Mating Performance: Assessing Flirting Skills, Mate Signal-Detection Ability, and Shyness Effects

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Abstract

Several people today experience poor mating performance, that is, they face difficulties in starting and/or keeping an intimate relationship. On the basis of an evolutionary theoretical framework, it was hypothesized that poor mating performance would be predicted by poor flirting skills, poor mate signal-detection ability, and high shyness. By employing a sample of 587 Greek-speaking men and women, we found that more than 40% of our participants experienced difficulties in starting and/or keeping an intimate relationship. We also found that poor flirting skills, poor mate signal-detection ability, and high shyness were associated with poor performance in mating, especially with respect to starting an intimate relationship. The effect sizes and the odds ratios indicated that flirting skills had the largest effect on mating performance, followed by the mate signal-detection ability and shyness.

Keywords

mating performance, mating, mismatch, flirting, shyness

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Introduction

A considerable proportion of people living in Western societies experience poor mating performance, meaning that they face difficulties in starting and/or keeping an intimate relationship (Apostolou, Shialos, Kyrou, Demetriou, & Papamichael, 2018). Recent research has identified several predictors of poor mating performance, including sexual functioning, self-esteem, personality (i.e., extroversion, conscientiousness, and neuroticism), and jealousy (Apostolou et al., 2018; Apostolou, Paphiti, Neza, Damianou, & Georgiadou, 2019). The current study contributes to this line of work by testing the predictions that poor flirting skills, poor mate signal-detection ability, and high shyness would predict poor performance in mating. We will start our analysis by discussing the nature of poor mating performance.

Poor Mating Performance in an Evolutionary Perspective

Mating success has prominent evolutionary significance because those who fail to attract and retain a partner, in comparison to those who do not, face considerably lower chances to see their genetic material represented in future generations. This fact translates into strong selection pressures being exercised on people to evolve adaptations that would enable them to succeed in this endeavor (Buss, 2017). Emotions such as romantic love, loneliness, jealousy, and sexual desire constitute such examples. For instance, loneliness is a negative emotion that motivates people to find intimate partners in order to get rid of it (Apostolou, 2016). These mechanisms work reasonably well as most people eventually find a partner, marry, and have children (Miller, 2011).

Yet for many people residing in preindustrial societies, these mechanisms do not work sufficiently well, resulting in longterm or permanent singlehood. In particular, recent research indicated that almost one in two adult individuals experienced

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difficulties in attracting and retaining a mate and were likely to experience prolonged spells of singlehood (Apostolou, Papadopoulou, & Georgiadou, 2019). Evolutionary theorizing can enable us to understand the observed prevalence rates of poor mating performance. More specifically, a major insight of evolutionary psychology in understanding human behavior is that behavioral mechanisms have evolved in the ancestral human environment which is likely to have been very different from the contemporary one (Tooby & Cosmides, 2015). Thus, if a specific aspect of the contemporary environment is different from the ancestral one, the behavioral adaptations that have evolved to interact with it may not work well.

In more detail, for reasons such as random genetic mutations, most traits exhibit variation (Hallgrímsson & Hall, 2005). Selection forces act on this variation, removing from the population any variants that are harmful to the fitness (i.e., survival and reproductive success) of individuals and their genetic relatives (Fisher, 1958). Thus, in a specific environment, selection forces would allow variation in a trait that is not harmful to one's fitness. Nonetheless, if the environment with which this trait interacts in a fitness-increasing manner changes considerably, part of the variation may become fitness-impairing. Selection forces would remove the fitness-impairing variants, eventually adjusting the variation of the trait to the new environmental conditions. This process takes time, and if the change in the environment had been very recent, there would not have been sufficient time for selection forces to remove all these variants from the population. Accordingly, there would be several individuals today who exhibit nonoptimal variation in the trait under consideration and, who are thus, likely to suffer fitness penalties. This evolutionary mismatch hypothesis (Crawford, 1998; Li, van Vugt, & Colarelli, 2018; Maner & Kenrick, 2010) can explain why several people today face difficulties in the domain of mating (Apostolou, 2015).

