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Partner Status Influences Women's Interest in the Opposite Sex

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Abstract Previous research has demonstrated that hormones, relationship goals, and social context influence interest in the opposite sex. It has not been previously reported, however, whether having a current sexual partner also influences interest in members of the opposite sex. To test this, we obtained explicit and implicit measures of interest by measuring men's and women's subjective ratings and response times while they evaluated photos of opposite-sex faces. Fifty-nine men and 56 women rated 510 photos of opposite-sex faces for realism, masculinity, attractiveness, or affect. We found that these subjective ratings were not influenced by partner status in either men or women. However, women who did not report having a current sexual partner spent more time evaluating the photos than women who did have partners, demonstrating greater interest in the photos. Sexual partner status did not predict men's response times. These findings may reveal that relationship commitment in women suppresses interest in alternative partners.

Keywords Sex differences · Response time · Viewing time · Mate choice · Face processing

Men and women's interest in the opposite sex depends on both internal and external contextual factors. Men and women's physiological and psychological status biases information processing of, and subsequent responses to, potential mates (Bateson

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and Healy 2005; Lindgren et al. 2007; Miller and Todd 1998). Previous research demonstrates that hormonal state, relationship goals, and social situation are important factors in how men and women respond to the opposite sex (e.g., Gonzaga et al. 2008; Haselton and Gangestad 2006; Moore 1985; O'Hagan et al. 2003; Pillsworth and Haselton 2006). These contextual factors may influence men and women differently, however, owing to differences between the sexes in reproductive pressures and strategies (Gangestad and Simpson 2000; Miller and Todd 1998). One possible contextual element influencing interest in the opposite sex is whether or not the men and women already have a sexual partner. In their evaluations of men, women must balance the trade-offs of fertilization, relationship establishment, and investment in current offspring, which may serve to confine sexual interest to a current partner (Gangestad and Simpson 2000). Men, on the other hand, are able to fertilize multiple females, and an interest in extra-pair females may enhance male reproductive success (Symons 1979). The current study experimentally tests the influence of sexual partner status on interest in the opposite sex.

Previous work demonstrates that subjective reports of attraction vary with an individual's recent sexual activity; men and women who reported no recent sexual activity found sexually explicit stimuli depicting heterosexual intercourse more sexually attractive than participants reporting sexual activity within the preceding month (Rupp and Wallen 2007a). Another study demonstrated that women found men who were in relationships less attractive then single men, although male participants found single and married women equally attractive (O'Hagan et al. 2003). The specific influence of sexual partner status on interest in the opposite sex has not been as extensively examined, however. Most research examining influences of partner status has looked for differences in preferences for certain characteristics, such as dominance (Havlicek et al. 2005) or masculinity (Jones et al. 2005; Provost et al. 2006; Waynforth et al. 2005), rather than overall levels of interest. Additionally, research demonstrating an effect of sexual partner status on interest in sexual stimuli has been based on responses to explicit images of sexual activity, rather than more ecologically valid stimuli such as faces (e.g., Rupp and Wallen 2007a). Finally, previous literature has focused primarily on committed sexual romantic relationships that have significant social and psychological consequences distinct from the expected effects of simply having a sexual partner (Gonzaga et al. 2008; Lydon et al. 2003; Miller 1997). Hence it is not clear how having a sexual partner influences interest in members of the opposite sex and whether any potential difference is consistent with presumed sex differences in evolutionary reproductive history.

Sexual partner status may influence interest in the opposite sex subtly and may not even be a conscious aspect of sexual and social decision making. Implicit motives may alter partner preferences, affiliative behavior, and sexual strategies and act subconsciously to bias interest in the opposite sex (Lindgren et al. 2007; Maner et al. 2007; Schultheiss et al. 2003). Therefore, interest in sexually relevant stimuli measured through subjective reports may fail to capture subconscious effects of partner status. A developing literature suggests that viewing time is an accurate measure of implicit motivation (Laws and Gress 2004), including sexual interest (Harris et al. 1996; Laws and Gress 2004; Quinsey et al. 1996; Rupp and Wallen 2008a). Generally, subjects look at images they find more attractive for longer times, and in males this measure of attractiveness has been validated by both subjective

reports and penile tumescence. Male and female subjects have also been shown to look longer at pornographic slides that they rate more highly arousing (Brown 1979). Additionally, longer viewing times in men are correlated with higher testosterone, suggesting that viewing time may be a reliable indicator of sexual motivation (Rupp and Wallen 2007b). Another measure of participants' motivation is response time to a stimulus as measured by the time they take to evaluate a stimulus subjectively or perform a cognitive task—for example, categorizing stimuli. Women with lower sexual desire have lower response times when evaluating sexual stimuli than do women who report higher levels of sexual desire (Conaglen and Evans 2006).

