# Good Genes, Good Providers, and Good Fathers: Economic Development Involved in How Women Select a Mate

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Men's mate values are defined based on three broad categories—good genes, good providers, both of which are selected early across the animal kingdom, and good fathers that represent the last pedigree of primate evolution and may have contributed to the human development of modernity and gender equality. Women select long-term mates based on these 3 mate values, and women's mate preference over them depends on the prevailing ecological conditions. Based on 4 samples comprising a total of 1,257 Chinese women, we found that women in general and those with high socioeconomic status in particular (Study 1), as well as women in cities compared with rural women (Study 2), preferred good-father over good-provider and good-genes attributes in long-term relationships. Similar results were obtained in an experimental study ($n =$ 123) where, under good economic compared to poor economic and control conditions, women prioritized good-father over good-provider and good-genes attributes. These findings indicate that in modern-day economies, in which a woman spends the same amount of time and energy on education and employment and acquires approximately the same amount of resources and same extent of safety and disease protection as men, her mate preference is likely to center on good-father attributes, as her reproductive success depends on a helper at the nest increasingly more than other mate contributions.

*Keywords:* good fathers, good providers, good genes, female mate preference, mate value, life history

Evolutionary mating research has been paying increasing attention to women's mating (Lee & Zietsch, 2011). One of the issues under investigation has been what male mate qualities women prefer in a long-term or short-term mate (e.g., Buss, 1989), as well as how environmental conditions affect women's mate preference (Low, 2005; Moore, Cassidy, Law Smith, & Perrett, 2006). The findings in general converge on the evolutionary prediction that, consistent with intrasexual and intersexual selection of weapons and ornaments, women prefer good-provider or weapon-like and good-genes or ornament-like male mate attributes. For example, in Buss' original cross-cultural study (Buss, 1989), as well as subsequent replications (e.g., Chang, Wang, Shackelford, & Buss, 2011b; Shackelford, Schmitt, & Buss, 2005), education, career, and wealth (good provider) and being good-looking, being athletic, and having a sense of humor (good genes) are all on women's mate preference lists. However, in these and other studies (e.g., Li, Valentine, & Patel, 2011), women also value and even prioritize a third set of mate attributes—for example, being kind, loving, and staying at home—that constitute good fathers. This third set of good-father mate values does not seem to have a ready explanation from the two-process framework of intrasexual and intersexual selection. In the

present study, we proposed a mate preference framework that defines men's mate values according to three Gs—good genes, good providers, and good fathers. The first two Gs have been selected early and adopted by most animals, whereas the third G may represent unique aspects (e.g., alloparenting) of more recent primate and human evolution and is hypothesized to be particularly relevant in today's developed economies where a domestic helper may add more to a woman's reproductive success compared to the other two mate contributions. We tested the good-father long-term mate preference hypothesis on four samples of Chinese women.

## Good Genes and Good Providers

The most essential female mate choice involves the choice of good genetic stock to ensure the best possible outcome of a female's obligatory parental investment (Trivers, 1972). Good genes are indicated by physiological and behavioral characteristics that are costly to their male bearers and do not contribute to the bearers' fitness except for attracting mates (Zahavi, 1975), although some good-genes traits such as attractiveness are also correlated with health (Nedelec & Beaver, 2014). Traits indicating good genes are often, although not always, linked to testosterone because the latter is believed to suppress immunocompetence (Gangestad & Simpson, 2000; Thornhill & Gangestad, 1999). Indicators of good genes, known as ornaments, include low-frequency calls; vibrant colors; bright plumage; and risk-taking behaviors of various insects, fish, birds, and mammals, all of which represent sexual dimorphic traits intersexually selected by conspecific females (Andersson, 1994). Good-genes indicators in men include a low-pitched voice (Collins, 2000), a masculine and symmetrical facial structure (Penton-Voak et al., 2001), symmetry, physical and facial attractiveness and muscularity (Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Scheib, Gangestad, & Thornhill, 1999; Thornhill & Gangestad, 1999), risk-taking proclivity and behavior (Kelly & Dunbar, 2001), and creativity and a sense of humor (Chen & Chang, 2015; Miller, 1999).

