ELSEVIER

Evolution and Human Behavior 33 (2012) 182 – 192

Evolution and Human Behavior

Original Article

Mating strategies in Chinese culture: female risk avoiding vs. male risk taking

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Initial receipt 30 November 2010; final revision received 14 September 2011

Abstract

Previous evolutionary literature demonstrating risk taking as a male mating strategy ignored cultural influences and the function of risk avoiding for women. The present research is the first to support the hypothesis that risk taking and risk avoiding, respectively, reflect Chinese male and female mating strategies. In Study 1, when under the impression of being watched by the opposite sex, Chinese men took more risks and women took fewer risks than when watched by a same sex or alone. In Study 2, Chinese male risk taking and female risk avoiding were positively related to their mating-related evaluation of the opposite-sex observer, and these results were reinforced by behavioral findings in Study 3. The implications of the findings regarding Chinese traditional mate preference and the evolutionary mechanism behind it are discussed.

Keywords: Risk taking; Risk avoiding; Mating strategy; Mate preference; Chinese culture

1. Introduction

"Her balmy breath was so gentle. She was as demure as a lovely flower reflected in the water. Her gait resembled a frail willow, agitated by the wind" (Cao, 1784/2004, chap. 3). Lin Daiyu, a well-known female character in Chinese literature, is depicted as beautiful, feminine, sensitive, and emotionally fragile. She is the embodiment of the supreme Chinese female beauty (Xu, 1987). Evidence for the social conception of Chinese women as timid, weak, and subordinate can also be found in many other literatures (e.g., Hooper, 1975; Wolf, Witke, & Martin, 1975).

Imagine you are a woman who lives in a society with a culture that considers conservativeness and timidity as becoming characteristics of women. Would you demonstrate bravery, adventurousness, and risk taking, or timidity and risk avoiding as mating strategies in front of a desirable potential mate? In the current paper, we reported on three serial experiments utilizing an interactive framework of evolutionary theories and cultural influences to help understand risk taking as a male mating strategy and risk avoiding as a female mating strategy in Chinese social contexts.

1.1. Evolutionary theories and studies of risk taking as male mating strategies

According to evolutionary theories, risk taking is related to some positive masculine traits valued by women in mate selection, such as bravery, wealth, competence, confidence, and social dominance (e.g., Bliege Bird, Smith, & Bird,

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doi:10.1016/j.evolhumbehav.2011.09.001

2001; Hawkes, 1991; Wilson, Daly, & Pound, 2002). These behaviors are also considered as indicators of good genes and the capability of protecting women and their offspring (Kelly & Dunbar, 2001). This explains why men are more likely to take and tolerate risks than do women in many situations (e.g., Chen, Baker, Braver, & Li, 2000; Wilson et al., 2002).

Furthermore, previous research in Western contexts has shown that men tend to take more risks when accompanied by partners than when they are alone, whereas women's risk taking is not influenced by the presence of others (Chen et al., 2000; Daly & Wilson, 2001). More importantly, it has been empirically supported that male risk taking was significantly impacted by mating motivations as well as sex-related cues; however, these were not shown to affect women (e.g., Baker & Maner, 2008, 2009; Pawlowski, Atwal, & Dunbar, 2008). Thus, in these relevant studies, no one has made a further inquiry into the relationship between female mating strategies and their risk taking. Some evolutionary psychologists did not even include female subjects in their studies of the relationships between risk taking and mating strategies (e.g., Frankenhuis, Dotsch, Karremans, & Wigboldus, 2010; Ronay & von Hippel, 2010).

1.2. Theories and studies on mate preferences

Many Western studies on mate preferences have confirmed the positive correlation between risk-taking behaviors and mate preferences in women's selection of men. Women indeed favored brave, risk-taking men over nonbrave, risk-averse men as romantic partners (Bassett & Moss, 2004; Farthing, 2005, 2007). Men were also well aware of this preference and even overestimated it (Farthing, 2005; Kelly & Dunbar, 2001). Critical assumptions in sexual selection theory (Darwin, 1871) and parental investment theory (Trivers, 1972) view mate selection as primarily female. However, this line of research is limited in its knowledge and understanding of men's choice of women and how women compete for potential mates. Perhaps, if cultural factors are taken into account, a new relation between mating strategies and risk taking (or avoiding) would be observed.

Culture affects human's success and survival by partly affecting mate selection (Higgins, Zheng, Liu, & Sun, 2002; Richerson & Boyd, 2005). However, the influence of culture on mating strategies remains a neglected topic in risk-taking research. Given the lack of empirical research about mating strategies related to risk taking and risk avoiding across cultures, our studies based on Chinese samples deserve a systematic investigation.

In Western culture, as a result of individualism and feminist movement, risk-avoiding behaviors may not be directly related to women's attractiveness to men (Walters, 2005). However, what is preferred in one culture may not be desirable in another (Zhang & Kline, 2009). Despite the far-reaching Cultural Revolution in the last century, traditional values in mate selection as well as conservative sexual culture still keep a tenacious hold in China today (Chan, 1990; Higgins et al., 2002). Sex-role differences and gender stereotypes are much more emphasized and remain quite constant in China despite rapid changes in the role of women globally (Cheung, 1996; Lii & Wong, 1982). Thus, apart from typical visual cues such as physical attractiveness (Buss, 1987), the unique Chinese culture has developed its own specific cues for men to use in selecting potential mates that are in line with traditional Chinese social and gender roles. These roles can be traced to Yin-Yang Theory and Confucianism, whose constraints are still present in modern Chinese society (Verschuur-Basse, 1996).

According to *Yijing* (*I-ching* or *Book of Changes*), the philosophical basis for Confucianism and Taoism, the universe is seen as a balance of conflicting forces, Yin and Yang. Yang represents the active male principle, such as prowess, strength, and activity, while Yin stands for the negative female principle, such as weakness, yieldingness, and passivity (cf. Lin, 1935). This was later formulated by Confucius into important characteristics for unalterably virtuous expectations of Chinese women (Pope-Davis & Coleman, 2001). These expectations are the "three obediences (*san cong*)," referring to the requirements to obey first their father, then their husband, and, during widowhood, their son (cited in Gao, 2003), and the "four virtues (*si de*)," prescribed as virtuous women should behave chaste and yielding, talk less and properly, be graceful and restrained in appearance, and perform domestic chores dutifully and willingly (Hooper, 1975). These characteristics have since restricted women's behaviors in intrasexual relationships in China (Verschuur-Basse, 1996; Gao, 2003).

These traditional thoughts constructed the cultural background for mate preferences in China. Chinese men tend to choose wives based on their chastity, gentleness, thoughtfulness, femininity, and submissiveness (Higgins et al., 2002; Zhao, 2002), all of which pertain to low social dominance. It has also been shown that Chinese men prefer wives who are less educated, are less intelligent, have lower career status, and have lower capabilities than themselves (Bullough & Ruan, 1994). Therefore, it is low social dominance and lower capabilities that Chinese men find attractive in potential mates.

