

Research article

Nonindependent mate choice: the first study with real-life couples in a Greek sample

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Abstract

In humans, as in other species, nonindependent mate choice takes place when females are influenced in their mate choice by the choices of other females. Previous studies have used almost exclusively experimental methods, with the most robust finding being that women tend to be more attracted to men who are paired with attractive women. Results, however, have often been conflicting, and the degree to which experimental methods are capturing real-life social processes has not been validated. In this study a self-report questionnaire was administered to a sample of young Greek men and women who were in monogamous romantic relationships. Participants also provided facial photographs of themselves that were rated for attractiveness. Men in these relationships tended to report more perceived opposite-sex interest than their partners, though this difference was not as clear or strong as expected. Furthermore the degree to which men - and women - reported opposite-sex interest was not related to the attractiveness of their partners. We discuss what might account for these unexpected results and suggest ways for improving the current methodology.

Keywords: Nonindependent mate choice, attractiveness, mate choice copying, romantic couples, evolutionary psychology.

Introduction

Non independent mate choice refers to female mate choice that is adaptively influenced by the choices of other females [1]. Observing females (focal females) that take into consideration the mate choices of other females (model females) can, under certain circumstances, make a better than random choice of mate while paying very little or none of the mate choice costs [2]. The costs of mate choice can be extensive, ranging from the expenditure of time and energy to the risks of predation and harassment by males that get rejected along the way [3-6]. Added to this, certain females that are not very competent in their mate choice abilities should be adaptively inclined to take into consideration the choices of more competent females [7]. It has been consistently found that while younger and more inexperienced females are influenced in their choices by the choices of older females, the latter are not influenced by the choices of the former [8-10].

Mate choice copying is the most straightforward and widely studied type of nonindependent mate choice, having been demonstrated in a variety of promiscuous and polygamous species of fish, birds, insects and mammals (reviewed in Vakirtzis [11]). Copying takes place when a male is most likely to be selected by focal females after having been selected by a model female and is more likely to be rejected by focal females after having been rejected by a model female [1see also 12-13]. In other words a male's prior success with one or more females will breed more success with females who are privy to these interactions and a male's failure with breed more failure. This process is expected, given the appropriate mating system, to lead to large male mating skews [14].

The idea that women are influenced in their romantic choices by the choices of other women goes back at least to the 1970s [15], and recent years have seen a resurgence of experimental interest in this topic. Studies have shown mixed results: while some studies found that men in relationships were perceived as more attractive by the women raters [16-17], other studies failed to find this [18-20]. Unlike most promiscuous and polygamous

species where a copying process has been found, contemporary western societies do not exhibit a substantial male mating skew, and most men tend to have one monogamous partner at any given time [21-23]. In the absence of substantial male mating skew the absence or presence of a partner does not provide much information to other women. A more promising variable for research into human nonindependent mate choice appears to be the attractiveness of a man's partner [20, 24]. In particular the mate value of women is more heavily dependent on physical appearance than the mate value of men [25-26], meaning that, due to assortative mating in terms of mate value, the visual inspection of a man's mate will likely yield a more precise estimate of his mate value than a simple visual inspection of the male alone [27]. We should, in other words, expect women to be especially sensitive to how attractive the female partner of a man is: women should be more attracted to men with attractive mates and less attracted to men with unattractive mates [27]. Experimental studies in humans tend to confirm this, with women rating men who are paired to attractive partners as more attractive compared to men who are paired to unattractive partners [20, 28-30]. From an evolutionary perspective there should be not gender symmetry with regards to this effect, i.e. it would be expected that men should not be influenced by the attractiveness of a potential mate's partner [27], and this is what many studies have found [17, 24, 28, 29, 31, 32].

