preferences while increases in individual-level status do not? Bioecological exchange

theory proposes that the answer to this question can be found by considering intersexual equality as a valuable mate characteristic to women.

There are several ways that a woman suffers when she is lower in status than her husband that are evolutionarily relevant. First, powerful and wealthy people are more likely to cheat (Lammers, Stoker, Jordan, Pollmann, & Stapel, 2011; Atkins, Baucom, & Jacobson, 2001). Among the Tsimane forager-horticulturalists of Bolivia both physically dominant men and socially influential men have more extra-marital affairs (von Rueden, Gurven, & Kaplan, 2011). Better hunters also have more mates in the Ache and Meriam foraging societies (Smith, 2004). Female economic dependence is associated with more opposition to female promiscuity in both post-industrial (Price, Pound, & Scott, 2014) and pre-industrial societies (Schlegel & Barry, 1986). This means that when men are high in status and women are not, men can cheat on their wives, but wives will be judged harshly if they cheat on their husbands. Thus, it is easier for men to cheat without any significant negative repercussions when men are higher in status than their wives. Supporting this assertion, a nationally representative U.S. sample found that breadwinners with homemaking spouses are the most likely to cheat (Atkins, Baucom, & Jacobson, 2001).

Infidelity is the most common reason for divorce in pre-industrial societies as well industrialized nations (Marlowe, 2004; Betzig, 1989; Amato & Previti, 2003). A nationally representative survey in the U.S. found that 16.5% of men were involved with someone else before their marriage ended, and that divorce becomes more likely

when there are more alternative mates (South & Lloyd, 1995). The household income of divorced single mothers is half that of married women with children in the U.S. (Pew Research Center, 2013). Fathers spend less time and money on genetic offspring of former mates than genetic offspring of current mates; less than half as much when children reach an age at which child support is no longer legally required (Anderson, Kaplan, & Lancaster, 1999). After divorce in foraging societies the genetic father often ceases providing any investment because the mother and children go to live with another group (Shostak, 2000). By marrying a man who provides more than her, a woman stands a higher risk of losing him and most of his investment in their children.

Women who are financially dependent on their spouses have more difficulty leaving a marriage even when their spouses become abusive. Financially dependent women are more likely to be abused (Kalmuss & Straus, 1982; Kaukinen, 2004), pre-industrial societies with higher male control of resources have higher wife-beating prevalence (Levinson, 1989), and across 52 nations the higher the Gender Equality Measure, the smaller the percentage of women who have been physically abused by a male partner (Archer, 2006). Financially dependent women are also less likely to leave abusive relationships (Strube & Barbour, 1983), and are more likely to return to an abusive relationships (Aguirre, 1985). A ten country study found that victims of domestic violence are more likely to suffer from poor health, are more likely to have thought about or attempted suicide, and are more likely to have experienced a miscarriage (Garcia-Moreno, Jansen, Ellsberg, Heise, & Watts, 2005). Multiple meta-

analyses have found negative developmental effects of children witnessing domestic violence (Wolfe, Crooks, Lee, McIntyre-Smith, & Jaffe, 2003; Kitzmann, Gaylord, Holt, & Kenny, 2003). In fact, infants and children are more likely to die when their mothers are abused (Asling-Monemi, Pena, Ellsberg, & Persson, 2003; Ahmed, Koenig, & Stephenson, 2006). A woman's lower status compared to her husband puts her at risk of spousal abuse, which has detrimental effects on her reproductive success.

Given the heightened risk of spousal infidelity and domestic abuse when women are lower in status than their husbands, bioecological exchange theory predicts that the more a woman makes, the more equality of income she will want in a mate. Women are predicted to still favor mates who can provide some resources because of a recurrent need for provisioning during lactation throughout human evolutionary history. Marlowe (2003) revealed that Hadza foraging women provide 57% of the calories brought back to camp, while adult men provide 43%. Among married adults at a within-couple level, women provide more calories than men when they have no children, but men provide more calories than women between the birth of a child and weaning. This is due to women's lowered foraging efficiency during lactation (fewer calories brought back per hour foraging), as well as fathers providing more calories than men without young children. Among married adults with offspring under one, men provide 69% of the calories. This drops to 58% among married adults with children under three (breastfeeding becomes less frequent after the first year), and 53% among married adults with offspring under eight. These increased

provisioning levels were largely due to honey, which is easier to direct towards a man's own family than meat. Similar results were found in studies of two other forager groups - the Hiwi and the Ache (Hurtado, Hill, Hurtado, & Kaplan, 1992) - supporting the hypothesis that women benefit from pair bonds in foraging populations in part because of men's provisioning during the critical period of lactation. Women also benefit from pair bonds because of men's direct care.

The Other Half of Paternal Investment: Men Are Facultative Caregivers, and Women Find Caregiving Attractive

Among birds, 90% of species have paternal investment; indeed, paternal behavior is thought to be evolutionarily older than maternal behavior (Van Rhijn, 1990). However, only 3-5% of mammalian species have long-term pair bonds between males and females and paternal care (Clutton-Brock, 1991). Several rodent species are monogamous, biparental carers (e.g. Djungarian hamster, California mouse, Prairie vole), and a few primate species are as well (e.g. cotton-top and Golden lion tamarins, Common and black tufted-ear marmosets, Goeldi's monkey's, titi monkeys, and owl monkeys; Kentner, Abizaid, & Bielajew, 2010). Siamangs are the only other ape species with paternal care, but they are still distant relatives of humans (Fernandez-Duque, Valeggia, & Mendoza, 2009). Across species there seems to be a common biological substrate between monogamy, pair-bonds, and paternal care (Fernandez-Duque, Valeggia, & Mendoza, 2009). Humans are the only great ape with monogamy and fathers that carry, clean, teach, feed, defend, and play with their offspring, suggesting that direct paternal care independently evolved in humans.

Hormonal research suggests that men are naturals at fathering. The challenge hypothesis (Wingfield, Hegner, Dufty, & Ball, 1990), which has been corroborated across many species, posits that males in polygynous species (which typically have low paternal care) maintain high testosterone levels throughout the breeding season, while males in monogamous species (which typically have biparental care) have high testosterone levels when competing for mates, but low testosterone levels when pair bonded or caring for offspring. The monogamous, biparental pattern is found in humans (Stewart-Williams & Thomas, 2013). Van Anders and Watson (2006) conducted a longitudinal study which found that unpartnered men who later became partnered and stably partnered men had lower testosterone levels than unpartnered men who remained single. A subsequent study confirmed that the relationship between relationship status and testosterone is mediated by interest in acquiring new partners (van Anders & Goldey, 2010). These findings were further corroborated by a study of a large sample of military servicemen: unmarried men have higher testosterone levels than married men (Mazur & Michalek, 2008). A longitudinal representative study in the Phillipines found that men with high waking testosterone levels were more likely to become partnered fathers by 4.5 years later, fatherhood decreased their testosterone levels, and fathers involved in 3 or more hours of childcare each day experienced a greater decrease than those less involved in direct childcare (Gettler, McDade, Feranil, & Kuzawa, 2011). A recent study revealed that this decline starts even before birth; men's testosterone levels decline during the prenatal period (Edelstein et al., 2014). Men show testosterone reactivity to mate

competition, pair bonding, and offspring care the same way that other socially monogamous, biparental species do (Stewart-Williams & Thomas, 2013).