Those aforementioned mate selection criteria deriving from the traditional aesthetic perception of women (Zhu, Dong, Qian, Wang, & Liu, 2004) had many Chinese women more constrained by ancient traditions than liberated by new socialist ideas (Kaledin, 1989). From an early age, Chinese women were taught and socialized to be timid, reserved, shy, obedient, unassertive, humble, attentive, respectful, and, above all, chaste (Higgins & Sun, 2007; Hooper, 1975), all of which encourage women not to be risk takers. In contrast, strong, dominant, independent Chinese women with higher positions are often expected to remain single (Zhu, 2008).

1.3. The relationship between mating strategy and mate preference

Although traditional intrasexual selection is mainly termed as female choice (sexual selection theory, Darwin, 1871; parental investment theory, Trivers, 1972), men certainly also exert considerable mate choice, especially in monogamy-restricted mating systems (Buss, 1988). As Buss (1988) indicated, "patterns of human intrasexual competition can be predicted from knowledge of mate selection criteria: the mate preferences of one sex can determine over evolutionary time the domains in which the opposite sex competes" (p616). In other words, men are predicted to compete most strongly to display the traits valued by women. Likewise, men's preferences should influence female–female competition in an analogous way: women are expected to be aware of the characteristics that men desire and compete to show those traits. Combining the above findings, we formulated our hypotheses on mating strategies in the Chinese social context.

1.4. Overview of the present research

The evolutionary perspective proposes that the behavior of an individual of one sex is to some extent determined by the style of mate preference of the opposite sex (Buss, 1988, 1996). If this holds true, Chinese male mate preferences will encourage women to demonstrate the behaviors that signal the characteristics of low social dominance and lower capabilities in front of a potential mate. Therefore, risk avoiding is predicted to be a female mating strategy that is supposed to be facilitated by mating motivations and sex-related cues. In contrast, Chinese male risk taking is expected to be facilitated by mating motivation or sex-related cues.

In the current research, we examined the relationships between mating-related factors and risk taking of Chinese male and female participants under the interactive perspectives of evolutionary and cultural psychology. In Study 1, participants performed the Balloon Analogue Risk Task (BART) and were told either that their performance would be private (control group) or that it would be watched by a partner via the Internet (experimental groups). The experimental groups either viewed an opposite-sex or a same-sex partner in a self-introduction video. If male risk taking and female risk avoiding are designed to facilitate mating in China, then it should be hypothesized that:

Hypothesis 1. Compared to Chinese participants who believe their risk task is watched by a same-sex partner or no one, for those who believe their risk task is watched by an opposite-sex partner, (a) men will take more risks and (b) women will take fewer risks.

If this hypothesis is confirmed, risk taking of men and women should also be linked with their mating-related evaluation of the opposite-sex partner and their desire to associate with him or her in the same pattern. In Study 2, we therefore predicted that:

Hypothesis 2. (a) Chinese men's risk taking will be positively associated to their mating-related evaluation of the opposite-sex confederate, whereas (b) women's risk taking will have a negative correlation with their evaluation of the opposite-sex confederate; (c) there will be no relation between male or female risk taking and evaluation to the same-sex confederate.

As a next step, we further tested the relationship between the behavioral indicator of the participants' desire to associate with the opposite-sex partner and their risk taking. In Study 3, it was expected that:

Hypothesis 3. (a) Male participants who are willing to leave their contact information without any conditions or hesitation will take more risks than those who leave their contact information with conditions or hesitation and than those who refuse to do so, (b) while female participants who leave contact information without any conditions or hesitation will take fewer risks than women who behave in the other patterns.

In addition, two studies conducted by Baker and Maner (2008, 2009) on risk taking and mating motivation did not control for participants' relationship status. However, many researchers had found that single men were more likely to take risks than married ones (McLanahan, 1999) and that the perception of the opposite sex differed between men under diverse relationship statuses (Maner, Gailliot, & Miller, 2009). Therefore, we included participants' relationship status as a control variable across conditions in Study 1 and Study 2. The results showed no differences in risk taking as a function of relationship status but marginally significant associations between women's relationship status and some of the evaluations of the same-sex confederate (please refer to Appendix A, available on the journal's website at www.ehbonline.com).

2. Study 1

By manipulating the sex of the "observer" (confederate), the first study provided an initial test of the hypothesis that Chinese women use risk avoiding while Chinese men use risk taking as their mating strategy, respectively.

2.1. Methods

2.1.1. Participants

A total of 224 postgraduates and undergraduates (106 male and 118 female; mean age 21.84, S.D.=2.55) from Beijing Normal University, Central University of Finance and Economics, North China University of Technology, and Beijing Union University were recruited in exchange for a payment of RMB 5 yuan. None had taken any psychology-related course before. There were 110 participants (49 men, 61 women) in committed relationships and 114 who were single (56 men, 58 women).

2.1.2. Materials

2.1.2.1. Balloon Analogue Risk Task. BART (Lejuez, Read, Kahler, Richards, Ramsey, & Stuart, 2002) is a well-validated, computerized, laboratory-based behavioral measure of risk taking. It simulates a real-world situation in which participants were confronted with a potential risk of higher loss when pursuing more benefits.

Participants were given the following instructions: "You are going to see 30 balloons, one after another, on the screen. For each balloon, you will use the mouse to click on the box that will pump up the balloon. Each click pumps the balloon up a little more. You get 1 point for every pump. Balloons pop if you pump them up too much. If a balloon pops, you lose the points you earn on that balloon. To keep the points from a balloon, stop pumping before it pops and click on the box labeled 'Collect.' After each time you collect points or pop a balloon, a new balloon will appear." Therefore, more pumps would lead to higher points earned but also a higher risk of explosion, namely, higher risk of loss.

The average number of pumps per unexploded balloon was the primary dependent variable. The number of pumps on all balloons, the number of popped balloons, and the total points earned were secondary indicators of risk-taking behavior. The result pattern of total points in all conditions differed from the other three measures and had nonlinear relationships (presented as inverted U curves) and relatively low correlations with the other three measures ($r<.29$, $p<.001$ between total points earned and the other three measures vs. $r>.91$, $p<.001$ among the other three measures). Interviews conducted to participants indicated a possible alternative that some Chinese students found a strategy to get high points without taking high risk. Total points thus were considered less validated to reflect risk taking of Chinese participants and therefore were not taken into analysis.

2.1.2.2. Confederate's self-introduction videos. Both the male and female confederates in the self-introduction videos were highly attractive university students. Before the experiment, researchers first chose four attractive men and four attractive women as candidates; 97 unpaid heterosexual undergraduates and postgraduates (48 male, 49 female) were then invited to rate the percentile attractiveness of the opposite-sex candidates and then to indicate one candidate they perceived most attractive. Finally, a man (mean ranking=top 29%, 45% of female raters ranked him as first attractive) and a woman (mean ranking=top 24%, 55% of male raters ranked her as first attractive) were invited to record the video.