How well, if at all, results obtained in the lab generalise to real-life situations is difficult to know given the lack of non-experimental studies in the field [32]. To date only two studies have used questionnaire methodology to capture men and women's perceptions of how their own attractiveness varies as a function of being in a relationship. Using a two-item questionnaire Platek et al. [33] found that both male and female undergraduates retrospectively reported an increase in dating opportunities upon entering a new dating relationship. Vakirtzis and Roberts [32] administered a more detailed questionnaire of perceived opposite-sex attractiveness to a large sample of men and women (N=381) who were either single or in a relationship. Additionally, the subset of respondents who were in a relationship rated their

own and their partner's attractiveness and reported how their self-perceived attractiveness to the opposite sex had changed before and after the relationship. Men who were in a relationship agreed more strongly with items like *«In general, I feel that I have become more attractive to other women (men) since I started dating my girlfriend (boyfriend)»* compared to women who were in a relationship. Furthermore, the higher the reported attractiveness of their partner, the more males tended to agree with these items, while there was no corresponding relationship between the reported attractiveness of their partner and the degree to which women agreed with these items. In the same study, males who were single agreed more strongly with items like *«In general, I feel that I have become less attractive to women (men) since I became single»* compared to women. Although the study by Vakirtzis and Roberts [32] was very suggestive of the reality of human nonindependent mate choice outside the laboratory, it had two weaknesses. Firstly, participants rated their own and their partner's attractiveness, a process which certainly introduced substantial error variance. Secondly, a more powerful methodology would have been to capture the responses of men and women from the same couples, allowing for a «within-couples» comparison.

In the present study we expand on Vakirtzis and Roberts' [32] earlier research by replicating their questionnaire methodology but with a design that overcomes the aforementioned weaknesses. In particular we recruited a sample of undergraduate Greek couples who were in a stable romantic relationship and administered to both members of each couple a modified version of the questionnaire used in the 2012 study. In addition, participating couples were also asked to provide photographs of themselves that were subsequently rated for attractiveness by an independent panel, thus providing far more accurate measures of attractiveness. We predicted that a) men in a romantic relationship would report more perceived opposite-sex interest than their female partners and that b) that this reported opposite-sex interest would be moderated by the attractiveness of their romantic partner for male but not female participants. We also predicted that c) a number of contextual factors that allow for nonindependent mate choice to take place, like the degree to

which the couples frequented public places together and shared the same social networks, would similarly moderate the degree to which men reported increased opposite-sex interest.

Methods

Participants

Two hundred and thirty two romantically involved heterosexual couples (mean age 25.1 and 22.5 years for men and women, respectively) were recruited for this study from the undergraduate students at the Department of Social Work of the TEI of Crete. No outliers were excluded after using anomaly detection technique. Participants were provided an information sheet and were invited to participate in the study on the condition that a) they were in a monogamous romantic relationship of at least three months' duration and b) that their partner would also be willing to participate. It was not a requirement for participation that the partner also be a student.

Students were briefed on the purpose and requirements of the study and the voluntary nature of participation by the professor (A. K.) who was one of the researchers. Anonymity and confidentiality were guaranteed. Students who consented were given the study questionnaire and were asked to complete it onsite. They were then given another questionnaire for their partner, placed inside an envelope. The questionnaires were identical for males and females, with the obvious changes to sex-specific terms like *«my girlfriend/my boyfriend»* etc, as necessary. Each questionnaire was numbered uniquely for each couple, to allow us to match the male to the female responses, as well as to match both the questionnaires to the photographs of the couple. Students were instructed to invite their partner to complete the questionnaire, place it back in the envelope and seal it for privacy. An online URL was provided to the participants who would like more information about the study. The sealed envelope with the partner's questionnaire was then handed back to the professor at the following week's class or as soon as possible thereafter.

As part of the study students were asked to send a) one facial photo of themselves and one of their partner or b) one photo with both partners' faces, though it was stated that the former option was preferable. Participants were advised that the photos were to be evaluated for attractiveness by a group of raters and were instructed to email them to an email address specifically created for the purpose of the study. The students were reminded to indicate their unique identifying code when emailing the photos, so that the researchers could match the anonymous questionnaires with the photos. The final response rate - i.e. submission of the partner's questionnaire and the photographs, where one partner had already consented - was over 90%.

