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Sex ratio and mate preferences: A cross-cultural investigation

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Abstract

Sex ratio is the number of men per 100 reproductive-age women within a specified mating pool. We generated and tested two hypotheses about the cross-cultural relationships between sex ratio and mate preferences using preference ratings of 18 characteristics provided by 9809 participants and corresponding sex ratio data secured from an international organization. The Classical Sex Ratio Mate Preference Shifts Hypothesis predicts that in imbalanced sex ratio societies, the more numerous sex will lower their standards, to facilitate acquisition of a partner of the less numerous sex. The Alternative Sex Ratio Mate Preference Shifts Hypothesis predicts that in lower sex ratio societies, men will lower their standards to secure more short-term matings, whereas women will raise their standards to avoid deception by men seeking short-term relationships. Results supported the Classical Sex Ratio Mate Preference Shifts Hypothesis for men, and the Alternative Sex Ratio Mate Preference Shifts Hypothesis for women. Discussion addresses limitations of the current research and highlights future directions for research on the relationships between sex ratio and mating psychology and behavior.

Social exchange and evolutionary psychological models of relationship formation have highlighted economic processes operating on the ''mating market.'' According to these models, for example, individuals mate assortatively (Buss & Barnes, 1986; Cameron, Oskamp, & Sparks, 1977) and thereby acquire the best match for their own ''mate value'' (Kenrick, Groth, Trost, & Sadalla, 1993). In addition, social exchange and evolutionary models have argued that the availability of potential mates also might affect mating behavior (Baumeister & Vohs, 2004; Becker, 1976). The availability of potential mates is indexed by the sex ratio, the number of men per 100 reproductive-age women (with 15–49 years commonly used to define the age range of these groups of men and women; see Fossett & Kiecolt, 1991). When the sex ratio is imbalanced, intrasexual competition to acquire a mate of the less numerous sex theoretically should increase in intensity among members of the more numerous sex. This competition includes displaying attributes and qualities desired by the less frequent and therefore more selective sex (Pedersen, 1991).

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Men's behavior and women's behavior reflects these predicted shifts in competition. For example, men are more interested than women in casual sex (Buss & Schmitt, 1993; Clark & Hatfield, 1989). Correspondingly, lower sex ratio societies—in which women more than men compete for mates—are characterized by higher rates of self-reported female promiscuity (Schmitt, 2005), women's shorter skirts (Barber, 1999), and higher rates of illegitimate births (South & Trent, 1988) and teenage pregnancies (Barber, 2001). In contrast, higher sex ratio societies—in which men more than women compete for mates—are characterized by behaviors consistent with psychological sex differences produced by sex differences in minimum obligatory parental investment (i.e., men's minimum investment of a small amount of time and sperm, relative to women's minimum investment of 9 months of gestation and years of lactation; see Trivers, 1972). Most notable of these resultant psychological sex differences includes women's greater interest in cues of commitment (Buss, 2003). As such, higher sex ratio societies have lower divorce rates, more stable marriages (Pedersen, 1991; Secord, 1983), and earlier age of first marriage (South & Trent, 1988). Lichter, Anderson, and Hayward (1995) found that, consistent with women's greater interest than men's in a potential mate's status and resources (Buss, 1989; Feingold, 1992), women in higher sex ratio societies are more likely than women in lower sex ratio societies to actualize their preferences and marry a high-status man rather than a low-status man.

Previous research indicates that there are shifts in mating behavior according to the sex ratio. As Jennions and Petrie (1997) note, however, there are two aspects of mating preferences: *preference functions* (or preferences for characteristics that drive mate selection—the focus of this article), and *choosiness* (pertaining to actual mate selection). Constraints on mating options, such as an imbalanced sex ratio, are associated with shifts in behavior produced by heightened intrasexual competition among the more numerous sex to display characteristics desired by the less numerous sex. Are these behavioral shifts accompanied by psychological shifts in mating preferences? In the current research, we generated and tested two hypotheses derived from Sex Ratio Theory (Guttentag & Secord, 1983).