Men's biological reactions to children go beyond testosterone, are the same as those found in paternal animals, and are absent in non-paternal animals (Kentner, Abizaid, & Bielajew, 2010; Storey et al., 2000). Men's and women's gestational hormone variations are comparable: both have been found to experience elevated cortisol, prolactin, and estradiol levels just before birth (Storey et al., 2000; Berg & Wynne-Edwards, 2001; Edelstein et al., 2014). Fathers who engage in high levels of stimulatory contact (e.g. moving the baby in space, pointing to objects, touching the baby with objects) with their infant children experience increases in oxytocin, which facilitates social bonding (Feldman et al., 2010), and fathers have higher plasma oxytocin levels than non-fathers (Mascaro, Hackett, & Rilling, 2014). Furthermore, fathers experience increased activation of the reward centers in their brains when exposed to child picture stimuli, and decreased activation of reward and motivation regions when exposed to sexually provocative images compared to non-fathers (Mascaro, Hackett, & Rilling, 2014). Taken together, these results indicate that paternal care is innate in humans.

Paternal care could only evolve in humans if it led to some benefit to male reproductive success. A game-theoretic analysis found that the benefits of providing paternal care outweigh the costs of not engaging in extra-pair copulations (McNamara et al., 2003). Due to humans' large brains, infants are born helpless, and alloparental care (care from people besides the mother) is needed (Hrdy, 2009). Grandmothers and

siblings are helpful alloparents (Sear & Mace, 2008), but fathers also play an important role (Gray & Anderson, 2010), and increase their care when other alloparents are not available (Fouts, 2008) as is typical in post-industrial societies. Humans' extended childhood also contributes to this need; most great ape offspring provision themselves after weaning, but human children do not start producing more calories than they consume until they are 18 in foraging societies (Hrdy, 2009; Kaplan, 1994). Children are less likely to survive in foraging societies when they do not have an investing father (e.g. Hill & Hurtado, 1996; Dwyer & Minnegal, 1993). Furthermore, a longitudinal study conducted in a Caribbean village found that father absence or living with a step-father causes higher cortisol levels, illness, and immunosuppression, suggesting that an absence of paternal care might leave children more vulnerable to disease and stress (Flinn & England, 1997; Kentner, Abizaid, & Bielajew, 2010). Father care has positive effects in post-industrial societies as well. Sarkardi, Kristiansson, Oberklaid, and Bremberg (2008) reviewed 18 studies of the effects of father engagement (defined as play, reading, outings, or care-giving activities), and found positive effects in 17 out of the 18 articles, 12 of which controlled for socioeconomic status. They found that father engagement was particularly important for children of low socioeconomic status. Some of the positive effects that could impact reproductive success include avoiding homelessness and becoming a state benefit recipient when the children grew up, higher IQ scores, higher educational attainment, and lower emotional distress and mental illness rates. Male care can help offspring survive and thrive just as male provisioning can, and

may become more valuable when the local ecology enables women to provide resources themselves.

When women are contributing to food production, paternal care may even lead to higher fertility rates at the couple level. Aka and Bofi forager women say that the reason they are more fertile than women in nearby farming groups is because Aka and Bofi husbands help raise the children while farming husbands do not (Fouts, 2008). A study performed with a U.S. national probability sample found that couples in which women did less than 54% of the housework were 3.5 times more likely than couples in which wives did 54-84% of the housework to have a second child (Torr & Short, 2004). Olah (2003) similarly found that couples who equitably share family responsibilities have a second child sooner than couples who do not in Sweden and Hungary. Cooke (2009) also found an acceleration effect of sharing household labor equally on progression to second birth in Italy and Spain. Finally, Mills and colleagues (2008) found that among women with high work hours and pre-existing children, fertility intentions are lower if there is an unequal division of labor in Italy and the Netherlands. Not only does paternal care lead to positive outcomes for children, but it also leads to having more children in families with working women (which was typical in our ancestral environment).

Just as male resource provisioning is variable (some males are very committed and provide generously for their children while others desert their children), so too is direct paternal care. Among foraging societies some, like the Ache of Paraguay, rarely hold or interact with their babies and children (Hill & Hurtado, 1996), while others,

like the Aka of the Congo Basin Rainforest, play a substantial role in childcare (Hewlett, 1991). Aka fathers are within arm's reach of their infants more than 50% of the time, and hold their babies 22% of the time when they are in camp (Hewlett, 1991). This is similar to the 29% of the time Euro-American mothers in the U.S. hold their children when taking maternity leave (Hewlett, Lamb, Leyendecker, & Scholmerich, 2000). Aka and Bofi forager fathers increase their level of physical contact as their children are weaned (Fouts, 2008). Factors that increase men's contribution to childcare in foraging societies include monogamy, relatively equal male and female provisioning, close relationships between husbands and wives, high fertility, a lack of warfare, and valuing males and females similarly (Katz & Konner, 1981; Hewlett, 2000). Across preindustrial societies (foragers, horticulturalists, pastoralists, and agriculturalists), foragers spend the most time with their infants and children, and agriculturalists spend the least (Marlowe, 2000).

Hook (2009) examined men's unpaid work in 20 developed countries from 1965 to the present and found that as more married women enter the workforce, spend longer hours in the workplace, and when social policies enable men to take parental leave, men spend more time doing housework and childcare. So, across both pre-industrial and post-industrial communities, men's childcare increases as women's resource-provisioning increases. Bioecological exchange theory hypothesizes that when women are better able to provide for their families they become more attracted to caregiving in men, which could help to explain this trend. Sexual strategies theory acknowledges the importance of paternal investment when women are selecting a

long-term mate, and recognizes that men vary in their ability and willingness to invest resources in a partner, making resource-provisioning a good criterion for mate selection; however, SST fails to recognize that paternal care fits the same criteria of being reproductively valuable and sufficiently variable across men.

A few evolutionary psychologists, however, have realized that indicators of paternal care might be attractive to women. Roney, Hanson, Durante and Maestripieri (2006) measured men's interest in infants using an implicit picture choice task, then investigated women's attraction to these men for short- and long-term relationships. They found that women were able to accurately deduce which men were interested in infants, and preferred these men as long-term mates even when controlling for physical attractiveness, kindness, and masculinity (physical attractiveness and kindness also predicted attractiveness for a long-term relationship; masculinity did not). Similarly, a study which asked men explicitly whether they liked children, and then had their pictures rated for long- and short-term attractiveness showed that women do prefer the faces of men who like children for both types of relationship (Penton-Voak et al., 2007). Furthermore, women found pictures of a man more attractive for a long-term relationship and more sexually attractive when the man was vacuuming or playing with a smiling baby rather than ignoring the baby in an experiment; men were less affected by picture condition (Brase, 2006). Sex-role beliefs had no effect on either sex's attraction. Finally, a field experiment staged a confederate meeting with his "sister" and her baby, and either interacting with the baby or ignoring him (Gueguen, 2014). Eventually, the "sister" and her baby left, and

the confederate asked a young woman seated nearby for her phone number. The confederate was given the woman's phone number more often, and was rated as more attractive, fatherly, desirable for a long-term relationship, kind, and loving when he interacted with the baby. These studies show that women are attracted to signs of direct childcare in men, not just financial paternal investment.

Tradeoffs: The More Men Provide, the Less Childcare They Do

Given that sexual strategies theory has not taken the importance of paternal care into account, it also has not highlighted the tradeoff between indirect paternal investment and direct paternal investment that occurs across human societies. Among the Aka and Bofi foragers, higher status fathers spend a smaller proportion of their time in close proximity to their children than lower status fathers (Fouts, 2008). Tsimane forager-horticulturalist fathers engage in more direct care when their wives are working (Winking, Gurven, Kaplan, & Stieglitz, 2009). Similarly, a nationally representative time-use survey in the U.S. has shown that the more men make and the more hours they work, the less time they spend with their children on weekdays (Yeung, Sandberg, Davis-Kean, & Hofferth, 2001), and similar surveys in Australia, Denmark, France, and Italy have shown that men in male breadwinner couples do less routine childcare than men in any other family configuration (Craig & Mullan, 2011). However, the more educated a man is the more he contributes to childcare, so it seems to specifically be resource-provisioning in post-industrial societies that is traded off with direct paternal care (Craig & Mullan, 2011). Bioecological exchange theory hypothesizes that as women increase in their own resource-provisioning

abilities, they shift from a preference for indirect paternal investment to a preference for higher levels of direct paternal investment, and a reciprocal lower interest in resource provisioning.