Another female choice involves the choice of indirect paternal care in the form of resources and provisioning (Marlowe, 2003), which are acquired through intrasexual competition but also become a target of female choice (Puts, 2010) because the qualities that make a good fighter are recognizable and memorable to both sexes (Berglund, Bisazza, & Pilastro, 1996). Males compete for resources, including the territories on which females feed and subsist (Andersson, 1994). Females are drawn to males who have access to resources over those who do not (Li et al., 2013). Among humans, resources include money and wealth, as well as social status, education, the motivation to achieve, and generosity in sharing resources (Huberman, Loch, & Önçüler, 2004). Because resources are the target of male intrasexual competition, holders of resources possess characteristics that enable them to win the competition. These characteristics, known as weapons, include a large body size and upper-body strength (Sell et al., 2009), masculine physical features (Pound, Penton-Voak, & Surridge, 2009), social dominance and formidability (Valentine, Li, Penke, & Perrett, 2014), competitive personalities and behaviors (Johnson, Burk, & Kirkpatrick, 2007), and aggression and warring attitudes (Chang, Lu, Li, & Li, 2011a; Chen & Chang, 2015). These intrasexual competitive attributes are also used to provide women with protection against predators and other conspecific male aggressors (Buss & Schmitt, 1993; Valentine et al., 2014). Thus, both provisioning and protection, and the attributes required to acquire and provide them, are favored by women as attributes of a preferred mate. Being a good provider is particularly preferred by women in the resource-based polygyny practiced by more than 80% of human societies; marriages within such polygynous societies are mainly monogamous (Marlowe, 2000; Murdock, 1967).

## Good Fathers

A third female choice that evolved recently in mammalian terms, and most likely coincided with human pair bonding and monogamy, is the choice of resident fathers who help raise young. Premature birth, as an adaptive workaround (Tinbergen, 1963) to the coevolution of bipedalism and increased cranial size (Benshoof & Thornhill, 1979), puts selective pressure on alloparenting (Hrdy, 2009). A father is especially suited to be an alloparent because no other relatives share the same extent of genetic inter-

est (Quinlan & Quinlan, 2008). The presence of a father at the nest is especially crucial during lactation, when women's foraging abilities are compromised (Marlowe, 2003). However, the adaptive function of a father at the nest is not provisioning per se, which serves a separate function as discussed earlier, but is direct paternal care; domestic fathers help at the nest by holding, grooming, babysitting, and being in proximity to offspring (Marlowe, 2000). Fathers also help children to gain social competitiveness and establish social status (Geary, 2000). Such direct care may represent a just as important or more important contribution of a father than the indirect care through provisioning that may not always materialize; evidence suggests that hunter-fathers seem seldom to bring home large game, and such large game is distributed equitably among households without favoring hunters' families (Hawkes, 1991; Hawkes, O'Connell, & Blurton Jones, 2001) and, especially in warm climates, women contribute to diets just as much as men do (Marlowe, 2001).

The domestic paternal roles are played by a few mammalian (Lukas & Clutton-Brock, 2012) and some primate fathers (Woodroffe & Vincent, 1994). Gorilla fathers have notably been observed to be the most domestic among primates in that they care for, play with, and protect their young (Whitten, 1987). Whitten (1987) stated that "associated males hold, cuddle, nuzzle, examine and groom infants and infants turn to these males in times of stress" (p. 346). Regarding reproductive patterns, including harem polygyny, concealed ovulation, and a high degree of paternity certainty, humans are believed to share a common ancestor that is more similar to gorillas than chimpanzees (Geary, Bailey, & Oxford, 2011). Like gorillas, human fathers who provide domestic parenting in addition to provisioning are selected through female choice. For example, fathers among the !Kung San in Botswana (Katz & Konner, 1981) and the Aka pygmies in central Africa (Hewlett, 1988, 1992) provide direct parental care to their infants and children; the frameworks of both these societies resemble ancestral social structures (Eibl-Eibesfeldt, 1989). Such paternal investment helps to reduce infant mortality and improve offspring competitiveness, especially in hierarchical social settings (Geary, 2000). Therefore, the attributes of being a good domes-

tic father and exhibiting underlying characteristics such as loving children and desiring a home (Buss & Shackelford, 2008) could be selected by women regardless of whether the man is a good provider.

Another possible reason for the evolution of good resident fathers and also a possible by-product of the coevolution between resident fathers and concealed ovulation is the reduction of infanticide risk (Hrdy, 1979). Although men do not appear to be as biologically inclined toward infanticide as are gorillas and other primates (Geary, 2000), the adaptive effect is the same in pacifying men into being nonaggressive, loving, and warm and kind toward children and women (Buss & Shackelford, 2008). These soft fatherly attributes are in contrast to attributes associated with good provisioning or being a good provider that are selected based on intrasexual competition and male–male combat. Concealed ovulation also prolongs mate guarding (Benshoof & Thornhill, 1979), which enhances men's affiliation with their female partner (Lovejoy, 1981; MacDonald, 1992) and the same underlying traits of being nonaggressive, caring, and loving (Brase, 2006; Urbaniak & Kilmann, 2003). Overall, affiliative, conciliating, and domestic attributes such as loving children and caring for the partner, which are found to be a notable component of modern women's mate preferences (Li, Bailey, Kenrick, & Linsenmeier, 2002), represent an evolved female choice for good domestic fathers.