2.1.3. Design and procedure

Participants participated in the experiment in separate testing rooms with one-way glass. They were told that the study was about interpersonal impressions and that they would mutually form impressions with a partner (confederate), initially via video and later by being observed while they were playing a game. Participants were told that the role of the observer or player was randomly assigned beforehand. In fact, all participants were designated to be the player. They were also told that their partner would evaluate their impression based on their performance in the game and that the partner would later decide if she/he would be willing to play a face-to-face game with the participant.

Participants first filled out a demographic questionnaire that included a question about their relationship status. After that, Experimenter A recorded a standardized self-introduction video of the participant (for reducing their suspicion of the manipulation) and sent it to Experimenter B on another computer in another room via IM software. Experimenter B then assigned a confederate's self-introduction video (either opposite or same sex) to the participants with a randomized block design by participants' relationship status.

After participants viewed the video, Experimenter A started remote assistance in IM software; Experimenter B on another computer accepted the application and moved the mouse to convince the participants that their screen was truly being watched. Experimenter A then left the experiment room before participants began BART. After completion, participants were fully debriefed and thanked.

2.2. Results and discussion

Participants were probed for suspicion of the manipulation in debriefing. Specifically, they were asked whether they knew the partner before and if they felt anything odd in the process of the experiment. No one expressed any suspicion of the manipulation and the goal of the experiment. One single male and one single female participant (both assigned a female confederate) finished BART with 30 balloons in less than 60 s, and their BART data were all outliers below 2.5 standard deviations from the mean. Thus, the data of the two participants were excluded from analyses, leaving 222 cases for analysis.

A general linear model analysis was conducted with participant sex and partner sex as between-subjects factors. A significant interaction emerged between confederate sex and participant sex on two measures of risk taking: number of pumps, $F(2,216)=2.99$, $p<.05$, $\eta^2=0.03$; and number of popped balloons, $F(2,216)=2.98$, $p<.05$, $\eta^2=0.03$. The result of pumps per unexploded balloon was not significant ($p=0.12$); however, it shows a trumpet-shaped pattern that is similar with the other indicators (Fig. 1). The pattern of the interaction was just as anticipated: only among participants who believed their risk task was watched by an opposite-sex partner, male participants took more risks than did female participants, that is, pumps per unexploded balloon [male: mean (M)=43.28, S.D.=13.27; female: M=32.77, S.D.=14.79], number of pumps (male: M=1189.38, S.D.=308.34; female: M=929.57, S.D.=371.91), and number of popped balloons (male: M=12.00, S.D.=5.10; female: M=8.31, S.D.=4.27), all

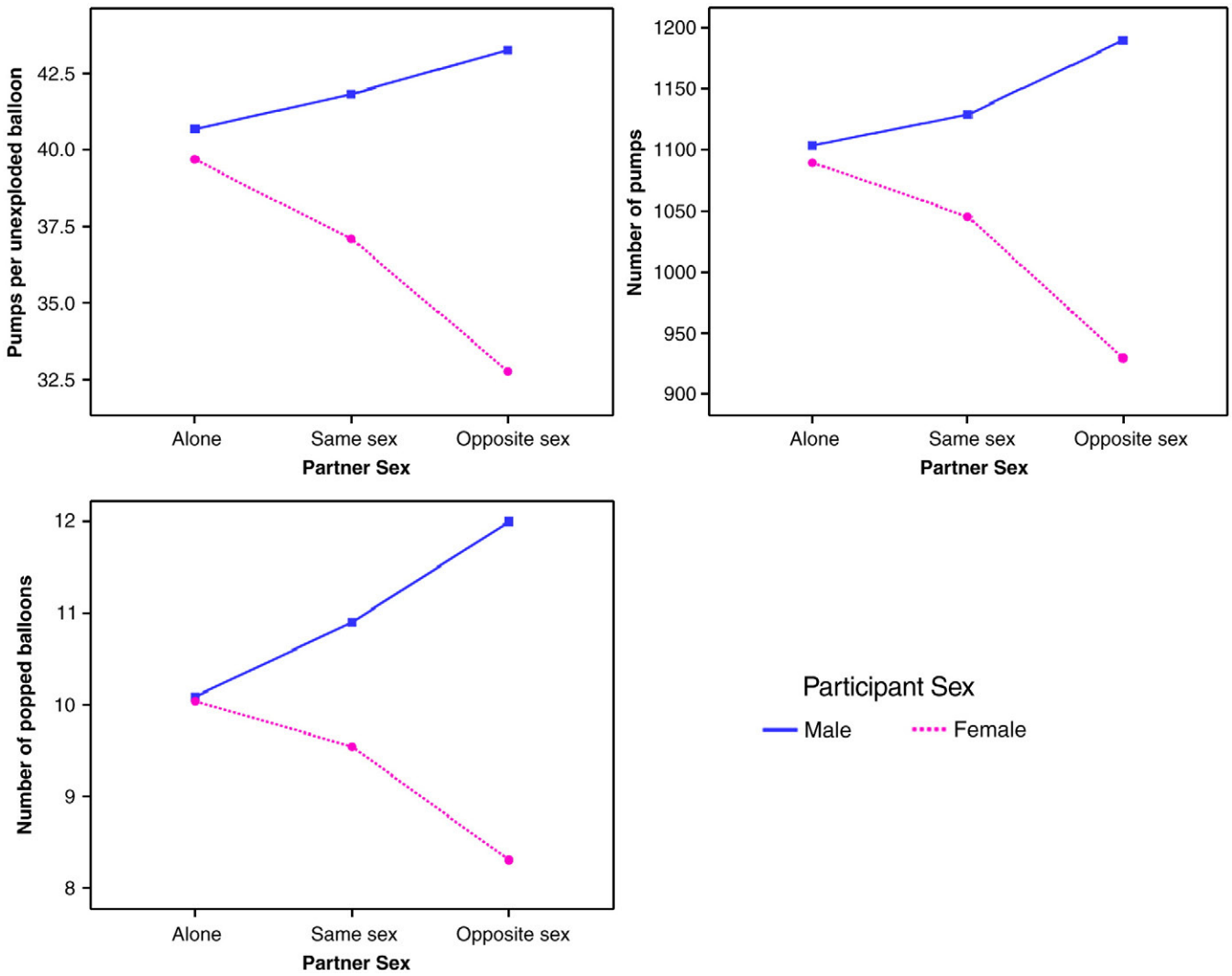

Fig. 1. Risk taking as a function of confederate sex and participant sex in Study 1.

*p*s<.001. No significant sex difference was observed among participants with no observer or with a same-sex "observer," *p*s>.17.