The present study tested the hypothesis that sexual partner status influences men's and women's implicit interest in the opposite sex. We hypothesized that the absence of a current sexual partner would increase the sensitivity of the participants to photos of the opposite sex. Increased sensitivity to and interest in the opposite sex would be expected to be reflected in longer response times when evaluating photos of faces. We predicted that women, but not men, with a current sexual partner would be less interested in pictures of the opposite sex in a manner that is consistent with different reproductive histories and strategies (Symons 1979).

Methods

Subjects

Participants were 56 women and 59 men recruited from introductory psychology classes at a large Midwestern university through an online experiment subject pool. Participants received one credit for time spent participating in the experiment. Participants were aged 17–26 (Mean=19.27, SD=1.30 years), heterosexual, not using any form of hormonal contraception (women), and from a variety of ethnic backgrounds.

Participants were tested across four cohorts, described in more detail below. Before testing began, participants provided their age, date of last menstrual period (women), and whether or not they had a current sexual partner (yes/no). Participants indicating that they presently had a sexual partner were also asked to indicate whether they were committed to that partner. Commitment was defined as being sexually unavailable for other partners. If they were available for sexual activity outside their current sexual partnership, they were categorized as uncommitted. Of the total 56 female participants, 21 women indicated that they had a current sexual partner (35 did not). Twenty-five men indicated that they had a current sexual partner and 34 men said that they did not. Three male participants indicated that they had a sexual partner but that they were not sexually committed to that partner (n=2 from cohort 1; n=1 from cohort 4). All women with sexual partners indicated that they were sexually committed to that partner. Chi-square analysis demonstrated that the distribution of participants with and without sexual partners was not different across cohorts for women ($\chi^2_{3,59} = 3.27$, p=0.35) or men ($\chi^2_{3,56} = 3.79$, p=0.29).

Women were categorized into two groups based on their likelihood of conception when tested as calculated from the date of their most recent menstrual period. Thirty-three women reported menstrual onset putting them at low likelihood of conception,

and 23 were tested when likelihood was higher (low=days 1–5 and 17–35, high=days 6–16 following menstruation; Miller et al. 2007; Wilcox et al. 2001). The distribution of women by likelihood of conception was independent of sexual partner status ($\chi^2_{1,56} = 0.04$, p=0.88) and cohort ($\chi^2_{3,56} = 4.95$, p=0.18).

Procedure

Stimuli Photos of male and female faces were taken from public domain websites on the internet. All faces were edited to the same 640×480 pixel resolution with similar limited amount of background, and made black and white in Adobe Photoshop (Version 7.0.1, Adobe Systems Inc.). The selected photos were of individuals who were generally the same age range as the participants, depicting a neutral expression, and from a variety of ethnic backgrounds. Pictures were presented in randomized order on a laptop (Dell Latitude with 1280×800 pixel screen resolution) while participants were seated alone in a darkened room.

Testing Participants were in one of four cohorts, each performing a cognitive evaluation task on pictures of the opposite sex. Each cohort evaluated the pictures on one of four dimensions: realism, masculinity/femininity, attractiveness, or affect. We used four different cohorts to allow for the possibility that the effect of sexual partner status on cognitive processing of the opposite sex might differ depending on what trait participants were asked to evaluate. Participants were instructed to give their "gut reaction" and make their ratings as quickly as possible. Each picture was presented for a maximum of four seconds with a one-second fixation slide immediately following the picture presentation to ensure equal initial attention and orienting across pictures. A response within the four-second timeframe ended the presentation of each picture. If a participant failed to make a response within the four-second period, she or he was automatically taken to the next trial, and no data were counted for the missed picture. Responses were indicated on the keyboard of the laptop on which the stimuli were presented. Response time was recorded by the computer using Gazetracker software (Eye Response Technologies, Charlottesville, VA, USA) as the time in milliseconds that elapsed between the onset of presentation of the picture stimulus and the participant's indication of his/her evaluation (1–5) on the laptop keyboard. Within each sex, all cohorts viewed the same set of photos in a different randomized order and differed only in the trait they were asked to evaluate.