Measures

The questionnaire, entitled *Interpersonal relationship questionnaire for couples* was based on Vakirtzis and Roberts [32] earlier study and consisted of the following parts:

- Personal details including age, height, weight, and whether the participant was a student or not
- Self-rated attractiveness and attractiveness of partner on a scale from 1-10
- Factual information regarding the relationship. This included the duration of the relationship and how frequently (*almost never* to *almost daily*) the couple visited the following places for socializing: clubs/bars, restaurants, cafes, cinemas, house parties. Participants were also asked *to what degree do you and your partner share the same social networks, e.g. friends, acquaintances, colleagues etc?*.
- Subjects expressed their agreement or disagreement (on a 5-point scale) with the following four items [32], referring to how they believed they were viewed by opposite sex individuals in the context of their relationship.
 - Women (men) seem to look at me more when I'm with my girlfriend (boyfriend) than when I'm alone.*
 - In general, I feel that I have become less attractive to other men (women) since I started dating my boyfriend (girlfriend).*

- Some women (men) who previously showed little interest in me seem to flirt more with me since I started dating my girlfriend (boyfriend).*

- In general, women (men) flirt more with me since I started dating my girlfriend (boyfriend).*

Item 2 was reverse coded and the four items were summed to produce one composite measure of opposite-sex interest which was used as the dependent variable in the analysis.

e) The Rosenberg self-esteem scale [34] and the Social Information Processing subscale of the Tromso Social Intelligence Scale, were both translated in Greek [35]. These were administered to rule out spurious correlations with perceived opposite-sex interest due to participant variability in self-esteem or social intelligence [32].

Ten (10) pairs of questionnaires were identified which were largely incomplete and/or had other problems (like identical or nonsensical answers). Their exclusion reduced the final sample to 222 (mean age 25.1 and 22.5 years for men and women, respectively). A small number of these remaining 222 questionnaires had some missing items, which explains the slight sample size variability in different analyses. 91.7% of female respondents and 48.1% of males were students.

Results

Questionnaires

Table 1 shows the gender differences for the four items that served as dependent variables.

Table 1.: Comparison of Responses by Men and Women in romantically involved couples.

Items	Male		Female		t(df)
	M	SE	M	SE	
1. Women (men) look at me more when I am with my girlfriend (boyfriend) than when I'm alone	3.05	0.06	2.58	0.06	5.79(220)***

2. In general, I feel that I have become less attractive to other women (men) since I started dating my girlfriend (boyfriend)	2.31	0.05	2.17	0.06	2.04(220)*
3. Some women (men) who previously showed very little interest in me seem to flirt more with me since I started dating my girlfriend (boyfriend)	2.69	0.07	2.55	0.07	1.55(220)
4. In general, women (men) flirt more with me since I started dating my girlfriend (boyfriend)	2.64	0.06	2.52	0.07	1.4(219)
Composite: 1+2 (reverse scored)+3+4	12.1	0.17	11.5	0.17	2.5(219)*

Note. M = Mean; SE = Standard Error; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Items 1, 3 and 4 were in the expected direction, though the difference was only significant for item 1. Item 2 was reverse coded, so the fact that males reported higher values than females was unexpected. Overall the composite measure of opposite sex interest showed a significant difference in the expected direction, with men reporting more overall opposite-sex interest than women. We examined if the sex difference in the composite measure of reported opposite sex interest (henceforth 'dependent variable') could be attributed to differences in male and female participants' self-esteem and social intelligence. We regressed the sex difference in the dependent variable against female self-esteem, female social intelligence, male self-esteem and male social intelligence. The only significant predictor was female self-esteem ($\beta = .22, p = 0.003$). While the overall model was significant ($F(4,190) = 3.234, p = .014$), it only accounted for 4.4% of the adjusted variance. To ensure that the sex difference was not spurious we conducted a repeated-measures analysis of covariance on the dependent variable, with female self-esteem as the covariate. Using Wilks' criterion there was a significant effect on dependent variable after controlling for the effect

of gender, $\Lambda = 0.96, F(2,206) = 9.58, p = .002, \eta^2 = 0.04$. The covariate females' self esteem was significantly related to the dependent variable $\Lambda = 0.96, F(1,206) = 7.93, p = .005, \eta^2 = 0.04$. Men had significantly higher levels in the dependent variable ($M = 12.06, SD = 2.57$) in comparison with their women counterparts ($M = 11.46, SD = 2.66$).

The significant sex differences found earlier for items 1 and 2 remained, whereas the sex difference for the composite statement was very close to significance.

The next part of the analysis examined how the composite measure of reported opposite-sex interest (henceforth 'dependent variable') varied as a function of several variables that were expected to influence the strength of nonindependent mate choice and the opportunities for nonindependent mate choice to take place [32]. These were a) the duration of the relationship b) the degree to which the couple's social circles overlapped and c) the extent to which the couple frequented public places like clubs or bars, eateries, house parties etc.