CLASSICAL SEX RATIO MATE PREFERENCE SHIFTS HYPOTHESIS

As the supply of one sex decreases, so should the value of acquiring as a mate a member of that sex *increase* (Baumeister & Vohs, 2004). Just as men and women in imbalanced sex ratio societies shift mating strategies to embody the desires and preferences of the less frequent sex, might they also lower their standards, in an additional effort to acquire a mate? We hypothesize that in conjunction with increased effort to display qualities desired by the less numerous sex, men and women may lower their mate preference standards when they are members of the more numerous sex.

The Classical Sex Ratio Mate Preference Shifts Hypothesis

Across cultures, mate preferences will vary according to the availability of the opposite sex, such that each sex will decrease their preference ratings (i.e., report less stringent and limiting preferences) when they are members of the more frequent sex.

Prediction 1

Across cultures, men's mate preference ratings will be correlated negatively with sex ratio.

Prediction 2

Across cultures, women's mate preference ratings will be correlated positively with sex ratio.

ALTERNATIVE SEX RATIO MATE PREFERENCE SHIFTS HYPOTHESIS

Constraints on mating options, combined with the preferred mating strategies of each sex, suggest an alternative hypothesis for the relationship between sex ratio and mate preferences. This alternative hypothesis also can be derived from Sex Ratio Theory (Guttentag & Secord, 1983). Because men's minimum obligate parental investment is relatively less than women's, men are more interested in opportunities for casual sex with a variety of partners (Buss & Schmitt, 1993). Accordingly, in lower sex ratio societies, rather than raising their standards, men may capitalize on short-term mating desires by lowering their standards. That is, in lower sex ratio societies where men are the less numerous sex and in greater demand, men may lower their mate preference standards in an additional effort to actualize their desires for casual sex with a variety of women. Men and women report being more promiscuous in lower sex ratio societies (Schmitt, 2005), and this behavioral result may be the result of a lowering of men's preference standards, enabling men to pursue casual sex with a greater number of women. It may be that men actually achieve this behavioral result (an increase in rates of promiscuity) by lowering their preference standards.

Correspondingly, because of women's relatively greater minimum obligate parental investment than men's, women are less inclined than men to mate indiscriminately and are more selective (Buss & Schmitt, 1993; Trivers, 1972). Because relatively more men are seeking short-term relationships in lower sex ratio contexts than in higher sex ratio contexts, women in lower sex ratio contexts may increase the importance placed on mate preference characteristics to avoid deception about long-term commitment by these short-term relationship seeking men. Women may increase their mate preference standards in lower sex ratio societies, in an effort to avoid deception by men who are seeking short-term relationships.

The Alternative Sex Ratio Mate Preference Shifts Hypothesis

Across cultures, mate preferences will vary according to the availability of the opposite sex, such that men, in an effort to secure more short-term matings, will decrease their preference ratings in lower sex ratio societies, and women, in an effort to avoid deception by short-term relationship seeking men, will increase their preference ratings in lower sex ratio societies.

Prediction 3

Across cultures, men's mate preference ratings will be correlated positively with sex ratio.

Prediction 4

Across cultures, women's mate preference ratings will be correlated negatively with sex ratio.

Some previous cross-cultural research indicates that controlling statistically for each country's level of socioeconomic development produces larger relationships between sex ratio and other demographic variables (South, 1988; South & Trent, 1988). We investigate this possibility in the current research by conducting two sets of correlational analyses in tests of each hypothesis—one in which we do not control for socioeconomic development and a second in which we control for this variable.

Although both hypotheses are equally compelling (the Classical Sex Ratio Mate Preference Shifts Hypothesis and the Alternative Sex Ratio Mate Preference Shifts Hypothesis) and the predictions are derived from theory using similar logic for each sex, the hypotheses may not be entirely competing. The hypotheses are mutually exclusive for each sex (i.e., men cannot be simultaneously raising and lowering their preference standards in lower sex ratio societies), but it may be that men and women in varying sex ratio societies shift mate preferences according to different adaptive logic. As such, using Sex Ratio Theory (Guttentag & Secord, 1983), informed by social exchange and evolutionary psychological perspectives, we generated and tested two hypotheses about the cross-cultural relationships between sex ratio and mate preferences. We secured data from an international study of mate preferences and the corresponding sex ratio for each culture represented in the preference database.