Stanik and Ellsworth (2010) provided some initial support for this hypothesis when they looked at the effect of women's intelligence on their mate preferences and traditional gender role endorsement. They found that more intelligent women value financial provider characteristics less in a mate than less intelligent women, even when assessing mates with a limited mate budget. Additionally, more intelligent women endorse traditional gender ideology less than less intelligent women. Intelligence is correlated with income even after controlling for parents' socioeconomic status (Bergman, Corovic, Ferrer-Wreder, & Modig, 2014). This suggests that the relationship between egalitarian gender ideology and lower preference for provisioning traits as well as higher preference for caregiving traits may ultimately be caused by the ability of a woman to provide resources herself, with gender ideology playing a mediating role.

Hendrix and Pearson's (1995) cross-cultural examination of the relationship between female food production, father-infant proximity, and divorce in 186 pre-industrial societies provides further support for this hypothesis. Across societies, fathers spending more time in direct contact with their children was associated with lower divorce rates. This was particularly true of societies in which females contributed substantially to food production: when fathers did not spend much time near their children divorce rates were 57%, while when fathers spent more time with

children divorce rates were 19%. As the author concludes, “marriage is stabilized if women are heavily involved in productive labor and men are involved in reproductive labor” (Hendrix & Pearson, 1995, p. 226). The only other type of society with a similarly low divorce rate (17%) is agricultural societies with low female economic and political power, which also tend to limit women’s access to divorce. Thus, when women have full access to divorce in pre-industrial societies, the best way to stabilize marriages is for women’s contribution to subsistence and men’s contribution to parenting to approach equality. This suggests that women who are capable of provisioning their families might have increased preferences for paternal caregiving characteristics.

Men’s Tradeoff: Mating Effort vs. Parenting Effort

If paternal care is so beneficial to children, so attractive to women, and such a stabilizing factor for marriages, then why do mothers devote more time to direct care on average than fathers across all known societies (Gray & Anderson, 2012)? This is largely because of the tradeoff that men face between effort put into acquiring mates and effort put into parenting. By pursuing status and resources men can both attract new mates and provide for long-term mates. High-status men among Tsimane forager-horticulturalists have more in-pair surviving offspring, as well as more extra-marital affairs (von Rueden, Gurven, & Kaplan, 2011). A representative U.S. sample showed that high-income men have sex more often, and have a higher number of biological children; however, higher education levels negatively impacted both of these variables (Hopcroft, 2006). Anderson, Kaplan, and Lancaster (1999) explore

men's financial contributions to the raising of genetic and non-genetic children. They show that men spend as much money on step-children of their current mates as genetic children of former mates, both in the form of general annual expenditures and college tuition. This suggests that the resources men acquire by working can be used to invest in their biological children, but is also used as a form of mating effort (Anderson, Kaplan, & Lancaster, 1999). Time and energy put into direct care for genetic offspring is non-transferable to extra-pair mates or new wives, so it should be most appealing to men when monogamy is typical (i.e. when a man's reproductive success is constrained by his wife's reproductive success), and less appealing when polygyny is typical (i.e. a man can have exponentially more children by accruing resources, and then acquiring more wives). Marlowe (2000) found that this is the case: the highest levels of father-infant proximity occur in polyandrous societies (one wife with multiple husbands; not a very common mating system), similarly common in monogamous and slightly polygynous societies (where most people still mate monogamously, but polygyny is legal), and lowest in societies that have general polygyny. So, while for women's mating interests a man who has moderate status and helps out substantially with housework and childcare is ideal, men benefit from focusing mostly on provisioning because it allows them to invest in their children, but also leave their mating options open.

The Puzzle of High-Status Women

Are men attracted to women who are good providers? On the one hand, female provisioning does have its benefits. A study of Tsimane forager-

horticulturalists found that work effort is correlated between spouses, and the more the pair contributes to productive activities, the more children they have (Gurven, Winking, Kaplan, von Rueden, & McAllister, 2009). Among the Hadza foragers of Tanzania, while women value foraging more than men, foraging was still among the top three most important traits to Hadza men (Marlowe, 2004). There was a correlation between preference for good foraging or hardworking wife and the importance placed on fidelity; men who thought good looks were important were less likely to value foraging and more likely to value youth (Marlowe, 2004). These correlations could map onto a long-term mating phenotype and a short-term mating phenotype, respectively, which have been shown to exist in humans (Wlodlarski, Manning, & Dunbar, 2015). Pillsworth (2008) found no sex differences in the importance of physical attractiveness and resource-related traits in a long-term mate preference ranking task performed by Shuar forager-horticulturalists. However, when Shuar high-schoolers assessed actual peers who had been rated on various traits, provider qualities predicted romantic desirability for women, but not men. The ability to provide food may be attractive in a mate for foraging men, but not the most important trait.

Evidence from post-industrial societies also suggests that some income is a good quality for a potential wife to have. A nationally representative U.S. sample demonstrated that while women find “not likely to hold a steady job” less attractive than men, men still find this trait unattractive (Sprecher, Sullivan, & Hatfield, 1994). College-educated men find women more attractive as a marriage partner the more

they make up until about $40,000; values higher than this do not make women any more or less attractive (Kenrick, Sundie, Nicastle, & Stone, 2001). Another representative U.S. sample study found that men were unwilling to marry a woman without steady employment, and men who made more and were more highly educated were less likely to want to marry a woman of low socioeconomic status than low status men (South, 1991). Assortative mating on both education (Breen & Salazar, 2011) and income (Sweeney & Cancian, 2004) have increased over time as more people have gone to college and more women have entered the workforce in the U.S. However, as mentioned above, men are better able to cheat on their wives when their wives are economically dependent on them, suggesting that men might prefer a mate who makes less than them, but more than nothing (Atkins, Baucom, & Jacobson, 2001). Supporting this idea, Brown and Lewis (2004) found that men preferred office assistants over co-workers or supervisors for a long-term relationship. Taken together, these findings suggest that men might prefer women to make less than themselves, but still be capable of providing some resources.

The Current Research

To provide insight into the paradox of men's and women's changing preferences in response to societal gender equality, but not individual increases in income, the current research examines how people's long-term mate preferences change as a function of the proportion of household income they expect to contribute. The potential tradeoff people make between direct parental investment and indirect parental investment will also be examined. Our studies will address three questions

about long-term mate section: 1) Do people lower their preference for social status as the proportion of household resources they expect to provide increases? 2) Do people trade resources for childcare in mate selection? 3) Are there sex differences in people's long-term mate choices even at high levels of income?

The current research will significantly contribute to the debate between proponents of sexual strategies theory and proponents of social role theory. By bringing the focus to relative status within the household rather than relative status of potential mates compared to their same-sex peers, these studies will clarify some of the inconsistencies in the literature. Additionally, by examining the tradeoffs people make between provider characteristics and caregiver characteristics, the importance of the latter will be revealed. As outlined below, bioecological exchange theory argues that both men and women change their mate preferences as they become capable of acquiring more resources, seek to trade those resources for childcare, but still do so in a sex-differentiated manner.