## The Three Gs and Context-Dependent Female Mate Choice

Among the three Gs, good-genes characteristics affect premating decisions (Andersson, 1994), and their benefit to the reproductive success of the female is immediate, taking place at insemination (Trivers, 1972). The benefits of good-provider and good-father mate attributes for female reproductive success are realized only through postmating events involving offspring and are subject to the participation of the male who exhibits these attributes. Thus, good-provider and good-father attributes representing direct paternal investment realized in postmating events are more comparable with one another and are separated from good-genes mate attributes, which represent indirect paternal investment in premating decisions. To the extent

that all behavior can be seen as the manifestation of life history strategies to optimize various tradeoffs between somatic and reproductive effort (Chisholm, 1993; Del Giudice & Belsky, 2011), the three-G mate preferences represent life history strategic variations in balancing between mating and parenting of the reproductive effort. The time frame in realizing the three-G benefits to women's reproductive success corresponds to the life history strategic continuum ranging from *r*-selected mating-oriented fast to *K*-selected parenting-oriented slow strategies (Ellis, Figueredo, Brumbach, & Schlomer, 2009). The immediate reward of good genes precludes a longer time orientation beyond mating and insemination to achieve fitness. The benefits of good providers and good fathers necessitate long, or longer, postmating time that is focused on parenting the young. Good-genes mate preferences are therefore enacted by or related to a fast life history strategy that favors mating over parenting, whereas good-provider and good-father mate preferences represent a slow strategy to prioritize parenting over mating. Between good providers and good fathers, mate preference over the latter represents an even slower strategy with a stronger emphasis on direct parental investment through biparenting.

However, the enactment of different life history strategies and, subsequently, the corresponding mate preferences depend on ecological conditions that alter the costs and benefits of different life history tradeoffs to result in vast life history strategic variations within species (Del Giudice & Belsky, 2011). In general, an unpredictable, compared to a predictable, environment evokes a fast rather than slow strategy that favors mating and immediate reward rather than parenting and future fitness return (Ellis et al., 2009). This is because environmental unpredictability due to pathogen and disease or wars and famine and other extrinsic risk diminishes the correspondence between parental investment and offspring fitness (Quinlan, 2007). In an extreme environmental hazard, either parents or the offspring may not live long enough to deliver or to receive parental investment (Del Giudice & Belsky, 2011). Environmental predictability and controllability, on the other hand, increase offspring's fitness response to parental investment and are associated with a slow strategy that favors parenting and future

return over mating and immediate payoff. Thus, environmental predictability versus uncontrollability evokes a parenting-versus-mating-oriented reproductive strategy (Chisholm, 1993) which, consistent with the same parenting-versus-mating orientation, activates and promotes different mate preferences such as those representing good providers and good fathers versus those indicating good genes.

Compared to the past (e.g., the Pleistocene, the preindustrial West, or China of 30 years ago before the ongoing rapid and massive urbanization and socioeconomic development), modernity and contemporary living facilitate greater control over the environment, especially regarding public health care and disease control. Modern women, especially those of higher socioeconomic status, are expected to shift their focus on mate preferences from good-genes attributes indicating good genetic stock to good postnatal care, including paternal care and provisioning and the underlying good-father and good-provider attributes. Existing data seem to corroborate a mate preference shift away from good-genes attributes that is also correlated with economic development. For example, women in less developed countries such as Tanzania (Little, Apicella, & Marlowe, 2007), Jamaica (Penton-Voak, Jacobson, & Trivers, 2004), and Latvia (Moore et al., 2011) exhibited a greater preference for male faces representing symmetry, masculinity, and other good-genes indicators compared with women in the United Kingdom, a more developed country. Similarly, the human development index, which represents the living standard, and the national health index, which is highly correlated with gross national product, were negatively correlated with women's preference for masculine facial features (Moore et al., 2013) over feminine facial features in men (DeBruine, Jones, Crawford, Welling, & Little, 2010).

Another relevant change in ecological conditions that also carries proximate rather than purely evolutionary significance is the fact that, compared with their predecessors, contemporary women have greater and more gender-equal resource-capturing capacities and are considerably less reliant on men for provisioning (Low, 2005). Furthermore, women's participation in the labor force increases their need for paternal involvement in raising young. As Newson and Richerson (2009) theorized and empir-

ically tested (Newson et al., 2007), modernity is the result of women becoming increasingly engaged in paid labor outside the home and spending less time in the familial and kinship context. As changes in adaptive relevance occur, the ecological context of modernity is expected to increasingly emphasize good-father mate attributes, compared with good-provider attributes, when women evaluate men for the possibility of establishing stable long-term relationships. Whereas this ecological hypothesis is tenable for most contemporary women, it is especially true for women with high rather than low socioeconomic status. Mate preference surveys conducted in 37 cultures (Buss, 1989) and more recent ones conducted in China (Chang et al., 2011a) and the United States and Singapore (Li et al., 2011) showed that "kindness" was rated among the highest and was rated statistically higher than "attractiveness" or "earning capacity," supporting women's mate preference for good-father over good-provider and good-genes attributes.