Subsequent pairwise comparisons showed that male participants who believed their risk task was watched by an opposite-sex partner had more total pumps, $p<.07$, and more popped balloons, $p<.03$, than those who performed BART alone ($M=103.45$, S.D.=299.55 and $M=10.09$, S.D.=4.45, respectively). Female participants who believed their risk task was watched by an opposite-sex partner had fewer pumps per unexploded balloon, $p<.05$; fewer total pumps, $p<.06$; and fewer popped balloons, $p<.09$, than those who performed alone ($M=39.69$, S.D.=10.42; $M=1089.79$, S.D.=243.69; and $M=10.04$, S.D.=3.62, respectively). Female participants who believed their risk task was watched by an opposite-sex partner also pumped less than those who believed their risk task was watched by a same-sex partner ($M=1045.45$, S.D.=258.84), $p<.08$. Other subsequent pairwise comparisons were not significant, *p*s>.11.

The results of Study 1 confirmed our prediction. Compared to the male participants who believed their performance was observed by a man or no one, those who believed their performance was observed by an attractive woman took more risks, supporting Hypothesis 1(a). Female participants who believed their performance was observed by an attractive man took fewer risks than those in the other conditions, supporting Hypothesis 1(b).

3. Study 2

If the results of Study 1 were due to the self-presentational functions served by female risk avoiding and male risk taking associated with mating, similar effects should be observed in the relationship between mating-related evaluation and women's risk avoiding/men's risk taking. To test this effect, we replicated Study 1 with an extra measurement for converging evidence. Since Chinese individuals are

Table 1
Correlations between mating-related evaluation and performance measures on BART

	Male (n=83)			Female (n=93)		
	Pumps per unexploded balloon	Number of pumps	Number of popped balloons	Pumps per unexploded balloon	Number of pumps	Number of popped balloons
Opposite-sex partner (n=100)						
First impression	.191	.148	.210	**−.213****	**−.239****	**−.328***
Sex appeal	**.301***	**.252****	**.243****	−.092	−.147	−.163
Being liked by opposite sex	**.283***	**.251****	**.254****	−.120	−.096	−.087
Personality charm	**.297***	**.252****	**.290***	−.008	−.029	−.084
Happiness	**.283***	**.271***	**.325***	.116	.123	.074
Same-sex partner (n=76)						
First impression	.271	.202	.204	−.068	−.065	−.030
Sex appeal	.223	.154	.084	−.164	−.153	−.154
Being liked by opposite sex	.174	.155	.111	.080	.054	.083
Personality charm	.242	.232	.175	−.154	−.130	−.121
Happiness	.273	.224	.234	.115	.098	.073

p>.10; $^{*}p$<.05; $^{**}p$≤.10.

reluctant to talk about sex in public (Chan, 1990), it is hard to directly ask about Chinese participants' mating motivation or sexual arousal. We therefore developed some general mating-related evaluation items. For both male and female participants, we expected that risk taking/risk avoiding would only be significantly related to dimensions that are emphasized in their own mate preferences.

3.1. Methods

3.1.1. Participants

Our sample contained 176 participants (83 male and 93 female; mean age 22.13, S.D.=2.68) from the same population in Study 1 who received a payment of RMB 5 yuan. There were 65 participants (29 men, 36 women) in a committed relationship and 111 who were single (54 men, 57 women).

3.1.2. Materials

A seven-point Likert-like scale consisting of five items was designed to measure mating-related evaluation, including the first impression of the partner (1=*very bad*, 7=*very good*), the partner's sex appeal (1=*very low*, 7=*very high*, same for the following items), the extent to which she/he is liked by general opposite sex, personality charm, and happiness. Other materials were the same as in Study 1.

3.1.3. Design and procedure

In a randomized block design to equate relationship status, participants viewed a video performed by either an attractive same-sex "partner" or an opposite-sex "partner," both of whom were the same as in Study 1. After that, participants were invited to evaluate their partner using the mating-related evaluation scale. Participants then performed BART and believed their risk task was watched by the person in the video who would evaluate them based on their performance and decide if she/he would be willing to play a face-to-face game with the participant. After completion, participants were fully debriefed and thanked.

3.2. Results and discussion

No participant showed any suspicion of the manipulation and the experiment's goal. One single male participant was excluded from the analysis due to the same reasons as in Study 1.

As shown in Table 1, male participants' ratings of the opposite-sex confederate's sex appeal, the extent to which she is liked by general opposite sex, personality charm, and happiness were all positively related with their risk taking, providing support for Hypothesis 2(a). Female participants' first impression of the opposite-sex confederate was negatively related with their risk taking, providing partial support for Hypothesis 2(b). For both male and female participants who believed their performances on BART were watched by a same-sex partner, no significant relationship was found between risk taking and their evaluation of the "partner." Besides, many of the other correlations were also in line with our predictions, though not significant.

4. Study 3

Having demonstrated that some of the mating-related evaluation items were positively related to female risk avoiding and male risk taking, Study 3 moved on to test whether participants' desire to associate with the opposite-sex "partner" would relate to their risky behaviors. For the same reason why we could not directly ask Chinese participants about sexual interest or sexual attraction in Study 2, participants in the third study were asked about their willingness to leave personal contact information for the opposite-sex "partner" after the risk task. Here we identified the validity of the behavioral indicator of the desire to associate with the partner by examining participants' mating-

related evaluation of the opposite-sex confederate. In Study 3, we added five additional items to the mating-related evaluation questionnaire, two of which are the speculation of the partner's future income and IQ, which are valued in female mate selection (e.g., Buss, 1989). We expected that male participants' behaviors of leaving personal contact information would be reflected by their evaluations of the dimensions that are valued in male mate selection, such as sex appeal. Likewise, female participants' behaviors of leaving personal contact information would be interpreted by their evaluations of the dimensions that are valued in female mate selection, such as future income.

4.1. Methods

4.1.1. Participants

We recruited 207 participants (107 male and 100 female; mean age 21.21, S.D.=2.35) from the same population as in Study 1 who received a payment of RMB 5 yuan. There were 83 participants (43 men, 40 women) in committed relationships and 124 who were single and not currently dating (64 men, 60 women).

4.1.2. Materials

A seven-point Likert-like scale was designed to measure mating-related evaluation. The scale consisted of five items identical to the evaluation in Study 2 and five additional items, including the degree that the participant likes the partner, IQ, possible future income, the extent to which the participant hopes that the partner is willing to play a face-to-face game with him/her, and the desire to make friends with the partner. Other materials were the same as in Study 1.

4.1.3. Design and procedure

All participants were invited to view a self-introduction video of an attractive opposite-sex confederate, who was the same one as in Study 1. After viewing the video, participants were asked to evaluate the "partner" on the scale. After that, participants did BART and believed their risk task was watched by the opposite-sex partner who would evaluate them based on their performance and decide if she/he would like to play a face-to-face game with the participants 6 months later.