The first cohort (N=13 women, 14 men) evaluated how realistic the pictures looked to them (1 = very unrealistic, 2 = unrealistic, 3 = neither realistic nor unrealistic, 4 = realistic, 5 = very realistic). Participants were told that the pictures they were going to view had been altered with computer software and that we were interested in how natural the pictures looked, and whether or not they looked "fake." The second cohort (N=14 women, 15 men) was asked to indicate how masculine or feminine the faces appeared to them (1 = very feminine, 2 = feminine, 3 = equally masculine and feminine, 4 = masculine, 5 = very masculine). Before testing, participants were shown a picture of a computer-generated average face of the opposite sex (Rowland and Perrett 1995). Participants were instructed to consider this exemplar as a face of "average" masculinity (a rating of 3) and then to rate the following pictures with respect to that baseline. The third cohort (N = 14 women, 15

men) was asked to indicate how attractive the person in the picture was (1 = very unattractive, 2 = unattractive, 3 = neither attractive nor unattractive, 4 = attractive, 5 = very attractive). Finally, the fourth cohort of participants (N=15 women, 15 men) rated the pictures for how positive or negative in affect the person in the picture appeared (1 = very negative, 2 = negative, 3 = neutral, 4 = positive, 5 = very positive). Participants were instructed that "positive" affect would characterize someone who looked friendly, happy, or nice. Participants were instructed that a face characterized by a "negative" affect would look unfriendly, sad, or mean.

Statistical Analysis Data were exported from the presentation software to Excel and were further analyzed in SPSS (Version 14.02, SAS Institute). Dependent variables were participants' response times (seconds) and subjective ratings (1–5) for the various traits. To examine the influence of partner status on interest in and evaluations of the opposite sex we conducted two within-sex multivariate ANOVA analyses (MANOVA). Separate analyses were conducted for men and women because they viewed different stimuli (i.e., men viewed female faces and women viewed male faces). Within females, we performed a 2 (partner status: yes, no)×4 (cohort: realistic, masculinity, attractive, affect)×2 (conception likelihood: high, low) MANOVA with mean response times and ratings as the dependent measures. Within males, we performed a 2 (partner status)×4 (cohort) MANOVA with mean ratings and response times as the dependent measures. Significant multivariate effects were followed up by within-sex univariate ANOVA and paired t test post hoc analyses.

Results

Women

MANOVA analyses demonstrated overall effects of sexual partner status ($F_{2,39}$= 6.98, p=0.003) and cohort ($F_{6,80}$=11.17, p<0.001), but not conception risk ($F_{2,39}$= 2.73, p=0.08), on women's subjective ratings and response times. The multivariate tests also demonstrated a significant interaction between women's sexual partner status and their conception risk ($F_{2,39}$=3.61, p=0.04) and between cohort and conception risk ($F_{6,80}$=2.45, p=0.03). There was no significant interaction effect of women's sexual partner status and cohort ($F_{6,80}$=2.16, p=0.06) or of the three-way interaction between sexual partner status, cohort, and conception risk ($F_{6,80}$=2.01, p=0.07). Statistically significant multivariate effects were further examined with univariate ANOVA described below.

Follow-up univariate tests showed no effect of sexual partner status on women's subjective ratings ($F_{1,40}$=0.48, p=0.50; Mean=3.13±0.61; Table 1). However, there was a main effect of partner status on women's response times ($F_{1,40}$=9.74, p= 0.003, Fig. 1); women who did not report having a current sexual partner took longer to respond (Mean=1.43±0.28 s) than women with a current sexual partner (Mean= 1.31±0.29 s). Ratings of attractiveness were positively correlated with women's response times, supporting our interpretation that longer response times indicate increased interest in the photos (Pearson one-tailed bivariate correlation; r_{14}=0.44, p=0.05; Fig. 2).

Table 1 Women's subjective evaluations (on a scale of 1–5) by cohort and partner status (mean±SD)

Cohort	Sexual partner status		Total
	No	Yes	
Realistic	3.36±0.56	4.05±0.75	3.57±0.68
Feminine/masculine	3.39±0.44	3.24±0.15	3.31±0.33
Attractive	2.57±0.37	2.12±0.81	2.47±0.49
Affect	3.31±0.22	3.03±0.40	3.13±0.34
Total	3.11±0.54	3.16±0.73	3.13±0.61

Univariate analyses demonstrated an effect of cohort on women's subjective ratings ($F_{3,40}$=19.51, p<0.001, Table 1) and response times ($F_{3,40}$=5.96, p=0.002, Table 2). Post hoc paired t test analyses demonstrated that women who evaluated the pictures for attractiveness rated the photos lower than women who made their evaluations for the other dimensions (paired t tests, p values<0.005, Table 1), suggesting that they evaluated the male faces on this trait more critically. Additionally, women evaluating how realistic the pictures looked rated the photos higher than did women who were rating the male faces on other dimensions (paired t tests, p values<0.005, Table 1). Post hoc analyses for response times showed that women evaluating masculinity took the longest to make their responses (paired t tests, p values<0.001, Table 2), suggesting that this may be the most difficult trait to evaluate.