### Present Study

We hypothesized that contemporary women overall, and particularly women with high compared with low socioeconomic status, would prefer good-father over good-provider attributes and good-father over good-genes mate attributes. We investigated this hypothesis in the context of assortative mating practiced by humans and other animals (Anderson & Klofstad, 2012). When women assort their mate preferences according to their own economic conditions (Kalmijn, 1991), we would expect overall positive correlations between women's economic conditions and all three-G mate values. Therefore, we examined only the relative magnitudes of the correlations between women's economic conditions and three-G male mate values, as well as the relative importance assigned to the three categories of mate values. We tested this hypothesis in three studies. The first study consisted of two independent surveys administered to women in a city in Jiangsu Province, China, and to a heterogeneous online sample of Chinese women. In these two samples, we developed and validated the Women's Mate Preference Questionnaire (WMPQ) to measure the three-G mate attributes and examined the associations between the three-G male

mate values and the social economic status (SES) of the women. In the second study, we examined economic development by comparing the mate preferences of rural and urban women across the three categories of mate values. The third study was an experiment in which we manipulated socioeconomic condition to examine its effect on prioritizing among good-genes, good-provider, and good-father mate preferences.

### Study 1

We conducted two separate surveys to develop the WMPQ to measure the three-G male mate values and investigated the three-G mate attributes in relation to women's SES.

**Samples.** The first sample was a community sample of 515 women from a small city with a population of 1 million in Jiangsu Province, China. The participants ranged in age from 22 to 48 years ($M = 31.25$, $SD = 4.37$). Their education levels were widely distributed: 8.4% had received a primary school education, 34.1% had received a middle school education, 23.5% had received a high school education, 11.4% had received a 2-year college education, and 22.2% had received a 4-year college education or above. Their monthly incomes ranged from 0 to ¥20,000, with a mean of ¥3,089.44 ($SD =$ ¥2,722.43).

The second sample consisted of 373 female respondents who were surveyed online. The respondents ranged in age from 18 to 46 years, with a mean of 26.85 years ($SD = 4.66$). Most of the respondents had received a 4-year (68.9%) or 2-year college education (26%), and the remaining respondents (5.1%) had a high school education. Their monthly incomes ranged between ¥900 and ¥25,000 ($M =$ ¥4,620.00, $SD =$ ¥3,289.45).

**Developing the Women's Mate Preference Questionnaire.** In developing the WMPQ, we first consulted the literature to find similar instruments. A factor analysis of a cross-cultural female mating preference data set revealed several preference clusters, including "good looks/health or intelligence," "status/resources," and "desire for a home/children" (Shackelford et al., 2005). Derived from the same questionnaire, a similar set of female mate choice indicators received high preference rat-

ings from a sample of attractive women with high mate values (Buss & Shackelford, 2008). Three clusters of these indicators were "good-genes indicators" (e.g., masculinity and sexiness), "good investment indicators" (e.g., potential income), and "good parenting indicators" (e.g., the desire for a home and children) (Buss & Shackelford, 2008). In another study, three dimensions were identified for defining female standards of an ideal intimate relationship: (a) health, passion, and attractiveness; (b) status and resources; and (c) warmth, commitment, and intimacy (Fletcher & Simpson, 2000). Finally, one of the earliest mate preference questionnaires administered in 37 countries and regions by Buss (1989) included attributes related to the three Gs such as physical attractiveness, good health, a sense of humor, and good communication skills (good genes); good financial prospects, ambition and industriousness, and favorable social status (good providers); and kindness, good domestic skills, a fondness for children, a willingness to commit to a relationship, and good parenting abilities (good fathers).

Based on these existing instruments, we developed 30 items pertaining to good-genes, good-provider, and good-father male mate values. These items were investigated using a pilot study of 113 female college and graduate students in Shanghai. The items were presented on a 6-point scale indicating the degree of importance regarding each male mate attribute in a long-term relationship. After item analysis, including an analysis of item-total correlations and factor loadings, the number of items was reduced to 21, with seven representing each of the attributes related to the three Gs. These 21 items constitute the WMPQ.

**Results and discussion.** This 21-item WMPQ was administered to the first sample of 515 women from Jiangsu Province. For the online sample, a shorter 12-item version of the WMPQ was used by retaining four items of the highest factor loadings for each of the three Gs. We conducted principal component factor analysis using varimax rotation and the eigenvalues-greater-than-one rule on both samples. The results yielded three factors corresponding to the three Gs that explained 51.13% of the variance in the community sample and 60.57% in the online sample. The 21 items and the factor loadings from the community sample are re-

ported in Table 1. In the two samples, the internal consistency reliability estimates were .74 and .61 for good-genes, .85 and .81 for good-provider, and .82 and .80 for good-father factors, respectively. The means and standard deviations of the three-G attributes of the two samples are reported in Table 2.