After the BART was finished, Experimenter A entered the room and asked the participants a standardized question, "Shall we give your contact information to your partner, so you can have personal contact during the next six months out of the experiment?" Participants' answers were subsequently coded by two coders (r=.995, p<.001) for one of three responses: agree without conditions or hesitation (typical answers including "Of course, yes! Can I have her contact information, too?" and "Sure"), agree with conditions or hesitation (such as agreeing hesitatingly, or agreeing "only if the partner is a student" or "only if the partner is willing to leave his/her contact information, too"), or refuse (such as a refusal after hesitation or an immediate refusal). After completion, participants were fully debriefed and thanked.

4.2. Results and discussion

Participants were asked for suspicion in debriefing in the same way as in the previous two studies, and no one mentioned that she/he had doubts during the experiment. The entire mating-related data of one man were missing. One man missed rating sex appeal; while another man and woman missed rating the desire to make friends with the partner.

The result of general linear model analysis revealed that men who answered differently on the questions of leaving contact information showed significantly different risky behaviors in three administrations of BART: pumps per unexploded balloon, $F(2,104)=4.57$, $p<.01$, $\eta^2=0.08$; number of pumps, $F(2,104)=4.95$, $p<.001$, $\eta^2=0.09$; and number of popped balloons, $F(2,104)=3.43$, $p<.03$, $\eta^2=0.06$. Consistent with Hypothesis 3(a), men who left contact information without conditions or hesitation had more pumps per unexploded balloon (M=43.97, S.D.=13.46), more total pumps (M=1208.13, S.D.=312.09), and more popped balloons (M=12.18, S.D.=5.18) than those who did it with conditions or hesitation (M=35.67, S.D.=13.05; M=1005.56, S.D.=325.70; and M=9.56, S.D.=3.92, respectively) and than those who refused (M=34.46, S.D.=12.55; M=972.83, S.D.=313.70; and M=8.92, S.D.=5.55, respectively), all ps<.05. The results are shown in Fig. 2.

To interpret these results, we examined the differences among mating-related evaluations of male participants with different behaviors. The ANOVA yielded significant main effects on sex appeal, $F(2,102)=3.39$, $p<.04$, $\eta^2=0.06$; the degree of liking her, $F(2,103)=3.89$, $p<.05$, $\eta^2=0.06$; the extent to which she is liked by general opposite sex, $F(2,103)=6.95$, $p<.002$, $\eta^2=0.12$; the desire to make friends with her, $F(2,102)=4.91$, $p<.009$, $\eta^2=0.09$; and the extent to which the participant hopes that she is willing to play a face-to-face game with him, $F(2,103)=3.26$, $p<.04$, $\eta^2=0.06$. No other main effects were found in other dimensions. Specifically, pairwise comparisons revealed that, compared to other conditions, male participants who left contact information without conditions or hesitation judged the female "partner" to be sexier and more fascinating to the opposite sex, liked her more, had a higher desire to make friends with her, and more strongly hoped she is willing to play a face-to-face game with him, ps<.05. No other significant differences were found. The results are shown in Graph 1 in Appendix B (available on the journal's website at www.ehbonline.com).

Surprisingly, female participants who left contact information with conditions or hesitation took fewer risks than those who refused to do it: pumps per unexploded balloon (M=31.54, S.D.=12.94 and M=39.73, S.D.=8.58, respectively), $F(1,37)=5.37$, $p<.03$, $\eta^2=0.13$; number of pumps (M=906.10, S.D.=314.52 and M=1130.89, S.D.=208.26, respectively), $F(1,37)=6.85$, $p<.01$, $\eta^2=0.16$; and number of

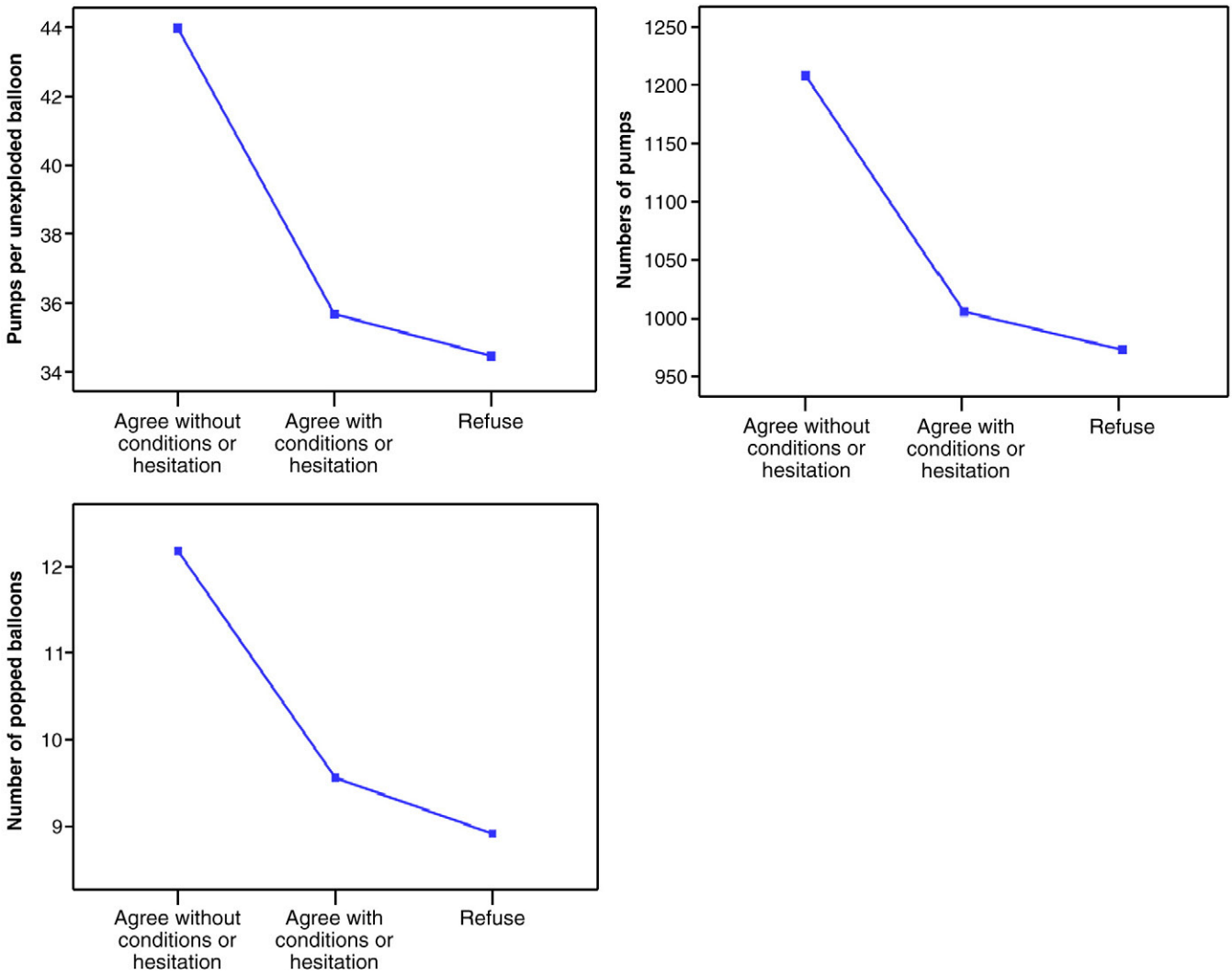

Fig. 2. Male participants' risk taking as a function of different behaviors on leaving contact information to the opposite-sex "partner" (as an indicator of the desire to associate with her) in Study 3.

popped balloons (M=7.80, S.D.=3.62 and M=9.95, S.D.=3.58, respectively), $F(1,37)=3.46$, $p<.07$, $\eta^2=0.09$. No other significant differences were found.