METHOD

Participants

Participants were 4499 men and 5310 women residing in 36 cultures located on six continents and five islands. Men ranged in age from 17 to 30 years, with a mean age of 23.3 years. Women ranged in age from 17 to 30 years with a mean age of 22.6 years (see Buss, 1989, for additional details).

Materials and Procedure

The survey used to assess mate preferences was adapted from Hill (1945). In this survey, participants rate the importance of 18 mate preference characteristics (see Table 1) on the following 4-point scale: *3 points = indispensable*, *2 = important*, *1 = desirable, but not very important*, and *0 = irrelevant or unimportant*. Instructions were provided to each collaborator for translating the instrument into the appropriate language for their sample (see Buss, 1989, for additional details). Sex ratio data were secured from a cross-cultural database for men and women ages 15 to 49 years (United Nations, 2004) and nearest to the year in which most of the mate preference data were collected (i.e., 1985). Table 2 lists the sex ratio for each of the countries or cultures. To obtain an index of each country's level of socioeconomic development, we followed the methods prescribed in South (1988), and summed standardized scores for the country's Gross National Product (GNP), infant survival rate, life expectancy, and the percentage of the population that is urban. Demographic data were obtained from the United Nations (2004) for the year 1985 and GNP data were obtained from the U. S. Bureau of the Census (2002) for the year 1990. Table 2 lists the resulting Development Index for each country (across countries, $\alpha = 0.82$).

RESULTS

Prior to conducting analyses, we examined all variables to identify statistical outliers. We identified one unambiguous outlier: the Zulu sex ratio was more than three standard deviations below the mean

Table 1. Correlations between sex ratio and 18 mate preference characteristics

	Zero-order correlations		Partial correlations	
Mate preference	Men	Women	Men	Women
Good cook and housekeeper	−0.17	−0.02	−0.20	−0.02
Pleasing disposition	−0.16	−0.21	−0.16	−0.21
Sociability	−0.43**	−0.19	−0.43**	−0.19
Similar educational background	−0.28	−0.38**	−0.28	−0.41**
Refinement, neatness	−0.27	−0.31*	−0.31*	−0.37**
Good financial prospect	−0.28	−0.31*	−0.31*	−0.35**
Chastity	0.13	0.34**	0.17	0.39**
Dependable character	0.21	0.15	0.22	0.16
Emotional stability and maturity	−0.25	−0.36**	−0.25	−0.36**
Desire for home and children	−0.26	−0.23	−0.28	−0.26
Favorable social status or rating	−0.22	−0.14	−0.25	−0.17
Good looks	−0.17	−0.08	−0.17	−0.09
Similar religious background	−0.15	−0.20	−0.16	−0.23
Ambition and industriousness	−0.15	−0.20	−0.16	−0.21
Similar political background	−0.11	−0.08	−0.11	−0.08
Mutual attraction—love	−0.18	−0.43***	−0.25	−0.51***
Good health	−0.08	0.02	−0.08	0.02
Education and intelligence	−0.28	−0.19	−0.29	−0.21

Note: Partial correlations control for the country's level of socioeconomic development (see Table 2 for development indices).
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

(see Table 2), and we, therefore, excluded the Zulu data from all analyses (see Tabachnick & Fidell, 2001; results including Zulu data are available from the authors on request).

Across cultures, men's importance ratings for 16 of the 18 characteristics correlated negatively with sex ratio (see Table 1). A binomial sign test indicated that these 16 of 18 negative correlations was significantly greater than the nine negative correlations expected by chance ($p < 0.001$). This result therefore is consistent with Prediction 1 of the Classical Sex Ratio Mate Preference Shifts Hypothesis that men's mate preference ratings will be correlated negatively with sex ratio, across cultures. Only one preference correlated significantly ($p < 0.05$) with sex ratio, however (see Table 1). Men's preference for sociability significantly correlated negatively with sex ratio.