The online sample represented much higher SES than the community sample (95% compared to 33% with a college education and ¥4,620 compared to ¥2,722 mean income). Combining the two samples, we conducted a 2 (community vs. online sample) × 3 (three Gs) analysis of variance (ANOVA). The results showed a significant main effect of three Gs [$F(2, 826) = 623.79$, $p < .001$, $\eta^2 = .60$] and the interaction effect [$F(2, 826) = 42.63$, $p < .001$, $\eta^2 = .09$], as well as a significant main effect of samples [$F(1, 827) = 123.92$, $p < .001$, $\eta^2 = .13$]. The good-father scale had the highest mean ($M = 4.86$, $SD = .84$), which significantly differed from the good-provider [$M = 3.84$, $SD = .90$; $t(828) = 30.44$, $p < .001$] and good-genes factors [$M = 3.89$, $SD = .79$; $t(828) = 29.59$, $p < .001$]. The high-SES online sample had higher means on all three Gs com-

Table 1
*Female Mate Preference Questionnaire Items and Factor Loadings*

|  | Component | | |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Stays at home | **.82** | .13 | .05 |
| Considerate | **.79** | .03 | .26 |
| Patient | **.76** | −.06 | .24 |
| Faithful | **.68** | .24 | .19 |
| Caring | **.60** | −.04 | .08 |
| Loves children | **.53** | .30 | .33 |
| Good housekeeping | **.48** | .37 | .31 |
| Good income | .15 | **.74** | .27 |
| High social status | −.13 | **.71** | .27 |
| Successful career | .15 | **.68** | .09 |
| Good family background | .11 | **.67** | .27 |
| Ambitious | .19 | **.63** | −.30 |
| Good education | −.16 | **.59** | .08 |
| Capable | .30 | **.43** | .08 |
| Creative | .29 | .06 | **.71** |
| Sense of humor | .40 | −.00 | **.71** |
| Masculine | .11 | .16 | **.63** |
| Good body | .19 | .37 | **.60** |
| Athletic | .18 | .24 | **.59** |
| Good voice | .21 | .03 | **.56** |
| Good-looking | −.02 | .10 | **.54** |

Table 2
*Means and Standard Deviations of the Three G Factors in Study 1*

| | Community sample ($n = 515$) | | Online sample ($n = 373$) | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Good father | 4.54 | .78 | 5.31 | .68 |
| Good provider | 3.67 | .75 | 4.10 | 1.05 |
| Good genes | 3.81 | .68 | 4.03 | .94 |

pared to the community sample, and the difference between the two samples on the good-father variable was the highest and was significant [$M_{\text{online}} - M_{\text{community}} = .82$, $t(827) = 15.55$, $p < .001$]. These findings support our hypothesis that contemporary women, especially those with high socioeconomic conditions, value good-father attributes more highly than they value good-provider or good-genes attributes in the context of a long-term relationship.

We computed SES by adding the standard scores for years of education and monthly income. Supportive of our hypothesis, SES was positively correlated with the good-father variable in both the combined sample ($r = .50$) and in the two samples separately ($r = .41$ and .39). In the combined sample, SES was most highly correlated with good-father attributes ($r = .50$) compared with good-provider ($r = .43$) and good-genes attributes ($r = .24$). The differences were statistically significant ($z = 2.12$, $p = .017$ compared with good providers; $z = 7.19$, $p < .0001$ for good-genes comparison). The fact that SES was also positively and significantly correlated with good-provider and good-genes attributes suggests the effect of assortative mating which, among human beings, is assorted mainly by wealth (Kalmijn, 1991).

## Study 2

In Study 2, we examined the effect of socioeconomic development by comparing women from rural villages and towns in which economic development has been relatively behind or delayed with women from urban areas of China. Whereas rural–urban developmental differences are universal, they are particularly pronounced in China; the average annual income

per capita was ¥24,565 for urban areas and ¥7,917 for rural areas (National Bureau of Statistics of the People's Republic of China, 2012), which provides a favorable opportunity to test our hypothesis about economic development.

**Samples and procedures.** We administered the 12-item version of the WMPQ to a community sample of rural women and a community sample of urban women. The rural sample consisted of 194 women aged between 18 and 46 years ($M = 27.73$, $SD = 4.68$) from a small town and a nearby village of Jiangsu Province. The majority (42.35%) were married, and 20.92% were in a long-term relationship. On average, they had received 14.09 ($SD = 2.97$) years of education, and 55% had received tertiary education. The urban sample consisted of 175 women aged between 17 and 47 years ($M = 27.46$, $SD = 4.46$) from Nanjing, the capital city of the province. Of the sample, 23.16% were married, and 20.90% were in a long-term relationship. On average, they had received 15.92 years of education ($SD = 1.68$), and 93% had received tertiary education. Regarding employment, 64% worked in a clerical or administrative capacity, 23% worked in a managerial capacity, 6% were housewives, 5% were unemployed, and 2% owned their own businesses. Their average monthly income was ¥5,141.58 ($SD = ¥3,652.09$). The rural sample had no income or employment information.