Predictions

Hypothesis 1: The greater proportion of household income an individual expects to provide, the less they will value social status, and the more they will value homemaking characteristics in a long-term mate.

Hypothesis 2: Women would ideally like to provide around 50% of resources and men would ideally like to provide more than 50%, but less than 100% of resources.

Hypothesis 3: Both men and women will seek to trade resources for housework and childcare in a long-term mate.

Hypothesis 4: The more women make, the more equality of provisioning and caregiving will appeal to them, while the more men make, the more a male breadwinner-female homemaker model will appeal to them.

Hypothesis 5a: The more women make, the more acceptable it will become for potential husbands to make less than them if potential husbands are willing to do 50% or more of the housework and childcare.

Hypothesis 5b: The more men make, the more acceptable it will become for women to make less than them regardless of housework and childcare levels except when their spouse is unwilling to do housework and childcare.

Hypothesis 6: Sex differences will persist in the amount men and women expect potential spouses to make across different levels of housework and childcare.

Chapter 5: Study 1

Study 1 tested how women's expected contribution to household income relates to their preferences for kindness, social status, physical attractiveness, creativity, and liveliness using the budget allocation paradigm (Li, Valentine, & Patel, 2011; Li & Kenrick, 2006; Li et al., 2002) to examine mate preference priorities. Previous studies showing that women who make more money still want high social status in a mate have not forced them to use a constrained budget (e.g. Townsend, 1989; Wiederman & Allgeier, 1992). Men and women both raise their minimum standards across mate traits when they are high in status (Kenrick, Groth, Trost, & Sadalla, 1993), indicating that this gives them high mate value (Buss & Shackelford, 2008). Forcing women to indicate their mate preferences using a constrained budget will show what they prioritize, while previous methods have only shown that they generally have higher standards. Given our arguments above about the benefits of paternal care and the possible detrimental effects of high status husbands, we predicted that on the individual level, women who expect to provide as much or more income than their husbands will value social status less in potential long-term mates than women who expect to provide less than half of their household income.

Method

197 female students at Singapore Management University responded to a survey online inquiring about their mate preferences (mean age = 20.71). Participants were asked to indicate what percentage of their household income they expected to earn when they were married. The distribution was non-normal, so we divided

participants into two similarly-sized groups appropriate for our hypotheses: women who expected to make less than their husbands (financially dependent; 43.6%) and women who expected to make as much or more than their husbands (financially independent; 56.4%). The mate-budget paradigm asked participants to allocate 10 mate dollars across five attributes – physical attractiveness, kindness, liveliness, social status, and creativity.

Results

Financially independent women prioritized kindness over every other trait in a long-term mate (see Table 1). Financially dependent women prioritized kindness and social status equally. GLM analysis of the mate budget allocations were performed with percentage of expected income (financially independent vs. financially dependent) as a between-subjects variable, and characteristic as a within-subjects variable. There was a significant interaction between projected financial independence and mate preferences, F (4, 676) = 48.56, $p < .001$. An interaction occurred when comparing kindness to social status at the different levels of financial independence, $F(1, 169) = 7.07$, $p < .01$. Financially independent women spent less of their constrained mate budget on social status ($M = 1.92$, $SD = 0.91$) than financially dependent women ($M = 2.23$, $SD = 1.01$), $t(169) = 2.27$, $p < 0.05$. These results suggest that financially independent women prioritize social status less than financially dependent women do, and may value kindness more. Kindness may be an indicator of willingness to invest in children as it often factors with child-related mate traits (e.g. Kenrick, Sadalla, Groth, & Trost, 1990).

Table 1

Low-budget spending on long-term mate characteristics

Characteristic	Financially Independent	Financially Dependent	Difference
Kindness	30.10[a]	26.96[a]	3.14[†]
Social status	19.51[b]	23.04[ab]	-3.53*
Creativity	12.82[c]	11.74[d]	1.08
Liveliness	18.45[b]	20.87[bc]	-2.42[†]
Physical attractiveness	19.13[b]	17.39[c]	1.74

Note. Budget attributions have been converted to percentage of total budget for ease of understanding. Superscripts denote comparisons within a column. Means with different superscripts are significantly different from one another ($p < .05$, Bonferroni adjusted).
*$p < .05$. [†]$p < .10$

Discussion

As predicted, women who expect to provide at least as much as their future husbands value social status less and kindness, a trait that may indicate family orientation (Kenrick, Sadalla, Groth, & Trost, 1990), more than women who expect to provide less than half of their household income. There are two important limitations to this study: 1) it was performed on undergraduates who have not entered the job market, and thus may not be able to accurately assess their ability to contribute, and 2) it did not ask participants explicitly about their preferences for men interested in substantially contributing to housework and childcare. These issues are addressed in Study 2.

Chapter 6: Study 2

Study 1 showed that women who expect to make as much or more than their husbands prioritize social status less than women who expect to make less than their husbands in an undergraduate sample in Singapore. Study 2 sought to conceptually replicate these findings in an international sample with a broader range of ages and socioeconomic backgrounds. Men are included in this study so we can examine intra- and inter-sexual differences. Study 2 goes beyond Study 1 by examining whether people trade income for housework and childcare. We predict that women will prefer to make around 50% of their household income while men will prefer to make more than 50% of their household income. Furthermore, because higher incomes should allow each sex to expect their preferred division of household labor, we predict that low income women will expect a male breadwinner/female homemaker division of labor while high income women will expect a more 50/50 division of paid work and childcare; low income men will expect a 50/50 division of paid work and childcare and high income men will expect a male breadwinner/female homemaker division of labor.

Method

Participants and procedure. Online participants (N = 155) were recruited through Amazon's Mechanical Turk, completed an online survey, and were paid 1 USD for their participation. Four participants were excluded because they were homosexual. Most were living in the U.S. (88.1%), with those outside of the U.S. living in India (7.9%), the Phillipines (2%), Romania, Belgium, and Serbia (.7%

each). All participants were fluent in English. The majority of participants were white (76.7%), 13.3% were Asian, 4.7% were black, 4% were Hispanic, and 1.3% were other race. Seventy-three men (ages 21-57, M = 34.30, 95% CI [32.28, 36.33]) and 78 women (ages 20-67, M = 37.46, 95% CI [35.05, 39.87]) participated.

Materials.

Desired Contribution to Household Income. Participants were asked, "When you are married what percentage of the household income do you want to contribute?" and were given a scale from 0 to 100.

Income and Expected Relative Income. Participants were asked how much they made in yearly income before taxes in U.S. dollars on a scale from 1 (*$0*) to 14 (*Over $200,000*) in $10,000 bands. The median income for both men and women was 4, or $20,001-$30,000. This median is similar to the U.S. median individual income for individuals 18 and over, which is $28,662 (U.S. Census, 2013). We also asked participants how much they expected their spouses to make using the same scale. We calculated expected relative income by dividing the participants' own incomes by the sum of their spouses' expected incomes and their own incomes. So a value below .5 indicates a participant expecting their spouse to make more, .5 indicates expecting their spouse to make the same, and a value above .5 indicates expecting to make more than their spouse.

Expected Division of Labor. Participants were asked how much they expect their spouse to contribute to the rent/mortgage, food costs, monthly bills, childcare (specified to be direct childcare, "e.g. changing diapers, putting kids to bed, playing

with kids, taking care of kids when they are sick"), household cleaning, and cooking on a scale from 1 (*0% you, 100% your partner*) to 11 (*100% you, 0% your partner*), with 6 representing a 50/50 sharing of contribution to that task. We used principal axis factoring to see if all items loaded onto one factor, and they did; this factor explained 65.51% of the variance. Rent/mortgage, food costs, and monthly bills loaded positively, and childcare, household cleaning, and cooking loaded negatively; all loadings were higher than .5. Participants' scores were recoded to create the Gendered Division of Labor Scale (α = .85 for women, .81 for men); 1 represents expecting the man to do all of the housework/childcare and the woman to pay all household expenses, 6 represents expecting the man and woman to share expenses and housework/childcare equally, and 11 represents expecting the man to pay all household expenses and the woman to do all of the housework/childcare.