Univariate analyses performed to follow up on the conception risk by sexual partner status multivariate interaction did not show a significant effect on either women's subjective ratings ($F_{1,40}$=3.26, p=0.08) or response times ($F_{1,40}$=1.28, p=0.27). Finally, an examination of the multivariate effect of cohort and conception risk (Table 3) demonstrated a significant interaction effect on women's subjective ratings ($F_{3,40}$=3.53, p=0.02), but not response times ($F_{3,40}$=0.47, p=0.70). Specifically,

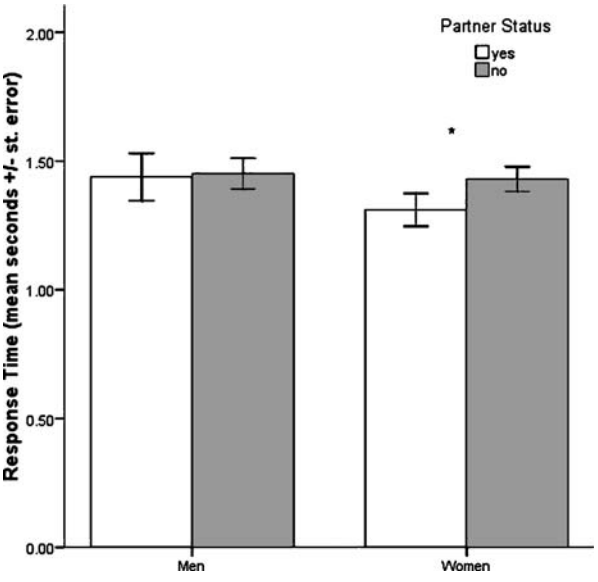

Fig. 1 Mean response times (s) collapsed across all ratings by sexual partner status for male and female participants. *Asterisk* denotes a significant difference within females between groups (p<0.01)

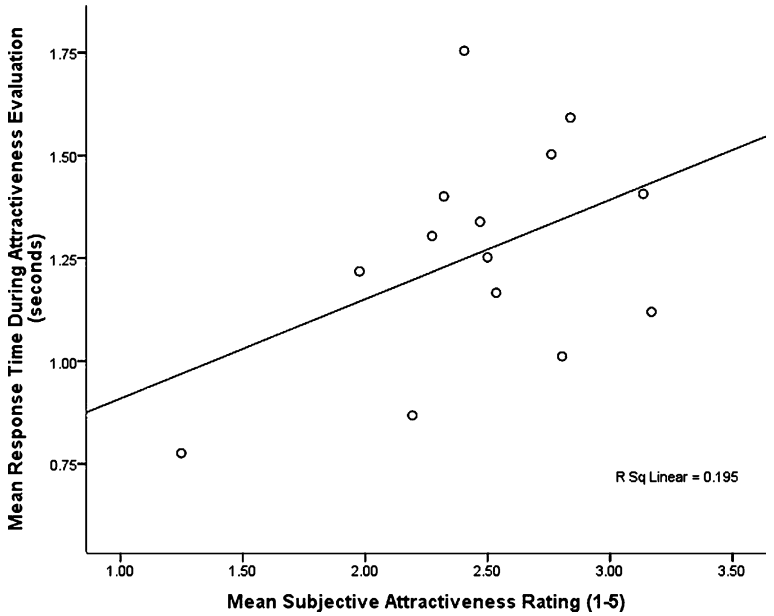

Fig. 2 Scatterplot of women's mean subjective evaluations of attractiveness (*x*-axis) with their mean response times (*y*-axis). Response times and ratings were significantly correlated (r=0.44, p=0.05)

women in the high conception risk group gave higher values to ratings of "realism" compared with women's ratings on the other three traits (paired *t* tests, *p* values< 0.01), whereas women with a low conception risk did not. Post hoc *t* tests within each cohort did not demonstrate any significant differences by conception risk, although this may be due to the relatively small sample sizes for the within-cohort post hoc tests.