**Results and discussion.** The means and standard deviations for the three mate values for the two samples are presented in Table 3. A 2 (urban vs. rural) × 3 (three Gs) mixed ANOVA yielded a significant interaction effect [$F(2, 366) = 18.13$, $p < .001$, $\eta^2 = .09$]. The subsequent simple effect comparison showed, as expected, a significant urban–rural difference regarding preference for good-father attributes, $t = -7.34$, $p < .0001$, but not for the other two

Table 3
*Means and Standard Deviations of the Three G Factors in Study 2*

| | Rural sample ($n = 194$) | | Urban sample ($n = 175$) | |
|---|---|---|---|---|
| | M | SD | M | SD |
| Good father | 4.18 | .99 | 4.90 | .87 |
| Good provider | 3.73 | .82 | 3.89 | 1.03 |
| Good genes | 3.84 | .81 | 3.84 | .90 |

mate attributes. The ANOVA also yielded a significant main effect comparing the three Gs [$F(2, 366) = 84.78$, $p < .001$, $\eta^2 = .32$]. As predicted, the highest mate preference was for good-father attributes for both samples. Paired $t$-tests showed that the expected differences were statistically significant ($t = 11.63$, $p < .0001$ against good-provider attributes and $t = 12.41$, $p < .0001$ against good-genes attributes in the urban sample; for the rural sample, $t = 5.24$, $p < .0001$ against good-provider attributes and $t = 4.19$, $p < .0001$ against good-genes attributes). Finally, the main effect representing the urban–rural comparison was also significant [$F(1, 367) = 18.95$, $p < .001$, $\eta^2 = .05$]. This result mainly reflects the finding that urban women had a higher mate preference for good fathers than rural women. Overall, these results were in accordance with our prediction, suggesting that socioeconomic development in the form of urbanization causes women to shift their mate preferences from good-provider and good-genes attributes to good-father attributes. These results emphasize the importance that modern women place on good-father attributes compared with that assigned to good-provider and good-genes attributes.

## Study 3

The results of Studies 1 and 2 were correlational in nature and provided limited implications regarding the influence of the environmental context of modernity on women's mate preferences. In Study 3, we experimentally manipulated economic conditions to examine their effect on mate preferences. We also used a forced tradeoff method to measure mate preference and thereby gain explicit knowledge regarding how women make tradeoffs among the three Gs as a function of economic conditions.

**Sample.** The participants in the experiment comprised 123 female college students (mean age = 21.72 years, $SD = 3.08$) who attended a university in Shanghai. All the participants were single and heterosexual. Using a between-subjects design, the participants were randomly assigned to one of three economic manipulation groups—good economic conditions ($n = 42$), poor economic conditions ($n = 42$), or control conditions ($n = 39$).

**Procedure and economic manipulation.** The experiment was conducted on an individual basis. Upon arriving at the laboratory, a participant was seated in front of a computer screen showing written instructions related to the experiment followed by instructions regarding the manipulation of economic conditions. Participants assigned to the good (poor) economic condition group were shown a statement asserting that, compared with the past, contemporary life is more controllable (uncontrollable) and offers more abundant (limited) resources and that it is easy (difficult) for a woman like the participant to make a living. The participant was then asked to imagine herself as having (not having) sufficient economic means and plentiful (scarce) material resources and to decide how she was to spend her money (pay her debt and buy necessities) regarding various types of houses, cars, and furniture (hospital bills, rent, and food). The participant input the answers into the computer. The control group, which only saw the general instructions but not those for the economic manipulation, solved simple math questions. Afterward, all participants were asked to select five out of 15 words in Chinese to describe her ideal future husband or long-term partner. The 15 words, with five representing each of the three Gs that were randomly mixed, were simultaneously presented on the screen. Translated into English, they are listed as follows: good-looking, has a sense of humor, athletic, creative, and courageous (good genes); ambitious with regard to his career, highly educated, has a high income, is a good leader, and generous (good providers); domestic, caring, loves children, kind, and honest (good fathers).