Fifteen of women's 18 preference ratings correlated negatively with sex ratio, across cultures, providing support for Prediction 4 of the Alternative Sex Ratio Mate Preference Shifts Hypothesis (see Table 1). A binomial sign test indicated that these 15 of 18 negative correlations was significantly greater than the nine negative correlations expected by chance ($p < 0.01$). Six of the correlations between women's preference ratings and sex ratio were marginally ($p < 0.10$) or statistically ($p < 0.05$) significant. Refinement, neatness, and good financial prospect were marginally correlated negatively with sex ratio. Similar educational background, emotional stability and maturity, and mutual attraction—love correlated significantly and negatively with sex ratio. Women's preference ratings for only one characteristic correlated significantly and positively with sex ratio: the preference for chastity (no previous sex).

Although two additional preference characteristics for men were marginally significantly correlated with sex ratio when Development Index was controlled statistically, and women's two marginally significant correlations reached statistical significance when Development Index was controlled statistically, controlling for Development Index did not result in partial correlations that differed

Table 2. Sex ratio and development index by country or culture

Country or culture	Sex ratio	Development index
Australia	103.23	2.15
Belgium	103.38	2.51
Brazil	99.26	−1.43
Bulgaria	101.61	0.04
Canada	102.60	2.00
China	108.30	−3.61
Colombia	98.19	−1.27
Estonia	99.47	0.12
Finland	104.47	0.57
France	102.30	2.14
(West) Germany	104.55	2.85
Great Britain	102.18	2.61
Greece	100.08	0.56
Hawaii	100.60	5.31
India	108.26	−6.30
Indonesia	100.81	−5.17
Iran	102.42	−3.33
Ireland	104.00	0.22
Israeli Jews	101.03	2.07
Israeli Palestinians	101.03	2.07
Italy	100.41	1.63
Japan	101.52	3.41
Netherlands	104.76	0.88
New Zealand	100.72	1.61
Nigeria	100.15	−8.42
Norway	105.23	1.31
Poland	101.95	−0.34
South Africa	100.15	−3.22
Spain	101.33	1.73
Sweden	104.55	2.20
Taiwan	108.62	0.78
United States (contiguous)	100.60	5.31
Venezuela	102.24	0.42
Yugoslavia	102.75	−1.28
Zambia	98.51	−6.91
Zulu	86.79	−3.22

Note: See text for additional details about sex ratio and Development Index.

significantly from the corresponding zero-order correlations (see Table 1; by Fisher's *r*-to-*z* transformation; all zs < 1.50, all ps > 0.10; analyses available upon request). In addition, sex ratio and Development Index were not significantly correlated ($r = 0.13$, $p > 0.10$).

DISCUSSION

Using Sex Ratio Theory (Guttentag & Secord, 1983), we generated and tested two hypotheses about the cross-cultural relationships between sex ratio and mate preferences. The first was the Classical Sex Ratio Mate Preference Shifts Hypothesis, which predicts that men and women will decrease their

standards when each sex is the more numerous sex. The second was the Alternative Sex Ratio Mate Preference Shifts Hypothesis, which predicts that, in lower sex ratio societies, men will lower their standards in an effort to obtain a greater number of short-term matings with a variety of women, and that women will increase their standards, to avoid deception by short-term relationship seeking men.

The results of this study provide some support for the Classical Sex Ratio Mate Preference Shifts Hypothesis for men. Although only one of men's mate preference ratings correlated significantly and negatively with sex ratio, there is a clear trend of negative relationships between men's mate preferences and the sex ratio. In lower sex ratio societies where women are more numerous, men may raise their preference standards for a long-term mate. Lichter et al. (1995) documented that in lower sex ratio contexts women do not marry men of a lower mate value, indicating that, despite being in greater demand, men may still not be able to actualize their more stringent mating preferences. This is consistent with the current results for women, as although previous research indicates that men and women engage in more short-term mating behavior in lower sex ratio societies (Schmitt, 2005), women do not decrease, but rather increase, their mate preference standards in this context.

Although the results suggest support for the Classical Sex Ratio Mate Preference Shifts Hypothesis for men, we recognize that they are not conclusive. We were able to document, however, that these results are not attributable to a country's level of socioeconomic development. Some previous research indicated that sex ratio effects are influenced by a country's level of development (South, 1988; South & Trent, 1988). The current results suggest that although socioeconomic development is a factor in behavioral shifts associated with sex ratio, it may not affect psychological shifts associated with sex ratio.