Results

Desired Income Contribution. As predicted, women's desired contribution to household income was not significantly different from 50%, M = 47.21, $t(77)$ = -1.31, *ns,* 95% CI [-7.06, 1.47], while men's desired contribution to household income was significantly higher than 50%, M = 64.97, $t(72)$ = 6.14, $p < .001$, 95% CI [10.11, 19.83]. Most women (53.84%) wanted to make the same amount of money as their husband, while only 28.76% of men indicated the same; most men wanted to make more than their wives (60.27%). The range for men was 20-100%; for women it was 0-100%. Only 10.96% of men wanted to make less than their spouses, while 28.21% of women wanted to make less than their spouses; 17.95% of women wanted to make

more than their spouses.These findings support our hypothesis that women prefer equality of resource provisioning while men prefer to provide more than half of resources.

The Effects of Own Income and Sex on Expected Relative Income. Age, sex, income, and the interaction of sex and income were entered into a regression equation. Age was entered as a covariate in all of our regressions because cohort effects have been reported in some mate preference studies and our age range was larger than an undergraduate population's (e.g. Buss, Shackelford, Kirkpatrick, & Larsen, 2001). The model was significant, $R^2 = .46$, $F(3,147) = 42.50$, $p < .001$. Age did not predict expected relative income, but sex, $b = -.11$, 95% CI [-.149, -.072], $\beta = -.34$, $p < .001$, and income, $b = .04$, 95% CI [.03, .04], $\beta = .55$, $p < .001$ did (see Figure 1). Notice that the slopes are parallel, indicating that the correlation is similar

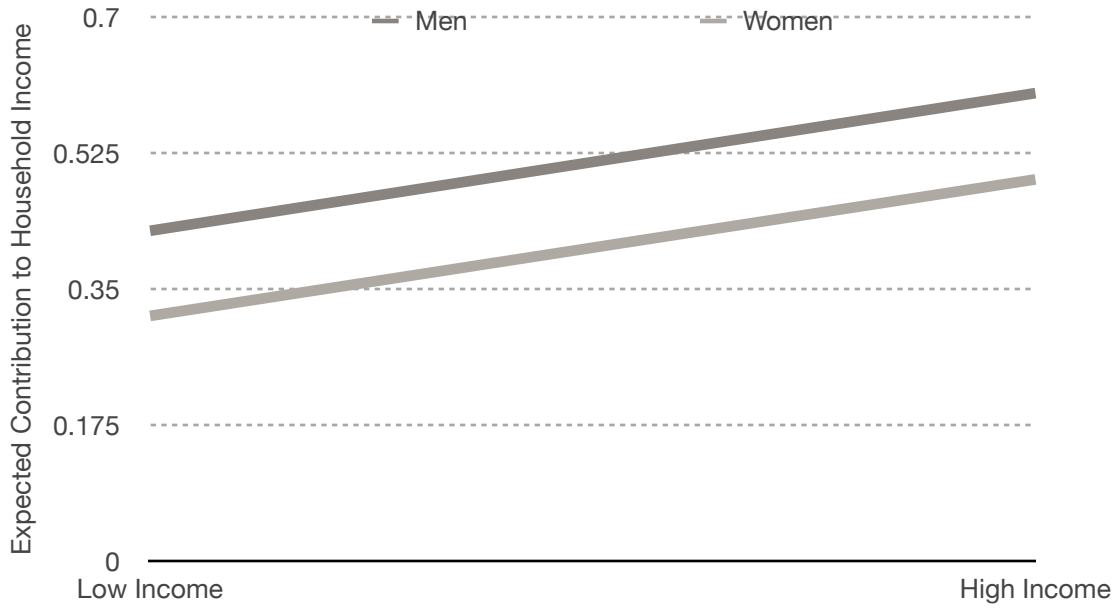

Fig. 1. Effect of own income and gender on expected relative income [own income/(spouse's expected income + own income)].

for men and women. Income explained 30% of variance beyond that of sex and age. Men and women both expect spouses to make more than them when low in income, but when high in income women expect to make about the same as their spouses, and men expect to make more than their spouses.

The Effects of Income and Gender on Expected Division of Labor. To examine whether people are trading resources for housework and childcare we tested a mediation model using Hayes' Process (2013) with expenses mediating the effect of income on housework/childcare, controlling for age (see Figure 2). The model was significant, total effect of income on childcare/housework = -.24, 95% CI [-.40, -.09], t = -3.07, p = .003, direct effect of income on childcare/housework = -.13, 95% CI [-.26, .01], t = -1.83, ns. Expected expense contribution mediated the relationship between income and childcare/housework, suggesting that people trade provisioning for housework and childcare.

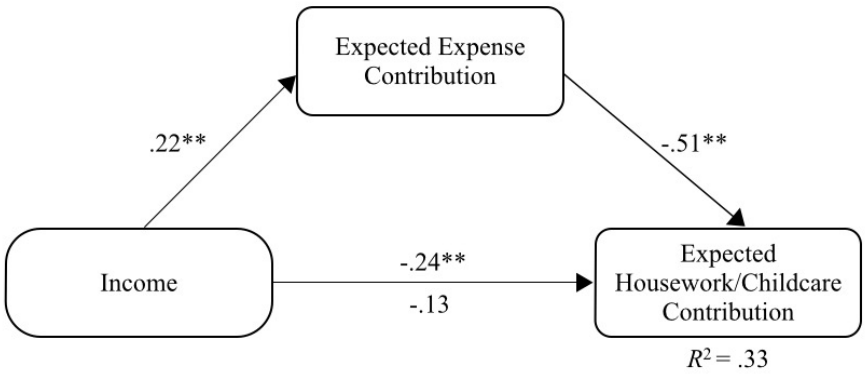

Fig. 2. Mediation model showing the effect of income on expected contribution to housework and childcare as mediated by expected contribution to household expenses, controlling for age. Standardized regression coefficients are shown (*p < .05; **p < .01). The total effect of income on expected housework/childcare contribution is above the line and the direct effect below the line.

To examine how income and gender affect the gendered division of labor within households, age, gender, income, and the interaction between gender and income were regressed onto the Gendered Division of Labor Scale. The model was significant, $R^2 = .13$, $F(4, 146) = 5.53$, $p < .001$. There was a main effect of age, $b = -.04$, 95% CI [-.06, -.02], $\beta = -.26$, $p = .001$, suggesting that older people are more likely to expect the man to do the breadwinning and the woman to do the homemaking. The effect of gender was non-significant, but the effect of income was significant, $b = -.17$, 95% CI [-.31, -.03], $\beta = -.28$, $p = .014$. These main effects were qualified by a significant interaction between gender and income, $b = -.32$, 95% CI [-.51, -.13], $\beta = .37$, $p = .001$. The more men make the more they expect a male breadwinner/female homemaker division of labor, $b = .17$, 95% CI [.03, .31], $t = 2.48$, $p = .014$, while the more women make, the less they expect a male breadwinner/female homemaker division of labor, $b = -.15$, 95% CI [-.29, -.02], $t = -.26$, $p = .025$ (see Figure 3). Given that women do not pass the equality point of six by 1 standard deviation above the mean, it is accurate to say that the more they make the more equality of paid and unpaid labor they expect, as predicted.