To interpret this effect, we looked at the relationship between female participants' mating-related evaluation of the opposite-sex "partner" and their behaviors on leaving contact information. Compared to female participants who refused to leave contact information, those who showed hesitation or proposed some conditions speculated that the partner would have a higher IQ, $F(1,37)=9.86$, $p<.003$, $\eta^2=0.21$, and higher income in the future, $F(1,37)=6.61$, $p<.01$, $\eta^2=0.15$, and they expressed a higher desire to make friends with him, $F(1,37)=3.31$, $p<.07$, $\eta^2=0.08$ (Graph 2 in Appendix B). No other significant differences were found. Fig. 3 presents the three measures of BART of female participants with different behaviors reflecting their desire to associate with the opposite-sex partner and the mating-related evaluations.

It is worth noting that these findings, though inconsistent with Hypothesis 3(b), reflect exactly the crucial role of Chinese traditional values in male mate preferences and how Chinese women tend to behave in front of a potential mate that they desire. Here, limiting conditions, such as saying "only if he is a student" (an actual example), and/or "showing hesitation," typically presented by a minute's shy consideration with a coy blush (and perhaps accelerated heartbeats), exactly revealed the female participants' high interest in the possible relationship with the attractive opposite-sex "partner." This is because they keenly know that Chinese men desire a timid, reserved, and chaste mate, who is not likely to leave their personal contact information that easily and forwardly to a relatively strange man. To the contrary, those who agreed to leave contact information at once actually did not care much about the impression that might be given by the experimenter to the male partner.

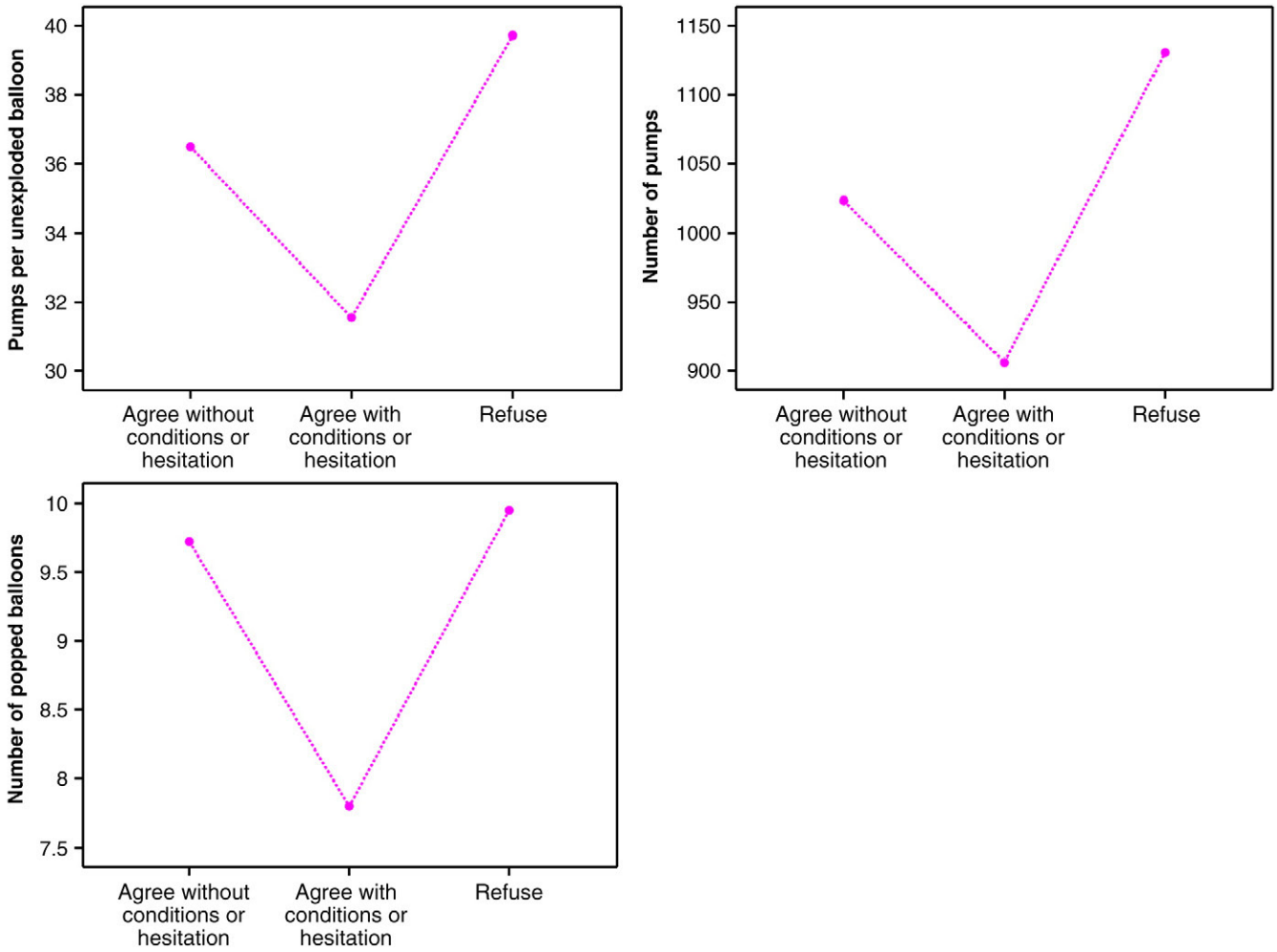

Fig. 3. Female participants' risk taking as a function of different behaviors on leaving contact information to the opposite-sex "partner" (as an indicator of the desire to associate with him) in Study 3.

The results of the mating-related evaluation further validate this explanation.

5. General discussion

Despite considerable knowledge about mating strategies in a Western setting, very little is known about the relationship between mating strategy and risk taking in an Eastern context like China, where approximately 20% of the world's human population resides. Partly for this reason, typical Western evolutionary research emphasizes the power of evolution at the expense of ignoring the impact of culture. Our work extends previous findings of risky behaviors by exploring the function of risk avoiding for women in the mating context in Chinese culture.