In particular, one aspect of the environment that has experienced considerable change relates to mate choice. Evidence from anthropological, historical, and phylogenetic studies indicated that in ancestral human societies, mate choice was regulated. More specifically, evidence from preindustrial societies, which resembled the way of life of ancestral ones, indicated that the typical mode of long-term mating was arranged marriage, where parents chose spouses for their children (Apostolou, 2007, 2010). For example, evidence from a sample of 190 contemporary foraging societies indicated that the most frequent mode of long-term mating, in about 70% of the societies in the sample, was arranged marriage with free courtship marriage being the common practice in about 4% of the societies (Apostolou, 2007). A different study employed comparative phylogenetic analyses with the purpose of reconstructing the ancestral human condition and provided further support that arranged marriage was typical in ancestral foraging societies (Walker, Hill, Flinn, & Ellsworth, 2011). In the same vein, free mate choice had not been the norm in any of the recorded historical societies as marriages were typically arranged (Apostolou, 2012; Coontz, 2006). Furthermore, men form male coalitions in order to fight other men and monopolize their resources, including women, by force (Ghiglieri, 1999; Tooby & Cosmides, 1988). Anthropological, historical, and archeological evidence suggests that such fights were common in ancestral societies (Bowles, 2009; Keegan, 2004; Puts, 2016).

In sum, there are good reasons to believe that the ancestral context of mating has been different from the contemporary one, in the sense that people were more constrained in exercising mate choice freely. Most probably, a woman living in ancestral human societies would receive a husband from her parents or she would become the wife or concubine of a man who had successfully used force to monopolize her. Most probably, a man would receive a wife from his parents, or he would have secured one from fighting other men. Adaptations evolved in mating have evolved to enable men and women to secure mates in such a context and may not work equally well in securing mates in a contemporary postindustrial context, where people have to find mates on their own without the contribution of their parents and without using force.

Still, the anthropological and historical evidence indicates that, in ancestral human societies, mate choice was also exercised. For instance, mate choice was exercised prior to marriage in premarital relationships, within marriage in extramarital relationships, and in divorce and later marriages, which were less likely to be controlled by parents (Apostolou, 2017). Thus, our point here is not that free mate choice was totally absent in ancestral human societies but that it was much more limited than in contemporary postindustrial ones.

On the basis of this theoretical framework, it has been predicted that several mechanisms involved in mating exhibit nonoptimal variation affecting mating performance, including mechanisms that regulate sexual functioning, personality traits, flirting skills, mating effort, and attention to looks (Apostolou, 2015; Apostolou et al., 2018, Apostolou, Paphiti, et al., 2019). One study found that, nearly one in two individuals experienced difficulties in either starting or keeping a relationship, with their mating performance being predicted by their level of sexual functioning, self-esteem, selfperceived mate value, pickiness, personality, attention to looks, and mating effort (Apostolou et al., 2018). A different study found that emotional intelligence, dark triad traits, jealousy, and attachment style were significant predictors of mating performance (Apostolou et al., 2019). The present research aimed to contribute to this line of work by identifying additional predictors of mating performance.

Flirting skills, mate signal-detection ability, and shyness. The mismatch between ancestral and modern conditions is expected to have affected flirting skills considerably. More specifically, in a context where mate choice was predominantly regulated or forced, flirting skills, mate signal-detection ability, and shyness were relative weak predictors of success in attracting mates. Accordingly, negative selection pressures would be relatively weak on individuals exhibiting poor flirting skills, poor mate signal-detection ability, and high shyness. In effect, such predispositions would remain in the population, but they would cause difficulties to people who reside in contemporary societies, where mate choice is freely exercised and where doing well in these dimensions constitutes an important predictor of success in mating.

Overall, on the basis of the proposed theoretical framework, we argue that due to regulation of mating and malemale competition, selection pressures on ancestral human societies would allow variation in flirting skills, mate signal-detection ability, and shyness levels that would not be optimal for a context where mate choice is freely exercised. Consequently, several people today would have flirting skills and mate signal-detection ability which are inadequate for a context of free mate choice. Similarly, several people are likely to experience high levels of shyness which may make it difficult to attract mates in a free mate choice context. Accordingly, we predict that these traits would compromise people's capacity to attract and retain mates, and as a consequence, they would be important predictors of poor mating performance. In addition, good flirting skills, a high mate signal-detection ability, and low shyness are predominantly needed in starting rather than keeping an intimate relationship. Accordingly, we can predict further that these factors would predominantly affect performance in starting rather than keeping an intimate relationship.