Men

The MANOVA analysis demonstrated an overall effect of cohort ($F_{6,102}$=3.85, p= 0.002), but not sexual partner status ($F_{2,50}$=0.60, p=0.55; subjective ratings, Mean=

Table 2 Women's response times (in seconds) by cohort and partner status (mean±SD)

Cohort	Sexual partner status		Total
	No	Yes	
Realistic	1.44±0.28	0.99±0.26**	1.30±0.34
Feminine/masculine	1.72±0.25	1.49±0.20*	1.60±0.24
Attractive	1.28±0.24	1.22±0.41	1.27±0.27
Affect	1.38±0.21	1.35±0.19	1.36±0.19
Total	1.43±0.28	1.31±0.29**	1.39±0.29

Women who did not have a current partner had longer response times overall ($F_{1,48}$=7.11, p=0.01)
**A significant difference within rating cohort by sexual partner status (paired samples *t* test p<0.05)
*A trend (p<0.10) toward a difference within rating cohort by sexual partner status

Table 3 Women's subjective evaluations (on a scale of 1–5) by cohort and conception risk (mean±SD)

Cohort	Conception risk	
	High	Low
Realistic	4.02±0.68*	3.49±0.67
Feminine/masculine	3.17±0.34	3.42±0.29
Attractive	2.66±0.30*	2.29±0.60*
Affect	3.08±0.34	3.29±0.32
Total	3.06±0.50	3.18±0.69

*A significant difference within conception risk group versus ratings within other cohorts ($p<0.01$)

3.12±0.47; Table 4; response times, Mean=1.45±0.40 s; Table 5) or the interaction of cohort and partner status ($F_{6,102}=1.48$, $p=0.19$). Follow-up univariate analyses for the significant multivariate cohort effect demonstrated a main effect of cohort on men's subjective ratings ($F_{3,51}=7.7$, $p<0.001$, Table 4), but not response times ($F_{3,51}=0.91$, $p=0.44$). Post hoc analyses revealed that subjective ratings were lower for men who evaluated masculinity compared with ratings for the other dimensions (paired t tests, p values<0.05, Table 4).

Discussion

These data demonstrate that sexual partner status influences women's implicit interest in photos of the opposite sex. That there were no detectable effects of sexual partner status on women's subjective ratings of male faces, but there were on response times, emphasizes the subtlety of this effect and introduces the possibility that sexual partner status impacts women's cognitive processing of novel male faces but not necessarily their conscious subjective appraisal. Male participants, by contrast, responded to photos of unfamiliar female faces independently of sexual partner status, when measured either as response time or by subjective evaluations. These findings of an influence of partner status in women may reflect that women, on average, are relatively committed to their relationships and current partners, which possibly suppresses their attention to and appraisal of alternative partners (Gonzaga et al. 2008; Lydon et al. 2003).

These findings are consistent with previous research demonstrating an effect of personal context on the cognitive processing of sexually relevant stimuli (Conaglen and Evans 2006; O'Hagan et al. 2003; Lindgren et al. 2007). However, some previous research interprets longer response times to indicate *decreased* interest in the stimuli (e.g., Field et al. 2004; Keogh et al. 2001; Mogg et al. 1998). For

Table 4 Men's subjective evaluations (on a scale of 1–5) by cohort and partner status (mean±SD)

Cohort	Sexual partner status		Total
	No	Yes	
Realistic	3.31±0.40	3.22±0.48	3.25±0.44
Feminine/masculine	2.69±0.57	2.80±0.16	2.73±0.47
Attractive	3.03±0.55	3.12±0.26	3.06±0.46
Affect	3.31±0.22	3.66±0.13**	3.45±0.25
Total	3.05±0.52	3.22±0.43	3.12±0.49

**A significant difference within rating cohort by sexual partner status (paired samples t test $p<0.05$).

Table 5 Men's response times (in seconds) by cohort and partner status (mean±SD)

Cohort	Sexual partner status		Total
	No	Yes	
Realistic	1.73±0.45	1.38±0.54	1.51±0.52
Feminine/masculine	1.32±0.30	1.76±0.42**	1.47±0.39
Attractive	1.40±0.34	1.26±0.49	1.36±0.39
Affect	1.50±0.31	1.40±0.28	1.46±0.29
Total	1.45±0.35	1.44±0.40	1.45±0.40