Consistent with our predictions, the results of the present research provide evidence that Chinese women take fewer risks when they believe their risk tasks were observed by an attractive man as opposed to another woman or no one. Their first impression of the male confederate was negatively correlated with their risk taking, while none of their evaluations of the same-sex confederate was related to their risky behaviors. Compared to those who refused or directly agreed to leave contact information for the male "partner," the female participants who proposed conditions or showed a modest hesitation took fewer risks and rated their male confederate highest on IQ and future income. These female subjects also had the highest desire to make friends with the "partner" among all female subjects. In contrast, Chinese male participants took more risks when they believed their risk tasks were viewed by an attractive woman, when they thought highly of her in mating-related terms, and when they were willing to leave their contact information without condition or hesitation.

5.1. Cultural implications

Chinese male results are consistent with previous Western studies (Frankenhuis et al., 2010; Pawlowski

et al., 2008; Ronay & von Hippel, 2010; Baker & Maner, 2009). These cross-cultural congruencies suggest that risk taking as a male mating strategy might evolve from the universal evolutionary process in which women prefer risk takers who have a higher potential to provide good genes, protection, and resources as potential mates.

In contrast, cultural differences have emerged in regards to Chinese female mating strategies when compared to Western studies. Here, female risk avoiding as opposed to risk taking was influenced by mating cues and mating motivation. The difference could be attributed to distinct cultural profiles of China and Western countries. The social status and expectations of women in Western countries, especially in the United States, have been changed through the feminist movements (Freedman, 2003). Contrarily, in China, the feminist movements have not exerted significant influence (Qi, 2006), as male dominance continues to be firmly entrenched (Hofstede, 1980; Lee, 1984). As it stands, historical and social forces that have shaped relationships between men and women in China are still at play in terms of people's expectations about a potential partner and thus in patterns of people's behaviors when they are in front of a desirable potential mate.

Our findings can be interpreted as a strong indication of traditional values resistant to the social and economic changes in China. Such traditional Chinese values embody Confucian ideology, in which male strength and female weakness have long been endorsed (Fang, 1991). Conventional criteria for evaluating Chinese women's beauty can be summarized as tenderness, compliance, gentleness, and timidity (Li, 2005), which could be traced back to the advocacy in *Precepts for Women* (*Nv Jie*):

> Yang (or men) should be valued as strong and firm, while Yin (or women) should be valued as gentle and weak.... When a newborn baby comes to the world, if it is a boy as strong as a wolf, his parents are still afraid that he might be too weak; whereas if it is a girl as sweet and gentle as a little mouse, her parents still fear she might be too strong (Kristeva, 1974, p76).

5.2. Evolutionary value of female risk avoiding

As Barkow (1992) indicated, "psychology underlies culture and society, and biological evolution underlies psychology" (p635). Much evidence suggests that evolutionary psychology shapes what we learn and how we think, and that in turn influences culture (Kenrick, Li, & Butner, 2003), which has adaptive significance in human evolution (Dawkins, 2006). Thus, it is necessary to further discuss the evolutionary value of Chinese traditional mate preferences on risk-avoiding traits of women. The main value might lie in its function of solving the problem of paternity uncertainty (Daly, Wilson, & Weghorst, 1982). Researchers have identified a positive relationship between risky behavior on BART and unsafe sex practices (Lejuez et al., 2002). Logically and empirically, a female risk avoider is more likely to be conservative, restrained, and of low social dominance. Furthermore, women with these traits are less likely to be involved in sexual activity with other men and more likely to yield to their husbands' control, both of which lead to a lower possibility to have other men's offspring. As it stands, the evolutionary psychological significance of the emphasis on chasteness lies in the guarantee that men's offspring carried their own genes rather than that of another.

Chastity was the most basic and crucial criterion in judging moral conduct of an unmarried woman in Chinese traditional society (Li, 2005). In cross-cultural mate selection research, the Chinese samples differed from other samples in paying more attention to chastity and giving less value to sociability and exciting personality (Buss et al., 1990), both of which are associated with unrestricted sex (Simpson & Gangestad, 1992).

5.3. Conclusion

Never before have cultural differences been taken into account when exploring the relationship between mating strategies and risk taking. Through this investigation, risk avoiding emerged for the first time as a female mating strategy in the cultural context of China. The current three studies provide converging support for the notion that risk avoiding serves self-presentational functions for Chinese women in front of a potential attractive Chinese mate. Chinese male participants, however, were shown to engage in risky behaviors when facing a potential mate, much like Western men.

Acknowledgments

The authors are grateful to editor Martie Haselton and the anonymous reviewer for supportive and constructive suggestions. Special thanks to Prof. Xinyue Zhou from Sun Yat-sen University for her constructive and professional suggestions for revising this paper as well as to Yijing Li, Hong Cao, and Yao Wang from Beijing Normal University for their efforts in recruiting participants.

Appendix A and B. Supplementary data

Supplementary data to this article can be found online at doi:10.1016/j.evolhumbehav.2011.09.001.

References

Baker, M. D., & Maner, J. K. (2008). Risk-taking as a situationally sensitive male mating strategy. *Evolution & Human Behavior, 29*, 391–395.

Baker, M. D., & Maner, J. K. (2009). Male risk-taking as a context-sensitive signaling device. *Journal of Experimental Social Psychology, 45*, 1136–1139.

Barkow, J. H. (1992). Beneath new culture is old psychology: gossip and social stratification. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 627–637). New York: Oxford University Press.

Bassett, J. F., & Moss, B. (2004). Men and women prefer risk takers as romantic and nonromantic partners. *Current Research in Social Psychology, 9*, 136–144.

Bliege Bird, R., Smith, E. A., & Bird, D. W. (2001). The hunting handicap: costly signaling in human foraging strategies. *Behavioral Ecology and Sociobiology, 50*, 9–19.

Bullough, V. L., & Ruan, F. F. (1994). Marriage, divorce, and sexual relations in contemporary China. *Journal of Comparative Family Studies, 25*, 383–393.

Buss, D. M. (1987). Selection, evocation, and manipulation. *Journal of Personality and Social Psychology, 53*, 1214–1221.

Buss, D. M. (1988). The evolution of human intrasexual competition: tactics of mate attraction. *Journal of Personality and Social Psychology, 54*, 616–628.

Buss, D. M. (1989). Sex differences in human mate preferences: evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*, 1–49.

Buss, D. M. (1996). Paternity uncertainty and the complex repertoire of human mating strategies. *American Psychologist, 51*(2), 161–162.

Buss, D. M., Abbott, M., Angleitner, A., Asherian, A., Biaggio, A., Blanco-Villasenor, A., et al. (1990). International preferences in selecting mates: a study of 37 cultures. *Journal of Cross-Cultural Psychology*, 5–47.

Cao X. (2004). Hung lou meng (Joly, H Bencraft, Trans). Wildside Press. [Original work published 1784].