There was very high agreement in the duration of the relationship provided separately by male and female participants in months ($r = .98$), and an average of the two values was correlated with the dependent variable for both women ($r = -.06, p = .402$) and men ($r = -.17, p = .013$). Surprisingly, men who had been in relationships for a longer time tended to report diminished opposite sex interest, which was the opposite of what we had expected.

The extent to which a couple's social circle overlapped was captured by the one-item question 'to what degree do you and your partner share the same social circle, e.g. friends, acquaintances colleagues etc?'. Answers were given on a 4-point ordinal scale ranging from 'completely or almost completely different social circle' to 'completely or almost completely common social circle'. Agreement amongst the male and female of each couple was very high ($\rho = .77, p = .001$), and an average of the two responses was used, but this did not correlate with the dependent variable for either the male or female participants (both NS).

Lastly, the frequency with which the couple frequented public places, such as clubs/bars, eateries, cafes, cinemas and house parties was examined on a 7-point ordinal scale that ranged from 'almost never' to 'almost daily'. Within-couple non-parametric correlations were very high and significant for every category of public place (all $p < .001$), and an average of the male and female response was taken for each category. For male participants only the frequency with which the couple frequented bars or clubs correlated with the dependent variable ($\rho = .18, p = .009$), whereas for women the dependent variable correlated with frequency of attending bars/clubs ($\rho = .15, p = .033$), as well as cinemas ($\rho = .17, p = .016$). All of these significant correlations were in the expected direction, with increasing frequencies of outings resulting in higher reported opposite sex interest.

Photographs, self-rated attractiveness and physical characteristics of participants

A number of pictures provided by participants were not of sufficient quality to be evaluable for attractiveness (e.g. overlapped faces, out of focus, dark or too small photos). Photographs of acceptable quality where the man and woman were pictured together were digitally cropped, resulting in the creation of two new images, one for each partner alone. Photographs where the man and woman were pictured alone were also cropped where necessary, most often to resize the image to suitable size or to crop unnecessary background/landscape information. In the end 128 acceptable photographs of men ($M_{age} = 25.3$) were rated by five female judges, undergraduate students from a different university than the one the sample came from ($M_{age} = 24.8$ years), and 126 acceptable photographs of women ($M_{age} = 22.5$) were rated by six male undergraduate students, also from a different university ($M_{age} = 22.5$). Inter-rater reliability was high both for the female ($\alpha = .79$) and male raters ($\alpha = .78$). The ratings for every image were subsequently averaged to produce a single rating. Interestingly, for women the judges' ratings were cor-

related with self-ratings of attractiveness ($r = 0.19, p = .036$) but not with the attractiveness ratings given by the women's partners ($r = 0.04, p = .682$). The same pattern held for the male images, where the judges' ratings correlated significantly with men's self-rated attractiveness ($r = 0.21, p = .019$) but not with the ratings given by the men's partners ($r = 0.001, p = .991$). Self-rated attractiveness was approximately normally distributed for both males and females, and the means did not differ by sex (7.2 for both).

Unexpectedly, the composite measure of self-reported opposite sex interest (i.e. the dependent variable) did not correlate with the attractiveness of one's partner as rated by the judges. This held true both for female ($r = 0.01, p = .925$) and male participants ($r = 0.06, p = .521$). For both sexes there were also no correlations between the dependent variable and the attractiveness of one's partner as reported by both the participants and their partners (all correlations *NS*). Surprisingly, self-rated attractiveness measure correlated with the dependent variable, both for female ($r = 0.20, p = .003$) and male participants ($r = 0.22, p = .001$).

Furthermore, we examined if the dependent variable correlated with more objective variables of physical attractiveness like self-reported height, weight and BMI. The opposite-sex interest reported by both men and women did not correlate with their partner's height, weight or BMI (all correlations *NS*).

After conducting a principal component analysis on items of dependent variable we found that the first item accounted for 50% of the variance. We therefore decided to use it as an index instead of the composite index in a structural equation model where we examined the hypothesis that social opportunities would mediate the relationship of male attractiveness and self-rated attractiveness by female. Our choice was also supported through the elbow method in scree plot, where the second factor had eigenvalue lower than 1.