Method

Participants

For the purpose of data collection, four research assistants were employed who recruited people who volunteered to take part in a study on intimate relationships. No monetary compensation was given, while the only prerequisite for participation was to be 18 years old or older. The study took place in Greece and in the Republic of Cyprus, and the data collection process lasted about 3 months. Initially, the participants were asked to sign a consent form, and subsequently, they were given the survey. Upon completion, participants placed the questionnaire in an unmarked envelope and sealed it. In the current study, 587 Greek-speaking individuals participated (309 women, 278 men). The mean age of women was 30.4 (SD = 10), and the mean age of men was 31.8 (SD = 10.3). Moreover, 30% of the participants were single, 33.4% were in a relationship, 33% were married, and 3.6% were divorced.

Materials

The current study was in Greek and had five parts. In the first part, participants had to score several questions related to their flirting skills. More specifically, we developed an instrument which consisted of seven questions that participants had to answer using a 5-point Likert-type scale ($1 = strongly \ disagree, 5 = strongly \ agree$). To ensure validity, the items of the instrument were chosen by Apostolou's (2019) qualitative

study, from the "Poor flirting skills" category (Appendix A). For this instrument, Cronbach's α was .83. In addition, a higher total score indicated better flirting skills. In the second part, participants were given questions related to their mate signal-detection ability. For this purpose, we developed an instrument which consisted of five questions that participants had to answer using a 5-point Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*). As before, in order to ensure validity, the items of the instrument were chosen by Apostolou's (2019) study, from the "Not picking up clues of interest" category inability to perceive clues of interest (Appendix B). For this instrument, Cronbach's α was .78. Also, a higher total score indicated a higher mate signal-detection ability.

In the third part, participants had to score questions related to their level of shyness. For this purpose, we employed the Shyness Scale which consisted of 14 items (Cronbach's $\alpha =$.57), with a higher total score indicating higher shyness (McCroskey & Richmond, 2013). In order to ensure consistency, the instrument was translated in Greek, and it was subsequently translated back in English. In the fourth part, participants were given the mating performance instrument developed by Apostolou, Shialos, Kyrou, Demetriou, and Papamichael (2018), which was a 5-item scale designed to measure how well individuals perform with regard to starting and keeping intimate relationships. Participants rated questions using a 5-point Likert-type scale (1 = strongly disagree,5 = strongly agree), with a higher total score indicating higher mating performance. In the fifth part, demographic information was collected including sex, age, and marital status. The order of presentation of the first four parts was randomized across participants.

Before proceeding with the statistical analysis, we investigated whether flirting skills and mate signal-detection ability were two distinct concepts or facets of one broader factor. Accordingly, we applied principal components analysis on the items of the two instruments. The results produced a two-factor solution: The items of the flirting skills instrument loaded on one factor, while the items of the mate signal-detection ability loaded on the second, indicating that the two were distinct concepts (see Appendix C). Finally, in Appendix D, we presented the correlations between the total scores of flirting skills, signal-detection ability, and shyness.

Results

Occurrence of Poor Mating Performance

Initially, we attempted to estimate the rates of poor mating performance by calculating the frequencies of participants' answers to the mating performance instrument. From Table 1, we can see that about 20% of participants indicated that they found intimate relationships difficult, about 31% indicated that they found it difficult to start a relationship, and about 24% to keep a relationship. We also calculated that 28.2% of the participants answered 1 or 2 (indicating low performance) in at least one of the two questions about starting and keeping a

I–2	3	4–5
22.8	36. I	41
51.4	29.3	19.2
38.2	35.9	26
30.8	39.9	29.3
24.2	34	41.8
	22.8 51.4 38.2 30.8 24.2	22.8 36.1 51.4 29.3 38.2 35.9 30.8 39.9 24.2 34

Table 1. Mating Performance.

Note. The numbers above reflect the percentages of participants' answers in each question of the instrument which employed the scale I = strongly disagree and 5 = strongly agree. The percentages that indicate poor mating performance are in bold.

relationship, and 13.5% answered 1 or 2 in both questions. Accordingly, 41.7% of the participants indicated difficulties in at least one domain of mating performance.