**Results and discussion.** The number of words selected formed three variables representing the three Gs; each G was represented by the number of words selected from that category. Figure 1 presents the means and standard deviations of these three variables under each of the three experimental conditions. Because the total number of words was fixed, the three variables represented a part of the total and were not independent. They represent ipsative data that cannot be analyzed using standard statistics with stable Type I errors (Greer & Dunlap, 1997). Following the procedures reported in the literature, we first computed two independent contrasts by subtracting good-genes and good-provider words, respectively, from the good-father words and then conducted one-way
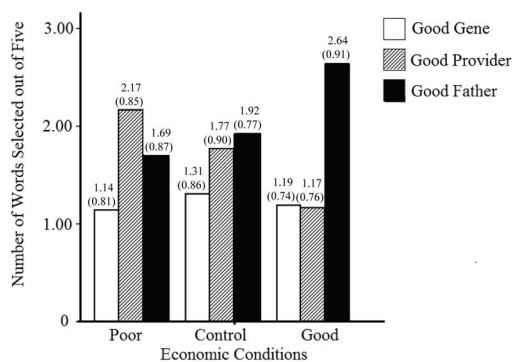
*Figure 1.* The effect of economic manipulation on the number of good-gene, good-provider, and good-father words selected to describe mate preferences. *Note.* Numbers are means (standard deviations are in parentheses).

ANOVA on these two computed contrasts separately.

For the first contrast between good-father and good-genes attributes, three economic conditions exerted significant effects [$F(2, 120) = 5.15$, $p = .007$, $\eta^2 = .08$]. Post hoc tests were conducted and revealed significant differences between the good economic conditions group (mean difference = 1.45, $SD = 1.47$), on one hand and the bad economic conditions group (mean difference = .55, $SD = 1.45$, $t = 2.84$, $p = .006$) and the control conditions group (mean difference = .62, $SD = 1.37$, $t = 2.65$, $p = .01$) on the other hand. No significant difference between the bad economic conditions and control conditions groups was observed. Under the good economic conditions, good-father attributes were prioritized significantly more than good-genes attributes.

The second contrast between good-father attributes and good-provider attributes also yielded significant results [$F(2, 120) = 18.77$, $p < .0001$, $\eta^2 = .24$]. Again, the good economic conditions group (mean difference = 1.48, $SD = 1.50$) differed significantly from both the bad economic conditions group (mean difference = −.48, $SD = 1.52$, $t = 5.92$, $p < .0001$) and the control conditions group (mean difference = .15, $SD = 1.44$, $t = 4.04$, $p < .0001$). No significant difference between the bad economic conditions and control conditions groups was observed. Under good economic conditions, good-father attributes were prioritized significantly more than good-provider attributes.

These results provided equally strong support for our hypothesis.

## General Discussion

Organisms have evolved to strive for survival and reproduction by following long-selected, species- and sex-specific routes and by adjusting their paths in response to the prevailing ecological landscape. As anisogamous mammals (i.e., large egg size relative to sperm, internal gestation, and lactation), women have, over the course of evolution, maximized their reproductive success by securing sufficient resources and high-quality genetic stock, and thus good-provider and good-genes attributes have become their preferred male mate values. These mate preferences for good providers and good genes have been developed in a species-general manner, either through intrasexual competition, mainly among the less invested males, or intersexual selection or mate choice, generally conducted by the more invested females, both of which are driven by differential parental investment (Trivers, 1972). The subsequent evolutionary path of primates led to the development of alloparenting, which is especially adaptive in large human groups of genetically related individuals (Hrdy, 2009). The good-father attributes could have evolved as more women favored fathers over other relatives as alloparents (Quinlan & Quinlan, 2008). The paragons of good fathers are gorillas (Whitten, 1987), with which human primates share similar mating patterns (Geary et al., 2011). The last 2 million years of human evolution have brought new challenges, including increased cranial volume, a prolonged childhood of offspring due to premature birth, and the need for considerable brain development through strong social interaction, all of which lead to and are effectively achieved by alloparenting and fathering. The subsequent evolution of the human mating system from polygynous to monogamous pair bonding (Benshoof & Thornhill, 1979) and to the current practice of imposed monogamy suggests that women's reproductive success depends on the procurement of paternal assistance at the nest, in addition to the procurement of sufficient resources and good-quality genetic stock. It may be speculated that good-father male attributes have become female mate preferences mainly in response to this last pedigree of human evolu-

tion, whereas good-genes and good-provider preferences are more species general, derived from a longer evolutionary past.