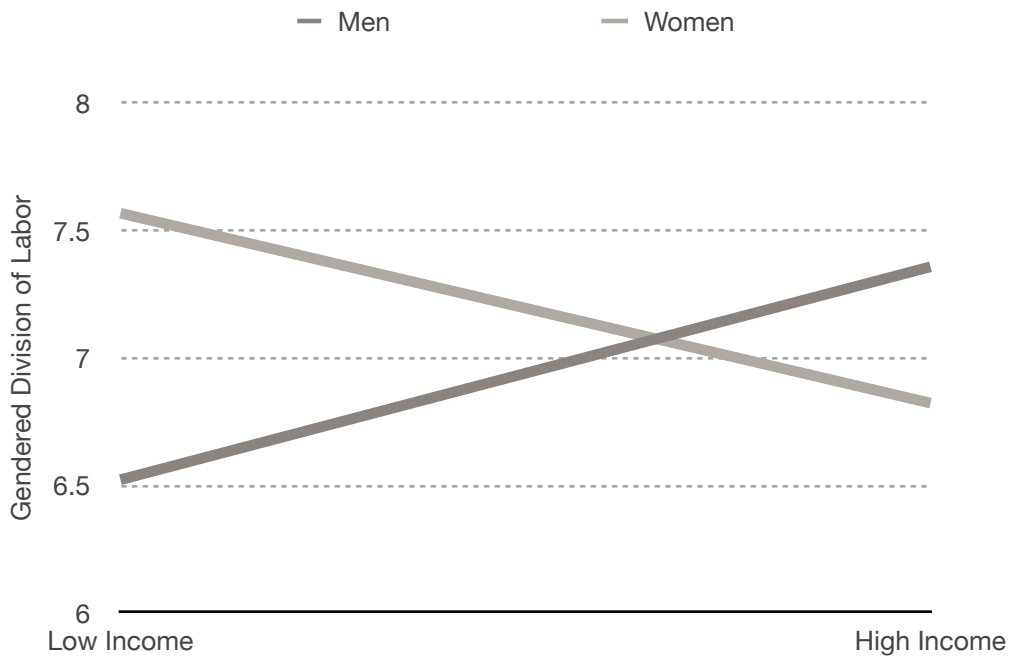

Fig. 3. Effect of gender and income on gendered division of labor. One indicates an expectation that women will cover 100% of household expenses and men 100% of housework and childcare, six indicates a 50/50 division of expenses and housework/childcare, and 11 indicates men covering 100% of expenses and women 100% of housework/childcare.

Discussion

Income and gender both affected expected relative contribution to household income, with low income men and women expecting to make less than their future spouses, high income women expecting to make the same as their future spouses, and high income men expecting to make more than their future spouses. Expected expense contribution mediates the relationship between income and expected participation in housework and childcare. Having a higher income leads both men and women to anticipate contributing more to bill paying, housing payments, and food payments, and in turn both sexes expect to trade these for housework and childcare in a long-term mate. Examining this from the framework of a gendered division of labor, we show that the more money men make the more they expect a male breadwinner/

female homemaker household model, while the more money women make the more they expect equality of housework and paid work.

Chapter 7: Study 3

Study 2 demonstrated that people do expect to contribute relatively more to their household income when they make more money, and that they expect to trade resource provisioning for housework and childcare in a mate. However, it did not establish a causal relationship between income and mating expectations. It could be that more competitive people have higher incomes and want equal partners if female, or subordinate partners if male. However, bioecological exchange theory hypothesizes that people are sensitive to changes in their environment that allow them to provide more resources, but that sex differences will persist even when men and women are both high in income. Specifically, when women have high incomes they are expected to be more accepting of their husbands making less than them if their husbands are willing to do 50% or more of childcare. Men, on the other hand are expected to be accepting of their partners making less than them at any level of childcare provisioning except 0% when they are high in income. A new measure was designed to test the tradeoffs people are willing to make between direct parental investment (i.e. childcare) and indirect parental investment (i.e. resource provisioning) in a potential spouse, and an income level manipulation was used to establish causation.

Method

Participants and procedure. Participants ($N = 546$) were recruited via email at Singapore Management University and were compensated with the chance to win SGD 200; 23 were excluded because they were more attracted to members of their

own sex. The majority of participants were of Chinese ethnicity (79.7%), 10.6% were Indian, 2.9% were Malay, 1.1% were Eurasian, and 5.7% were other ethnicity. 223 men (ages 19-36, $M = 23.67$, 95% CI [23.35, 24.00]) and 323 women (ages 18-35, $M = 21.94$, 95% CI [21.70, 22.19]) participated.

Materials.

Income Level Prime. Participants were told that we were interested in how students' incomes after graduation affect cognitions about their daily lives. There was a low income condition and a high income condition that were designed based on the average earnings of the lowest quartile for the least lucrative major and the average earnings for the highest quartile of the most lucrative major at the university. Focus groups conducted before the study indicated that lower salaries would not seem realistic to Singaporeans because they tend to live with their parents until marriage, so would just wait for a better salary if it was below an appropriate level for a college graduate. They were told, "Imagine you've recently graduated and been on the job market for quite some time. You are offered a job that pays a gross monthly salary of SGD 2,600 (6,000). You take the job." They were then asked to write about what their day-to-day life would be like.

Financial Independence. We used Moore, Cassidy, Law Smith, & Perrett's (2006) financial independence scale as a manipulation check. It measures how capable people think they are of supporting themselves, and how much autonomy they have in the workplace. An example question is, "How financially independent are you (i.e., how comfortably could you survive without the assistance of others such

as your partner, your parents, etc.)?" Responses were on a scale from 1 *completely dependent on others* to 7 *completely independent*. Scale reliability was acceptable, Cronbach's alpha = .71.

Expected Income. At the end of the survey we asked participants, "What do you think your gross monthly salary will be in your first job after you graduate?"

Minimum Relative Income Level. Students were asked to indicate the minimum income level that would be acceptable to them in a marriage partner in several different contexts. The contexts were different levels of housework and childcare that a potential partner was willing to do. There were five levels: 100%, 75%, 50%, 25%, and 0%. There were 11 different income levels that could be selected that were chosen based on Singapore's individual income deciles for working adults (there are 11 values because 0 was added), and ranged from SGD 0 to SGD 15,600 per month. The level they chose was subtracted from the income for their condition to create the minimum relative income level.

Results

Manipulation Check.

A two-way MANOVA was used to test the effects of sex and income level (high income after graduation prime vs. low income after graduation prime) on financial independence and expected income. There were significant multivariate main effects for sex, Wilks' lambda = .96, $F(2, 540) = 10.82$, $p < .001$ and income level, Wilks' lambda = .97, $F(2, 540) = 9.87$, $p < .001$. The interaction was not significant.

There was a univariate effect of sex on expected income, $F(1, 541) = 21.50$, $p < .001$, but no effect on financial independence. Men ($M = 4028.39$) expected to make more than women ($M = 3319.48$). There were univariate effects of income level on expected income, $F(1, 541) = 5.42$, $p < .05$, and financial independence, $F(1, 541) = 15.21$, $p < .001$. People in the high income prime condition had higher expected incomes (M = 3851.91) and higher financial independence (M = 4.97) than people in the low income prime condition (M = 3495.56 and M = 4.60, respectively).

Effect of Sex and Income Level on Minimum Relative Income.