Significant Effects

In order to estimate significant effects and interactions, we ran an analysis of covariance, where participants' total mating performance score was entered as the dependent variable, participants' sex was entered as the categorical independent variable, and participants' total scores for flirting skills, mate signaldetection ability, shyness, and age were entered as the continuous independent variables. The results indicated that there was a significant main effect of flirting skills on mating performance, F(1, 554) = 26.15, p < .001, $\eta_p^2 = .045$, with a positive coefficient, suggesting that lower capacity was associated with lower mating performance. Moreover, there was a significant main effect of the mate signal-detection ability on mating performance, $F(1, 554) = 16.24, p < .001, \eta_p^2 = .028$, also with a positive coefficient, suggesting that lower such capacity was associated with lower mating performance. Furthermore, there was a significant main effect of shyness on mating performance, $F(1, 554) = 5.84, p = .016, \eta_p^2 =$.010, with a negative coefficient suggesting that higher shyness was associated with lower mating performance.

In addition, there was a significant interaction between flirting skills and the mate signal-detection ability, F(1, 554) =9.80, p = .002, $\eta_p^2 = .017$. In order to interpret the interaction, participants were divided into different categories (see below), and the interaction was depicted for these categories (Figure 1). We can see that, when we move from the moderate-/high-tolow mate signal-detection ability, the mating performance of those who indicated low flirting skills dropped more sharply than the mating performance of those who indicated moderate or high flirting skills. Finally, no significant age and sex effects were produced.

We repeated the analysis entering as the dependent variable participants' responses on the question about how easy it has been for them to start an intimate relationship. The results indicated that there was a significant main effect of the mate



Figure 1. Interaction between flirting skills and the mate signaldetection ability.

signal-detection ability, F(1, 554) = 12.65, p < .001, $\eta_p^2 = .022$, with a positive coefficient. Moreover, there was a significant main effect of shyness, F(1, 554) = 5.84, p = .016, $\eta_p^2 = .010$, with a negative coefficient. Flirting skills was not significant, but there was a significant interaction between flirting skills and the mate signal-detection ability, F(1, 554) = 11.61, p = .001, $\eta_p^2 = .021$, which was similar to the previous interaction. Finally, we repeated the analysis by entering as the dependent variable the participants' responses to the question about how easy it has been for them to keep an intimate relationship. No significant main effects or interactions were produced.

Predictors of Poor Mating Performance

Almost all traits exhibit variation; thus, even if the mechanisms involved in mating were well-adapted to the modern conditions, they would still exhibit some variation. In this scenario, most people would have, for instance, good flirting skills, but some people would have better flirting skills than others, and so they would enjoy better performance in mating than people who did not have that good flirting skills. This variation may result in flirting skills, signal-detection ability, and shyness to be significant predictors of mating performance, and so it is consistent with the results produced above. On the other hand, the mismatch hypothesis predicts that a considerable proportion of people would not do well in these dimensions, which would impair their mating performance. Accordingly, the results we produced above are potentially consistent with the mismatch hypothesis but also with alternative hypotheses. Therefore, we proceeded in doing further analysis that would enable us to distinguish between these two possibilities.

More specifically, we divided our sample into those who experienced low mating performance (their mean scores were below 3) and moderate or high mating performance (their mean scores were 3 or more). We also divided participants into those who indicated low flirting skills (their mean scores were below 3—in total 25% of the cases) and moderate or high flirting skills (mean scores 3 or more). Similarly, we divided participants into those who indicated low mate signal-detection ability (their mean scores were below 3—in total 19.6% of the cases) and moderate or high such capacity (mean scores 3 or more). Finally, we divided participants into those with high shyness (scores—or above as indicated by scoring instructions—in total 22.4% of the cases) and those who experienced moderate or low shyness.

Subsequently, we ran binomial logistic regression using the newly created variables, where mating performance was entered as the dependent variable, and flirting skills, mate signal-detection ability, and shyness were entered as independent variables. Sex and age were also entered as independent variables. In this way, we could examine whether low capacity for flirting, low mate signal-detection ability, and high shyness could predict low mating performance.