Among the three Gs sought after by women, the procurement of good genes is intangible in the sense that no tangible material or service is provided, whereas the other two procurements are explicit and visible, which can be assessed by women based on the provided goods (good provider) or services (good father), and based on the attitude of the givers or how willing they are to give either material resources or energetic exertion and effortful services. Such assessment becomes a component of the good-provider and good-father preferences and bears on the moral or character judgment of a potential mate. The intangible quality of genetic provision leaves the impression that good-genes carriers are selfish, unwilling to provide tangible materials or energetic expenditures. Studies have indicated that women perceive masculine men as dishonest, uncooperative, and poor parents (Boothroyd, Jones, Burt, & Perrett, 2007). The difference between these two types of paternal contributions is derived from the distinction between premating and postmating reproductive decisions (Andersson, 1994). The good-genes mate preference is calculated into premating decisions, the benefit of which is effected one time at insemination, whereas the benefits of good-provider and good-father mate values on female reproductive success are realized continuously through postmating events and are subject to the participation of the male carrier. If mate desertion occurs, good-provider and good-father mate attributes—but not good-genes attributes—cease to contribute to the reproductive success of the female chooser. Because of this difference, certain good-provider and good-father attributes are selected because they reduce the likelihood of mate desertion. However, mate desertion can occur as a result of disease and other extrinsic risk that impedes the conversion of nongenetic (i.e., good-provider and good-father) mate attributes into female reproductive success, and that should cause a fast reproductive strategy favoring good-genes attributes (Ellis et al., 2009). Controllability and predictability of the environment should promote a slow strategy to focus on parenting and the underlying good-father and good-provider mate values.

Between good-provider and good-father mate values, the latter represents direct paternal care, such as holding and playing with the child, that requires energetic expenditure of the father helper at the nest, and the former represents indirect paternal care through investment of material resources (Marlowe, 2000). Paternal assistance at the nest enables women to leave their offspring to garner additional resources. This switching of sex roles is fundamental to modernization, which may cause "a shift in women's mate value from pure reproductive value to a mixture of reproductive and resource value" (Low, 2005, p. 66) and possibly a corresponding shift in prioritizing male mate values from good providers to good fathers. This shift in mate values sets the stage for the subsequent sociocultural development of humans, including, not necessarily in this order, imposed monogamy, gender equality, and urbanization and modernization, which all result from and are characteristics of women leaving the nest to enter the resource-garnering workforce. Once a woman spends the same amount of time and energy on education and employment and receives (approximately) the same amount of resources as a man, her dependence on resources to ensure reproductive success is reduced by half, and her need for a helper at the nest doubles. Living in such an environment, women's mate preferences could be expected to evolve to center around good-father attributes and move away from good-provider attributes, as observed in the present study.

However, the mammalian evolutionary "residue" continues to drive women's mate preference for good providers and good genes, even though the good-father mate preference is more salient in contemporary living conditions. This ancient evolutionary preference may have a considerably reduced function in contemporary society but becomes nominal and habitual, representing long-selected, species-general evolutionary momentum. The positive correlations found in the present study between social economic conditions on one side of the equation and all three-G mate preferences on the other side suggest that, as women acquired additional resources on their own, their desire for good resources and good genes, as well as good fathers, increased. This finding is also due to assortative mating practiced by many animals, including humans (Anderson & Klofstad,

2012). Women assort their mate selections probably based more strongly on the observable indicators of the first two Gs (e.g., wealth and status and height and physical appearance) than good-father indicators that are primarily internal or personality attributes such as being kind and loving. Thus, by assortative mating practice, a tall woman or a woman having high levels of education and income is likely to marry a tall man or an educated rich man independent of the three-G predictions. However, the correlation between social economic conditions and the good-father mate preference was robust in the present study, emphasizing the increasing functional value that good fathers, compared to good providers and good genes, have in ensuring contemporary women's reproductive success.

There are several limitations of this study. First, we relied solely on self-report to measure women's mate preferences. Although this method has been widely used and proven valid and reliable in mating research (Buss & Shackelford, 2008; Gangestad et al., 2007), the inclusion of other implicit methods, including that of the "mate budget" method (Li et al., 2002), should better capture mate preferences operating at both conscious and unconscious levels. Second, we examined women's mate preferences only in the context of long-term relationships. Although long-term relationships are the most relevant to human female mating, the inclusion of short-term mating may provide more insight into the evolutionary functions of the three Gs because, particularly relevant to short-term mating (Gangestad et al., 2007), the benefit of good-genes mate values is effected one time at insemination, whereas the benefits of the other two Gs are effected continuously. Future studies should distinguish between long- and short-term mating by examining women's implicit mating responses. Finally, this is one of the few studies not based on White, educated, industrialized, rich, and democratic populations (Henrich, Heine, & Norenzayan, 2010) especially needed to test pancultural evolutionary predictions. It is important and interesting to investigate the good-father hypothesis in other cultural groups, including Western women, to determine if there are cross-cultural differences against otherwise pancultural predictions. From a life history perspective, a future Western investigation of the issue should also help to un-cover the potential impact of mature economic development on mating compared to the drastic environmental changes taking place in China that may affect the present study. Despite these limitations, this is among the first studies to define men's mate values based on three categories of good genes, good providers, and good fathers that provides a broader framework to more fully capture women's long-term mating preferences and practices. By conducting both surveys and experiments, good-father mate values were determined to be the most valuable to modern women.

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