A repeated-measures ANOVA was used to test the effects of sex and income level (high income after graduation prime vs. low income after graduation prime) and childcare level (within-subjects effect; 100%, 75%, 50%, 25%, 0%) on minimum relative income level. Mauchly's test indicated that the assumption of sphericity was violated, chi-squared = 1515.14, $p < .001$, therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. There was a significant within-subjects effect of childcare level, $F(1.760, 911.483) = 401.43$, $p < .001$. When a potential spouse was willing to do 100% of childcare and housework, participants had the lowest minimum relative income level, and at each subsequent childcare/ housework level their minimum requirement increased significantly, suggesting a tradeoff between resource provisioning and childcare/housework (see Figure 4). There was a significant three-way, within-subjects interaction between sex, income level, and childcare level, $F(1.760, 911.483) = 3.28$, $p < .05$. Within subjects contrasts indicated that the interaction was linear, $F(1, 518) = 4.02$, $p < .05$. Low income men

and women became more similar in their minimum relative income requirements the less childcare and housework a potential spouse was willing to do. There was no significant difference between low income men and women when a potential spouse was not willing to do any housework or childcare; both required their spouses to make over SGD 4000 more than them per month in this instance (see Table 2). High

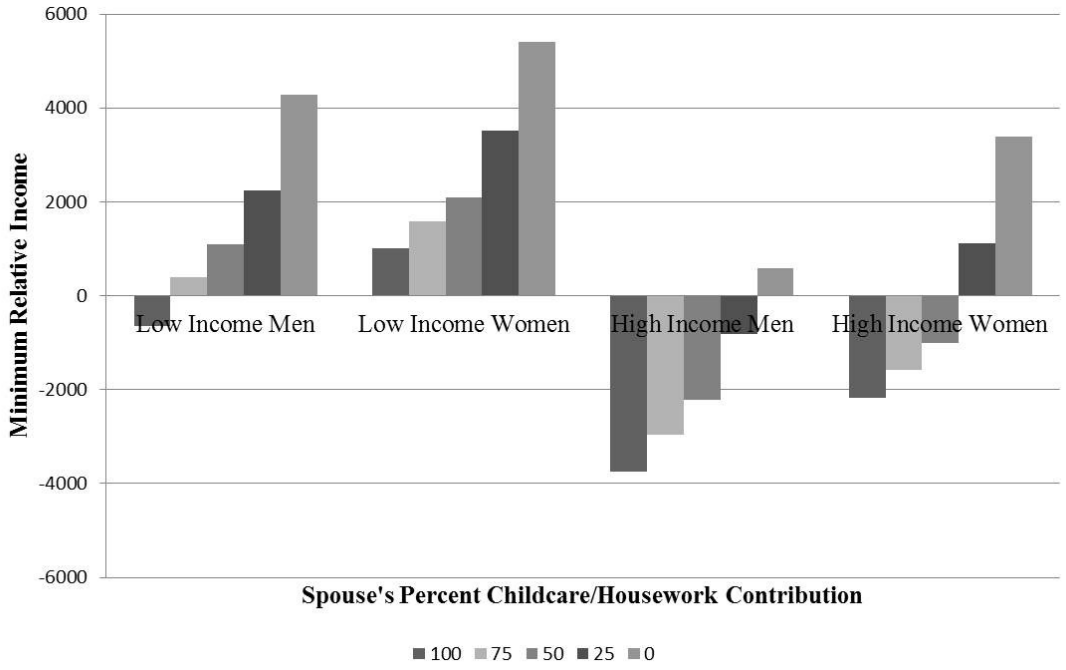

Figure 4. The effects of income level, sex, and spouse's percent childcare and housework contribution on the minimum acceptable relative income in a potential spouse.

income men and women differed at every level of housework and childcare. There was also a significant between-subjects effect of sex, $F(1, 518) = 64.50$, $p < .001$, and a significant between-subjects effect of income level, $F(1, 518) = 258.86$, $p < .001$. Examining the confidence intervals revealed that men, 95% CI [-466.22, 105.30], required lower relative incomes than women [1099.85, 1573.38], $p < .05$, and high

income people, 95% CI [-466.22, 105.30], required lower minimum incomes than low income people, [1835.36, 2360.02], $p < .05$.

As Table 2 shows, low income women want husbands who make more than them even when their husbands are willing to do 100% of housework and childcare, while high income women want husbands to make more than them if the husbands do less than 50% of housework and childcare, but will accept husbands who make less than them if they do 50% or more of housework and childcare. Low income men require their wives to make more than them unless their wives are willing to do 100% of housework and childcare, at which point they can make less. High income men are fine with their wives making less than them at all levels of housework and childcare except when their wives are unwilling to do any housework and childcare, at which point their wives are required to make at least as much as themselves.

Table 2

Effect of income level, sex, and percentage of housework and childcare spouse is willing to do on minimum acceptable relative income in a potential spouse

	Low Income Men	95% CI	Low Income Women	95% CI	High Income Men	95% CI	High Income Women	95% CI
100%	-640	-1101.58, -178.42	1004.17	648.05, 1360.29	-3754.46	-4190.62 -3318.31	-2173.24	-2560.59 -1785.89
75%	390	23.18, 756.82	1585.12	1302.11, 1868.13	-2964.29	-3310.90 -2917.67	-1574.65	-1882.48 -1266.82
50%	1097	726.42, 1467.58	2101.91	1815.28, 2387.10	-2216.96	-2567.13 -1866.80	-1003.52	-1314.51 -692.52
25%	2238	1651.58, 2824.42	3516.67	3064.23, 3969.10	-814.29	-1368.40 -260.17	1116.90	624.79, 1609.02
0%	4280	3420.67, 5139.33	5404.76	4741.78, 6067.75	580.36	-231.63, 1392.34	3388.73	2667.60, 4109.86

Discussion

Study 3 showed that when women make high salaries they do not necessarily expect their partner to make as much or more than them. Instead, they are fine with their partner making less than them if their partner is willing to do 50% or more of the housework and childcare. Women who make low salaries are less able to provision for their families, and so require their husbands to make more than them. Similarly, men with low salaries also expect their wives to make more than them unless their wives are willing to do 100% of the housework and childcare. Men with high salaries, on the other hand, are content with a wife making less than them at all levels of housework and childcare except when their wives are unwilling to do any homemaking, in which case equality of income is expected. Both men and women have lower relative income requirements the more housework and childcare their potential spouses are willing to do, suggesting that both men and women seek to trade resources for housework and childcare in a mate. However, as expected, women have higher minimum relative income requirements than men because of their recurrent need for some level of male provisioning throughout our foraging past.

Chapter 8: General Discussion

Three studies demonstrated that as women's status increases, the importance they place on the status of their expected spouse declines. My hypotheses were supported. All of the studies supported the first hypothesis: when people are able to provide a greater proportion of their household income they value status less and willingness to do housework and childcare more in a long-term mate. Study 2 supported the second hypothesis, which argued that the ideal level of provisioning for women is 50%, while the ideal level for men is more than 50%, but less than 100%. Studies 2 and 3 supported the third hypothesis: Both men and women do seek to trade resources for housework and childcare in a long-term mate. Studies 2 and 3 also supported the fourth hypothesis: the more women make the more equality of provisioning and parenting seems to appeal to them, while the more men make the more breadwinning seems to appeal to them. Study 3 supported hypotheses 5a and 5b: the more women make, the more acceptable it becomes for men to make less than them, but only if men are willing to take on at least 50% of the housework and childcare; high income men, on the other hand, are more accepting of their wives making less than them at every level of housework and childcare except when their potential wives are unwilling to do any homemaking.