The results indicated a significant main effect of flirting skills, $\chi^2(1, N = 561) = 15.30$, p < .001, with the odds ratio indicating that participants in the low flirting skills category, in comparison to participants in the moderate or high flirting skills category, were 2.33 times more likely to be in the low mating performance than in the moderate or high mating performance category. Similarly, there was a significant main effect of the mate signal-detection ability, $\chi^2(1, N = 561) =$ 9.98, p = .002, with the odds ratio indicating that participants in the low capacity category were 2.06 times more likely than participants in the moderate or high flirting skills category, to be in the low mating performance than in the moderate or high mating performance category. Similarly, there was a significant main effect of the shyness, $\chi^2(1, N = 561) = 4.88$, p = .027, with the odds ratio indicating that participants in the high shyness category were 1.62 times more likely than participants who in the moderate or high shyness category, to be in the low mating performance than in the moderate or high mating performance category. Finally, we found no significant effects of sex and age and no significant interactions.

Discussion

Our analysis indicated that more than 40% of the participants in the current study experienced difficulties in starting and/or keeping an intimate relationship. In accordance with our original predictions, we found that poor flirting skills, poor mate signal-detection ability, and high shyness were associated with poor performance in mating, especially with respect to starting an intimate relationship. The effect sizes and odds ratios indicated that flirting skills had the largest effect on mating performance, followed by the mate signal-detection ability and shyness.

Overall, our findings suggest that a considerable proportion of people experience poor mating performance, which is partially predicted by poor capacity for flirting, poor mate signaldetection ability, and high shyness. Our proposed theoretical

framework could enable us to understand individual differences in the latter three traits and their connection to mating performance. In particular, flirting skills, mate signaldetection ability, and shyness would exhibit considerable variation, with some people scoring high and some scoring low. In an ancestral context where mate choice was regulated or forced, poor flirting skills, inability to perceive clues of interest, and high shyness would have a limited effect on mating success, so these variants would be retained in the population. In a contemporary postindustrial context, individuals need to be outgoing to interact with prospective mates, they need to have a good mate signaldetection ability so that they divert their mating effort where the chances of success are high, and they need to have good flirting skills to persuade potential mates to be with them. Thus, these variants impair mating performance: People who are shy will be reluctant to interact with prospective mates, people who have low mate signal-detection ability may divert their mating effort to individuals who are not available or interested, and people who have poor flirting skills will drive prospective mates away.

It is important to say that the mismatch argument does not state that flirting capacity (i.e., flirting skills, mate signaldetection ability, and low shyness) was not necessary in the ancestral context for securing mates. As discussed in the Introduction section, the anthropological and historical records indicate that free mate choice was also present in ancestral human societies, and thus, such a capacity would had been beneficial to our ancestors in increasing their reproductive success. The mismatch argument states that flirting capacity is more important in contemporary postindustrial societies where mate choice is freely exercised than in ancestral human societies where free mate choice was constrained. As a consequence, for several people, their flirting capacity may be below what is adequate for dealing effectively with the demands of free mate choice in contemporary, resulting in poor performance in the domain of mating.

As predicted, our analysis indicated that these factors were predominantly associated with participants' performance in starting rather than keeping an intimate relationship. Once individuals have managed to secure an intimate relationship, these factors play little role in predicting how successful they are in keeping the relationship. Yet, the observed effects may not apply to all cultural contexts. More specifically, we expect that similar effects would be observed in other Western cultures where individuals have to find mates on their own. But such effects would be weaker or nonsignificant in cultures where mate choice is regulated (e.g., many Arab countries). Thus, further cross-cultural work is necessary in order to examine the effects of our independent variables in different cultural settings.

Poor mating performance is probably one of the reasons why several people in Western societies do not have an intimate partner. For instance, a study conducted in 2005 found that 32.7% of the adult population in the United States were not in an intimate relationship (Pew Research Center, 2006). In the same vein, another study, which examined a nationally representative sample of American adults, found that about one in four participants did not have an intimate partner (Rosenfeld, Reuben, & Falcon, 2015). A study which employed a sample of 1,682 Greek-speaking participants found that about half of single participants were involuntarily single; that is, they wanted to be in a relationship but faced difficulties in doing so (Apostolou et al., 2019). If a large part of the prevalence of singlehood is predicted by low mating performance, then it has to be that poor flirting skills, mate signal-detection ability, and high shyness would also predict singlehood, especially involuntary singlehood. Future research needs to establish better the connection between mating performance, its predictors, and singlehood.