Women's mate preference ratings also were negatively correlated with sex ratio, providing support for the Alternative Sex Ratio Mate Preference Shifts Hypothesis. Although women do exhibit behavioral shifts in increases of intrasexual competition to display characteristics desirable to men in lower sex ratio contexts, the current results suggest that women simultaneously increase their mate preference standards. The Alternative Sex Ratio Mate Preference Shifts Hypothesis suggests that this may be because in lower sex ratio contexts, where relatively more men are seeking short-term relationships than in higher sex ratio contexts, women may increase their mate preference standards to thereby avoid deception about long-term commitment by these short-term relationship seeking men. In lower sex ratio societies, men are in a position to realize their short-term mating desires, and women must comply with men's preferences or face exclusion from the mating market. Although women's behavior does show these shifts, women also appear to be motivated by a psychological defensive mechanism that may have co-evolved to protect them from being misled by men with short-term relationship intentions. Although the context may dictate that women shift their behavior, women who maintained more stringent mate preference standards and successfully avoided being deceived by short-term relationship seeking men in lower sex ratio contexts might have experienced relatively greater reproductive success over human evolutionary history. Future research might investigate additional predictions derived from this Alternative Sex Ratio Mate Preference Shifts Hypothesis for women. For example, although women report more sexually promiscuous *behavior* in lower sex ratio societies, they may not *desire* more short-term relationships in this context.

Only one preference characteristic correlated with sex ratio in the opposite direction from that predicted by the Alternative Sex Ratio Mate Preference Shifts Hypothesis for women. Ratings of the importance women place on chastity correlated positively with sex ratio. In hindsight, this result might have been predicted. It is consistent with research indicating greater self-reported sexual promiscuity in lower sex ratio societies, in that, not only are men and women more promiscuous in lower sex ratio societies, women also place less importance on securing a chaste mate. Women's decreased importance in finding a chaste mate in lower sex ratio societies may reflect the fact that fewer men are chaste in these societies. Alternatively, it might be argued that this singular result contradicts

the Alternative Sex Ratio Mate Preference Shifts Hypothesis for women. Future research might investigate new hypotheses that address this result for chastity. Future research also might investigate the assumptions associated with the speculation regarding women's apparent disinterest in chastity in low sex ratio societies (e.g., query women in lower and higher sex ratio societies regarding their beliefs about the prevalence of men's sexual promiscuity).

Additionally, it is possible that the documented shifts suggesting that women in lower sex ratio societies raise their mate preference standards are not, in fact, shifts associated with attempts to avoid deception by promiscuous men, but instead may be increases in standards related to mating with higher quality men in polygynous societies. That is, if polygyny is related to low sex ratio societies, women may reproductively benefit by raising their standards to find higher quality partners. Future research might investigate whether polygyny is a moderating factor of mate preference shifts with sex ratio, as well as investigate the quality of the men with whom women actually short-term mate in lower sex ratio societies.

One limitation of the current test of the Alternative Sex Ratio Mate Preference Shifts Hypothesis for men is that the data pertain to long-term mate preferences, although this hypothesis predicts shifts according to men's short-term mating psychology. In the absence of comparable short-term mate preference data, we tested preferences for long-term partners. Future research investigating sex ratio and short-term mate preference shifts may provide a better test of this hypothesis.

In addition, the current research tested two hypotheses derived from Sex Ratio Theory and adaptationist logic. Future research might profitably address alternative, non-adaptive hypotheses regarding mate preference shifts and sex ratio.

Because the sample of countries investigated in the current research is relatively small, and because no previous research has investigated the relationships among sex ratio and mate preferences, we discussed correlations that reached only marginal statistical significance. We caution readers to interpret the current results with appropriate caution and tentativeness, until these results are replicated with a larger sample of countries.

The results of this research indicate that mate preferences may be sensitive to the number of potential mates in the environment. The results did not provide support for just one of the hypotheses—instead, the results suggest that both sexes' mate preferences are sensitive to the sex ratio, but for different reasons. In lower sex ratio societies, both men and women appear to increase their mate preference standards. Men may do so in an effort to obtain a higher mate value long-term partner, whereas women may do so in an effort to avoid deception by short-term relationship seeking men.

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