There are multiple existing theories that seek to explain the relationship between gender, income, and mate preferences which cannot account for our findings. Social role theory argues that men and women choose partners based on anticipated social roles in a complementary fashion (Eagly & Wood, 1999). We do not disagree

with this general notion, but situate social factors as one aspect of local ecologies that are the result of other factors like climate in the case of foraging societies or technology such as household appliances and the contraceptive pill in the case of post-industrial societies (Marlowe, 2007; Coen-Pirani, Leon, & Lugauer. 2010; Bailey, 2006). Social roles are a proximate, not an ultimate, cause. We also argue that there may be psychological limitations to how much most women will want to provide given the recurrent need for male provisioning during lactation throughout our evolutionary history (Marlowe, 2001, 2003; Hurtado, Hill, Hurtado, & Kaplan, 1992). Indeed, only 6.41% of women in our sample wanted to exceed the maximum level of provisioning by women seen in modern foragers, which is 75% (Marlowe, 2001). Similarly, only 2.71% of men wanted to provide less than 25% of the household income, the lowest percentage of male provisioning seen among modern foragers (Marlowe, 2001).

Our findings also contradict a claim originating in sexual strategies theory that women's preference for resources grows stronger the more women make, and men with fewer resources have mate preferences indistinguishable from men with more resources (Buss & Schmitt, 1993). By forcing people to make tradeoffs between different potential traits in Study 1, looking at relative levels of provisioning and parenting across Study 2 and Study 3, and allowing people to indicate tradeoffs between parenting and provisioning in Study 3 we demonstrated that the preference for social status cannot be accurately assessed in isolation from other traits. Study 1 showed that when women expect to make as much or more than their future spouse,

the importance they place on social status is lower than for women who expect to make less than their partners. Study 2 demonstrates that though it is true that sex differences remain as men and women increase in income, mate preferences do change. Men go from expecting to make less than their partners and do around the same amount of housework and childcare as their wives when low in income to expecting to make more than their partners and doing less housework and childcare than their spouses when high in income. Women go from expecting to make less than their partners and doing most of the housework and childcare when low in income to expecting to make the same as their spouses and doing about the same amount of housework and childcare as their husbands when high in income. Similarly, Study 3 further highlighted that women are willing to trade off direct and indirect care when they have the financial resources to do so; women made to feel like they had higher incomes were willing to accept husbands with lower incomes than themselves as long as their husbands were willing to do 50% or more of the housework and childcare. These findings cannot be explained by previous theories, but can be explained by bioecological exchange theory.

Limitations and suggestions for future research.

There are several limitations to these studies. First, we have relied on self-report data. Future studies should attempt to replicate these findings in real-world mate selection scenarios such as a speed-dating. It could be that self-reported mate preferences would not extend to actual mate choices, but this seems unlikely given that we have previously shown that mate preferences indicated on surveys do predict

actual mate choices (Li et al., 2013). Secondly, these studies explicitly asked people about their mate preferences regarding housework and childcare. Future studies should use more implicit measures such as seeing whether high income women are more attracted to the faces of men who are more interested in babies as in Roney, Hanson, Durante, and Maestripieri's (2006) study. Furthermore, the biological mechanism that causes the observed patterns in our data has not been identified. Given that high testosterone is associated with competitiveness and low testosterone is associated with direct parenting behaviors, we suspect that testosterone may be involved; this should be a fruitful avenue for future research (Mehta, Wuehrmann, & Josephs, 2009; Booth, Granger, Mazur, & Kivlighan, 2006; Fleming, Corter, Stallings, & Steiner, 2002; Kuzawa, Gettler, Huan, & McDade, 2010; Mascaro, Hackett, & Rilling, 2014).

Bioecological exchange theory could also provide a useful theoretical framework for examining work-family conflict. The work-family conflict literature has neglected theory-development, and instead tends to derive its hypotheses from previous studies without articulating ultimate causes (Eby, Casper, Lockwood, Bordeaux, & Brinley, 2005). When work-family conflict is high, employees are less satisfied with their jobs and lives, more likely to quit, have more absences, and have lower commitment to their careers, so addressing its determinants could have real impacts for organizations and individuals (Kossek & Ozeki, 1998; Kossek & Ozeki, 1999). Women have greater family interference with work than men, but theoretical reasons for this sex difference are lacking (Allen & Finkelstein, 2014). Bioecological

exchange theory (BET) would suggest that this is the result of the compromise between men's and women's ideal divisions of labor. Furthermore, BET would suggest that women who have approximate equality of exchange of housework and childcare (e.g., husband does 75% provisioning, wife does 75% childcare; husband does 50% provisioning, wife does 50% childcare) should experience less work-family conflict than those with an inequality of exchange. Finally, BET has important organizational and national policy implications - work-family conflict is likely to be lower for women in organizations or countries that extend the same benefits to fathers that are extended to mothers. Women are less likely than men to have a stay-at-home spouse (Livingston, 2014), and according to BET men are less likely to want to stay at home and women are less likely to want their partners to stay at home. Thus, policies designed to increase equality and decrease work-family conflict should focus on encouraging more egalitarian dual-earner couples rather than an equal number of stay-at-home moms and dads.

Conclusions.

Both sexual strategies theory and social role theory have been proposed as explanations for sex differences in long-term mate selection (Buss & Schmitt, 1993; Eagly & Wood, 1999). These studies lend initial support for bioecological exchange theory, which proposes a model of long-term mating preferences that is more flexible than sexual strategies theory, but less flexible than social role theory. Sexual strategies theory argues that financially successful women should value traits in a long-term mate that indicate resource acquisition potential as much or more than less financially

successful women, and men should not differ in their mate preferences across different levels of financial success (Buss & Schmitt, 1993). Social role theory argues that long-term mate preferences arise primarily out of socialization and cost-benefit analyses, and thus in a society wherein women working and men staying at home was just as acceptable as men working and women staying at home, both should be equally likely (Eagly & Wood, 1999; Eagly, Eastwick, & Johannesen-Schmidt, 2009). Our studies demonstrate, in line with bioecological exchange theory, that financially successful women do prioritize resources in long-term mates less than financially unsuccessful women and less financially successful men do prioritize resources in long-term mates more than financially successful men, but at the same time sex differences persist even when both men and women are high in income. In these ways, our theory diverges from pre-existing theories.

Bioecological exchange theory also has points of agreement with both sexual strategies theory and social roles theory. We agree with Buss and Schmitt (1993) that men and women have unique information-processing systems governing mate choice because of differential levels of parental investment that result from the recurrence of sexually dimorphic gamete size, internal gestation, and lactation. We also agree with Eagly, Eastwick, and Johannessen-Schmidt (2009) that, "people desire a mate who will enable them to minimize the costs and maximize the benefits associated with their own anticipated life outcomes" (p. 403). However, we argue that recurrent evolutionary costs and benefits play into people's decisions as well as the costs and benefits presented by the current ecology (which includes present social norms).

In summary, our research is important because it demonstrates that both men and women trade resources for childcare when considering a marriage partner, but at different levels. Men go from expecting a relatively equal division of provisioning and parenting when low in income to expecting to provision more and parent less when high in income. Women go from expecting to parent more and provide less when low in income to expecting more equal parenting and provisioning when high in income. These findings support our bioecological exchange theory, which resolves some conflicts between social roles theory and sexual strategies theory. We argue that women have recurrently benefited most from providing around 50% of resources because it decreases the likelihood of a partner cheating on them or abusing them, and allows them to demand higher levels of paternal care, while still having sufficient resources through male provisioning during lactation. Men, on the other hand, benefit most from providing more than 50% of resources because they can attain more extramarital affair partners without having to fear their partner will leave them, and extract more maternal care from their partners. The local ecology (including technology and social norms) determines how much men and women can provide, and in turn how much they have to deviate from their ideal strategy. These studies provided initial support for our theory.

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