In addition, the instrument we used measured mating performance in general and did not differentiate between performance in short-term and long-term relationships. Some factors may affect mating performance differently in each case. For instance, lacking good flirting skill could affect more people pursuing a short-term mating strategy, that is, pursing several casual relationships, than a long-term mating strategy, that is, pursuing few long-term relationships. Accordingly, future research could attempt to investigate the impact of the variables we have examined here in predicting success in long-term and in short-term relationships.

One limitation of the current research is that it was based on self-report data, and people may not have, for instance, an accurate understanding of their flirting skills or their mate signal-detection ability. We believe that the potential bias would be more toward overestimation of one's capacities; that is, people would think that they have better flirting skills and ability to understand clues of interest than they really have (see Belmi, Neale, Reiff, & Ulfe, 2019; Kruger & Dunning, 1999). In order to address this bias, future studies could use peer reports on mating performance, flirting skills, mate signal-detection ability, and shyness. Furthermore, low capacity may result in prolonged spells of singlehood, and future research could examine how the factors we measured here affect the length of singlehood. In addition, our sample was not representative, so caution is needed in generalizing our findings to the population. Moreover, the Flirting and Clues of Interest Scales employed in the current study have not yet been widely used and validated, and future research should attempt to do so. Last but not least, as discussed above, the current study took place in a specific culture, and its results may not readily apply to other cultural contexts, especially if they are very different in their mating patterns.

In sum, how well people do in mating is a complex phenomenon with many factors at play. On the basis of an evolutionary theoretical framework, the current study found that poor flirting skills, poor mate signal-detection ability, and high shyness were associated with poor mating performance, especially in starting an intimate relationship. Future studies need to replicate these findings in different cultural settings and to identify additional predictors of mating performance.

Appendix A

Table A1. Flirting Skills Instrument.

- I. I have no anxiety when I talk to someone who interests me.
- 2. I do not know how to steer the conversation toward being romantically involved.
- I do not know how to start a conversation with someone I am interested in.
- 4. I am good at flirting.
- 5. I do not know how to ask someone I am interested in out.
- 6. I lose my words when I talk to someone who interests me.
- 7. I do not know how to flirt.

Note. Scoring instructions: A mean score could be estimated after items 2, 3, 4, 6, and 7 are reverse scored.

Appendix B

Table B1. Mate Signal-Detection Ability Instrument.

- 1. I can easily tell when someone is interested in me.
- I totally lack the ability to pick up and interpret signals of interest.
- I cannot tell the difference whether someone is just nice to me or she or he is into me.
- It takes me a lot of time to figure out whether someone is into me.
- When I start talking to someone, I can easily understand if she or he is interested in me.

Note. Scoring instructions: A mean score could be estimated after items 2, 3, and 4 are reverse scored.

Appendix C

 Table C1. Factor Loading From Principal Components Analysis on the Items of the Two Flirting Skills and Single-Detection Ability.

	Flirting Skills	Mate Signal-Detection Ability	
	Factor Loadings		
I lose my words when I talk to someone who interests me.	.772		
l do not know how to flirt.	.740		
I do not know how to start a conversation with someone I am interested in.	.734		
I do not know how to steer the conversation toward being romantically involved.	.725		
I do not know how to ask someone I am interested in out.	.719		
I have no anxiety when I talk to someone who interests me.	.478		
l am good at flirting.	.468		
I can easily tell when someone is interested in me.		.801	

(continued)

Table C1. (continued)

	Flirting Skills	Mate Signal-Detectior Ability
	Factor Loadings	
When I start talking to someone, I can easily understand if she or he is interested in me.		.760
It takes me a lot of time to figure out whether someone is into me.		.667
I cannot tell the difference whether someone is just nice to me or she or he is into me.		.654
I totally lack the ability to pick up and interpret signals of interest.		.626

Note. The rotation method employed was the direct oblimin.

Appendix D

 Table DI. Correlations Between Flirting Skills, Shyness, and Signal-Detection Ability.

	Flirting Skills	Shyness	Mate Signal-Detection Ability
Flirting skills	I	.363**	.494**
Shyness	.363**	I	.171**
Mate signal-detection ability	.494**	.171**	I

*Correlation was significant at the .01 level (two-tailed).

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