Chan, D. W. (1990). Sex knowledge, attitudes, and experience of Chinese medical students in Hong Kong. *Archives of Sexual Behavior, 19*, 73–93.

Chen, L., Baker, S. P., Braver, E. R., & Li, G. (2000). Carrying passengers as a risk factor for crashes fatal to 16- and 17-year-old drivers. *JAMA, 283*, 1578–1582.

Cheung, F. M. (1996). Gender role development. In L. Sing (Ed.), *Growing up the Chinese way: Chinese child and adolescent development* (pp. 56). Hong Kong: Chinese University Press.

Daly, M., & Wilson, M. (2001). Risk-taking, intrasexual competition, and homicide. *Nebraska Symposium on Motivation, 47*, 1–36.

Daly, M., Wilson, M., & Weghorst, S. J. (1982). Male sexual jealousy. *Ethology and Sociobiology, 3*, 11–27.

Darwin, C. (1871). *On the origin of species* (5th ed.) New York: D. Appleton and Co.

Dawkins, R. (2006). Memes: the new replicators. *The selfish gene* (pp. 189–201). Oxford: Oxford University Press.

Fang, C. (1991). Trapped by culture: women's suffering in Confucian society. *Doing theology with the Spirit's movement in Asia* (pp. 100–118). ATESEA: Singapore.

Farthing, G. W. (2005). Attitudes toward heroic and nonheroic physical risk takers as mates and as friends. *Evolution and Human Behavior, 26*, 171–185.

Farthing, G. W. (2007). Neither daredevils nor wimps: attitudes toward physical risk takers as mates. *Evolutionary Psychology, 5*, 754–777.

Frankenhuis, W., Dotsch, R., Karremans, J. C., & Wigboldus, D. H. J. (2010). Male physical risk taking in a virtual environment. *Journal of Evolutionary Psychology, 8*, 75–86.

Freedman, E. B. (2003). *No turning back: the history of feminism and the future of women.* New York: Ballantine Books.

Gao, X. (2003). Women existing for men: Confucianism and social injustice against women in China. *Race, gender & class*. (pp. 114–125). New Orleans: Southern University.

Hawkes, K. (1991). Showing off: tests of a hypothesis about men's foraging goals. *Ethology and Sociobiology, 12*, 29–54.

Higgins, L. T., & Sun, C. (2007). Gender, social background and sexual attitudes among Chinese students. *Culture, Health & Sexuality, 9*, 31–42.

Higgins, L. T., Zheng, M., Liu, Y., & Sun, C. H. (2002). Attitudes to marriage and sexual behaviors: a survey of gender and culture differences in China and United Kingdom. *Sex Roles, 46*, 75–89.

Hofstede, F. (1980). *Culture's consequences.* London: Sage.

Hooper, B. (1975). *Women in China Mao v Confucius. Labour history*. (pp. 132–145). Canberra: Australian Society for the Study of Labour History, Inc.

Kaledin, E. (1989). Chinese students confront American women's literature. *NWSA Journal, 1*, 465–473.

Kelly, S., & Dunbar, R. I. M. (2001). Who dares, wins: heroism versus altruism in women's mate choice. *Human Nature, 12*, 89–105.

Kenrick, D. T., Li, N. P., & Butner, J. (2003). Dynamical evolutionary psychology: individual decision rules and emergent social norms. *Psychological Review, 110*, 3–28.

Kristeva, J. (1974). *About Chinese women.* New York: Urizen Books.

Lee, M. C. (1984). *Feminine psychology.* Taipei: Da Yang Press.

Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., & Stuart, G. L. (2002). Evaluation of a behavioural measure of risk taking: the Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology Applied, 8*, 75–84.

Li, G. (2005). *Traps of Chinese cultural tradition.* Beijing: Long Match Press.

Lii, S., & Wong, S. (1982). A cross-cultural study on sex-role stereotypes and social desirability. *Sex Roles, 8*, 481–491.

Lin, Y. (1935). *My country and my people.* New York: John Day Company.

Maner, J. K., Gailliot, M. T., & Miller, S. L. (2009). The implicit cognition of relationship maintenance: inattention to attractive alternatives. *Journal of Experimental Social Psychology, 45*, 174–179.

McLanahan, S. (1999). Father absence and the welfare of children. In E. M. Hetherington (Ed.), *Coping with divorce, single parenting, and remarriage: a risk and resiliency perspective* (pp. 117–145). Lawrence Erlbaum: Mahwah NJ.

Pawlowski, B., Atwal, R., & Dunbar, R. I. M. (2008). Sex differences in everyday risk-taking behavior in humans. *Evolutionary Psychology, 6*, 29–42.

Pope-Davis, D. B., & Coleman, H. L. K. (2001). *The intersection of race, class, and gender in multicultural counseling.* Thousand Oaks, CA: Sage.

Qi, X. (2006). *Comparative study of birth culture in East and West.* Beijing: China Population Press.

Richerson, P. J., & Boyd, R. (2005). *Not by genes alone: how culture transformed human evolution.* Chicago: University of Chicago Press.

Ronay, R., & von Hippel, W. (2010). The presence of an attractive woman elevates testosterone and physical risk taking in young men. *Social Psychological and Personality Science, 1*, 57–64.

Simpson, J. A., & Gangestad, S. W. (1992). Sociosexuality and romantic partner choice. *Journal of Personality, 60*, 31–51.

Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.). *Sexual selection and the descent of man: 1871–1971* (pp. 136–179). Aldine: Chicago.

Verschuur-Basse, D. (1996). *Chinese women speak.* Westport CT: Greenwood Publishing Group.

Walters, M. (2005). *Feminism: a very short introduction.* Oxford: Oxford University Press.

Wilson, M., Daly, M., & Pound, N. (2002). An evolutionary psychological perspective on the modulation of competitive confrontation and risk-taking. *Hormones, Brain and Behavior, 5*, 381–408.

Wolf, M., Witke, R., & Martin, E. (1975). *Women in Chinese society.* Stanford University Press: Stanford CA.

Xu, Z. (1987). Beauty, the change to the noble and the destruction of both: Daiyu's image of aesthetic value. *A Dream of Red Mansions, 2*, 141–170.

Zhang, S., & Kline, S. L. (2009). Can I make my own decision? A cross-cultural study of perceived social network influence in mate selection. *Journal of Cross-Cultural Psychology, 40*, 3–23.

Zhao, B. J. (2002). An investigation and study of university students' outlook on marriage and love. *Chinese Journal of Clinical Psychology, 10*, 111–113.

Zhu D. (2008). *Managerial sex role stereotyping among Chinese students in New Zealand: a thesis submitted in partial fulfillment of the requirements for the degree of Master of Commerce and Management,* Lincoln University.

Zhu, S., Dong, W., Qian, M., Wang, Y., & Liu, X. (2004). Changes of mate selection of Chinese men in the last 15 years. *Studies of Psychology and Behavior, 2*, 614–621.