**A significant difference within rating cohort by sexual partner status (paired samples t test $p<0.05$)

example, studies using dot-probe paradigms to measure the impact of hunger (Mogg et al. 1998), anxiety (Keogh et al. 2001), or alcohol (Field et al. 2004) on participants' motivation, find that more highly motivated subjects respond more quickly. Therefore, an alternative explanation of the current study's finding of shorter response times in partnered women is one of facilitation of responding owing to having a current sexual partner. That is, having a partner may have facilitated partnered women's cognitive processing and evaluation of the male face photos and lowered response times. However, because women's subjective ratings of attractiveness were positively correlated with their response times (Fig. 2), we maintain our interpretation that longer response times in women without sexual partners reflects increased interest in the men and/or a suppression of interest in partnered women rather than a facilitation of male face processing in partnered women.

Worthy of discussion is the relative absence of an effect of conception risk on women's interest in photos of novel male faces. This may in part be due to the study's methodological limitations. The assessment of the impact of conception risk on the dependent variables measured in the study was conducted primarily to control for any interaction between risk and our primary variable of interest, partner status. Therefore, the sample sizes within cohorts across our two conception groups were relatively low, which decreased our power and possibly our ability to capture the effect of conception risk. Additionally, more accurate estimate of conception risk would require a narrower window than the one we used (days 6–16) and would be based on days closer to ovulation when conception risk is highest (i.e., days 12–14; Wilcox et al. 2001). Furthermore, the use of self-report and a retrospective report of most recent period may have been inaccurate. The statistically insignificant trend toward an effect of conception risk despite the low power of our comparison owing to small samples and the large window suggests that an effect of conception risk may exist. Therefore, we do not think our results regarding a null effect of conception risk on women's ratings and response times are conclusive; rather they should be investigated further with adequate sampling across women's menstrual cycles to allow for more succinct determination of conception risk.

While this study is a useful initial investigation of the role of sexual partner status on men's and women's interest in the opposite sex, uncertainties remain. The between-subjects design did not allow us to determine the direction of causation for the observed partner effect in female participants. Women who reported not having a sexual partner may systematically differ on some other variable that is responsible for the observed differences in response times. It is possible that sexual partner status is a marker for another psychosocial variable, or set of variables, rather than causal in its own right. We did not record more extensive information regarding the type of

sexual relationships men and women were engaged in, for example, or their relationship goals. A previous study found that men and women reporting less relationship satisfaction and commitment to their current partnerships looked longer at slides depicting attractive members of the opposite sex and that their viewing time positively predicted their relationship failure (Miller 1997). It has been hypothesized that men and women suppress their attention and interest to romantic "alternatives" in order to maintain their current romantic relationship (Gonzaga et al. 2008). This suggestion is supported by lower subjective evaluations of members of the opposite sex by men and women in committed relationships (Lydon et al. 2003). The women in the current study may have been fairly committed to their relationships and therefore demonstrated suppressed interest in the opposite sex. The same study in another group of women who are not committed to their partners may not find an effect of sexual partner status. Previous research also suggests that the characteristics of a woman's current partner and whether she is looking for a short- or long-term partner influence women's interest in extra-pair partners (Gangestad et al. 2007; Haselton and Gangestad 2006). It is possible that women who are more interested in short-term partnerships or who are not as satisfied or committed to their current partner may not have lower interest in the opposite sex compared with women who do not have partners. Future work should more thoroughly characterize women's current relationships and goals in order to understand the potential moderating effects of these variables on their interest in the opposite sex.

In sum, the current study demonstrates an effect of sexual partner status on women's implicit interest in photos of male faces. We did not find the same effect in men. However, because of differences in stimuli employed with men and women, a direct across-sex comparison was inappropriate and therefore sex differences in the effect of partner status on implicit interest cannot be directly examined in the current study. The observed effect of partner status in women is of practical importance for future studies investigating men's and women's interest in sexually salient stimuli and emphasizes the need to control for individual experience and personal situational factors—specifically, sexual partner status. This study also emphasizes the ability of non-subjective methodologies to capture subtle psychosocial effects on the cognitive processing of sexually relevant stimuli (Rupp and Wallen 2008b). Finally, consistent with previous work (Maner et al. 2007), these data further suggest that contextual influences on sexual interest and decision making may be present as early as the unconscious cognitive processing stage in women's response to sexually salient stimuli and contribute to observed downstream effects on subjective reports and behavior.

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