We created a latent variable for the frequency of the couple's joint attendance of public places (bars, cinemas, cafes

and restaurants). The relationship between women’s self-rated attractiveness and males’ perception that “women look at me more when I am with my girlfriend” was mediated by the frequency of joint attendance of these public places. As Figure 1 shows, the standardized regression coefficient between women’s self-rated attractiveness and males’ perception that “women look at me more when I am with my girlfriend” was statistically significant. We tested the significance of this indirect effect using bootstrapping procedures. Standardized indirect effects were computed for each of 2,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped standardized direct effect was .10, $p = .252$, and the standardized indirect effect was .05, $p = .027$ validating a full mediation effect of the joint attendance of public places.

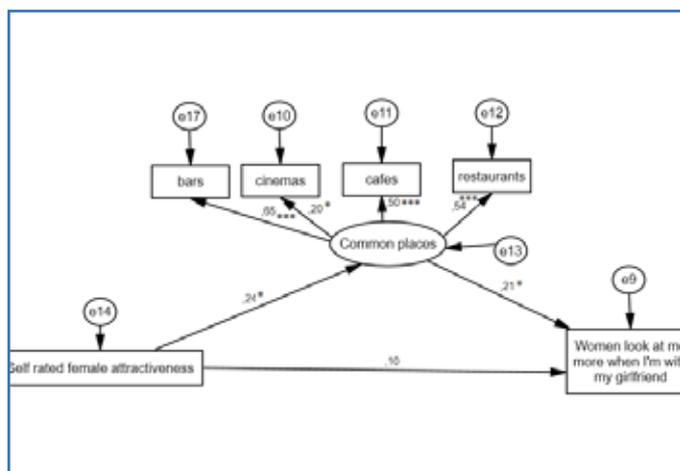


Figure 1. Structural equation model of the mediation of joint attendance of public places in the relationship between self-rated female attractiveness and self-reported increased levels of attractiveness by their male partner.

Note. * $p < .05$; ** $p < .01$; *** $p < .001$. Values are standardized regression weights. Fit indices for the model: CMIN=19.04, DF=8, $p = .015$; CMIN/DF=2.38; CFI=.88; RMSEA=.078 (LO=.03, HI=.13); SRMR=.05.

Discussion

This is the first study that investigated human nonindependent mate choice in real-life couples. In line with the results of a previous study on which the present one builds [34], we found that men who were in romantic relationships tended to report more opposite sex interest than their girlfriends, though this relationship was not as strong or as unanimous across all the questionnaire items as expected. We also found that the relationship between women’s self-rated attractiveness and their partners’ reported opposite-sex interest was mediated by the couples’ joint attendance of public places like bars and clubs. Outside of these findings, most of the expected relationships failed to appear. Most importantly, the attractiveness of men’s romantic partners, as rated by an independent set of raters, was not in any way correlated with the men’s self-reported attention from the opposite sex. Setting aside the lack of statistical significance, it was very surprising that the actual correlation itself was practically zero. This unexpected finding contradicts the core finding of prior research in this area [e.g. 20, 28-30] and is very difficult to interpret. In addition, elements of couples’ social life that were expected to be of relevance to nonindependent mate choice, like the degree to which couples shared a common social circle or frequented public places turned out to be marginally significant.

To date studies in this field have overwhelmingly used experimental methods, with only two prior studies using questionnaire studies [32-33]. The strengths of the current research are a) the aforementioned use of real-life couples that allows for within-couples comparisons, b) the collection of an extensive series of information relating to the couples’ social life, c) the collection of photographs that allows, for the first time, a more objective evaluation of participants’ attractiveness, d) the collection of physical data like height, weight and BMI and e) the cross-cultural element, as the majority of the relevant studies have been confined to English-speaking samples.

The most obvious improvement for future studies relates to the photographs collected; rather than participants providing photographs themselves, researchers would be well advised to take high quality, standardised photographs themselves. While logistically more demanding, we suspect that this step will dramatically improve the quality of the results obtained, and relationships that remained obscured in the present study will stand out in sharp relief. Another obvious improvement would involve the development of a more extensive and sophisticated self-report scale for capturing opposite sex interest as a function of one's romantic relationship status; whereas Vakirtzis and Roberts [34] showed promising results using the scale, the results presented here were disappointing. An overview of the results obtained here strongly suggest that, unlike the first study [34], the questionnaire was not quite capturing what it was meant to, at least when it comes to this Greek sample of undergraduate students.

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