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BRIEF REPORT

Effects of gender, rape-supportive attitudes, and explicit instruction on perceptions of women's momentary sexual interest

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Abstract Contemporary models of male-initiated sexual aggression toward female acquaintances implicate misperception of women's sexual interest. This study investigated the effects of gender, rape-supportive attitudes and an instructional manipulation on college students' sexual-interest judgments. Two hundred seventy-six women and 220 men judged the cues of momentary sexual interest expressed by photographed women; half received instruction on the differential validity of nonverbal cues of sexual interest for estimation of women's momentary sexual interest. Participants also completed an assessment of rape-supportive attitudes. Overall, college students' perceptions of women's momentary sexual interest are compromised both nomothetically and idiographically. Both male and female college students relied not only on women's nonverbal affect but also on the provocativeness of women's clothing and attractiveness when judging women's sexual interest. Men and women showed similar average ratings, but women relied more than men on women's affect, whereas men relied more than women on women's attractiveness. Both male and female students who endorsed more rape-supportive attitudes, relative to their peers, relied less on women's affect and more on women's clothing style and attractiveness. Explicit instruction regarding the greater validity of women's affective than nonaffective cues enhanced focus on nonverbal affective cues and decreased focus on clothing style and attractiveness. Although higher rape-supportive attitudes predicted more deficits in processing cues of sexual interest, explicit instruction proved to be effective for both higher-risk and lower-risk participants. These findings highlight the generalizability of the well-established effects of explicit instruction on category learning to sexual perception and may point to procedures that eventually could be incorporated into augmented prevention programs for sexual aggression on college campuses.

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Male-initiated sexual aggression toward female acquaintances is a major public-health problem on college campuses (e.g., Krebs, Lindquist, Warner, Fisher, & Martin 2007), and current prevention approaches for college populations are inadequate for reduction in the incidence of sexual aggression (e.g., DeGue, Valle, Holt, Massetti, Matjasko, & Tharp, 2014). Theoretical models of acquaintance-initiated sexual aggression implicate not only historical, attitudinal, personality, and contextual factors (Malamuth, Sockloskie, Koss, & Tanaka, 1991; Thompson, Koss, Kingree, Goree, & Rice, 2011), but also perceptual influences—namely, misperception of women's sexual interest (e.g., Abbey, Jacques-Tiura, & LeBreton, 2011).

Consistent with Abbey et al.'s (2011) model, impoverished processing of women's sexual interest correlates moderately with risk of sexually aggressive behavior, as commonly indexed by self-reported sexual aggression or rape-

supportive attitudes (Farris, Treat, Viken, & McFall, 2008b). High-risk men, relative to low-risk men, show deficiencies in attention to, sensitivity to, memory for, and decision making about women's sexual interest, as communicated nonverbally on a woman's face and in her body posture in full-body photographs (e.g., Treat, Farris, Viken, & Smith, 2015; Treat, Viken, Farris, & Smith, 2016; Treat, Viken, Kruschke, & McFall, 2011; see Fig. 1 for sample images). These deficits could foster misperception or potential dismissal of women's sexual nonconsent cues as token resistance or as purposely inciting frustration.

Moreover, men at greater risk of sexual aggression prioritize nonaffective information more than their peers when judging women's affect, particularly provocativeness of clothing and normative attractiveness (e.g., Treat et al., 2011; Treat et al., 2015, Treat et al., 2016). These cues are less likely to be diagnostic of a woman's momentary interest in a particular man, given their far greater stability throughout a social event. In contrast, nonverbal affect can fluctuate moment to moment and can be directed at a specific man. Thus, both prioritization of nonaffective cues and deprioritization of affective cues could increase risk for coercive and aggressive behavior.

This cue-utilization perspective on sexual perception suggests that well-established experimental methods designed to enhance category learning—such as trial-by-trial feedback and explicit instruction about the category structure—might be employed to alter men's focus on women's affective and nonaffective cues when judging women's current sexual interest in the laboratory. For example, trial-by-trial feedback (where subjects are given the "true" answer after each judgment they make) facilitates perceptual learning and decision making (e.g., Healy, Schneider, & Bourne, 2012), whereas explicit instruction regarding the category structure (verbal coaching about differential cue validity) expedites declarative learning and transfer (e.g., Karelaia & Hogarth, 2008; Lupyan & Thompson-Schill, 2012;). Thus, investigation of such experimental probes may enhance our understanding of sexual perception while simultaneously laying some of the basic-research groundwork for later development of novel prevention strategies.

The current work evaluates whether explicit instruction regarding the differential validity of affective versus nonaffective cues modifies cue utilization when judging a woman's momentary sexual interest. The instructions stress the relevance of a woman's nonverbal affective cues to her interest in a particular man at a particular point in time and urge participants to focus only on the woman's facial expression and body language and to ignore other aspects of the woman when judging her current sexual interest. In a prior study, using an independent sample (Treat et al., 2016), we examined the impact of trial-by-trial feedback on affective and nonaffective cue utilization, allowing us in this study to compare the magnitude of the prior feedback and current instructional manipulations on cue utilization. This provides preliminary insight into the role that declarative and procedural processes play in sexual perception and its potential modification within laboratory contexts.

We also examine, for the first time, whether gender moderates both cue utilization and attitudinal links with cue utilization. Prior work indicates that men show lower sensitivity to women's affect than do women (Farris et al., 2008a). Men also tend to overperceive the sexual interest of more, versus less, attractive women when speed dating (Perilloux, Easton, & Buss, 2012), whereas women tend to underperceive men's sexual interest. Thus, we evaluate whether men rely less than women on women's affect and more on women's attractiveness. We also determine whether the well-established link between rape-supportive attitudes and cue utilization among men generalizes to college women. Finally, we ask participants to self-report their reliance on women's affect, clothing style, and attractiveness after completing the judgment task, which provides a window onto participant awareness of cue-utilization patterns.

Fig. 1 Models whose momentary sexual interest ranges from extremely rejecting (*on the left*), to extremely sexually interested (*on the right*), as judged by both undergraduate women and experts in sexual perception

Method

Participants

Participants were 496 unmarried undergraduates between the ages of 18 and 24 years. The average age of participants was 19.24 years (SD = 1.15); 276 were female (55.6%) and 220 were male (44.4%); 73.9% identified as White/Caucasian and 12.5% as Asian-American/Asian; 94.2% reported at least one serious or casual dating relationship. This project was approved by the Institutional Review Board of the University of Iowa.

Photo Stimulus Set

Full-body photographs of undergraduate females were selected from a stimulus set containing 3,129 photos of women taken by the research team. Figure 1 presents sample photos. All models brought to the photo shoot warm-weather clothing that varied in sexual provocativeness. Models were asked to display affective cues ranging from rejection and sadness to friendliness and sexual interest. The final photo set varied along the three primary psychological dimensions of interest: sexual interest (SI; rejecting to sexually interested), provocativeness of dress (POD; conservative to provocative), and normative attractiveness (ATT).

The research team developed coding definitions and procedures, which were refined with experience coding small samples of pilot stimuli (see Treat et al., 2011). Nine undergraduate women were paid to code SI and POD. When judging SI, raters were instructed "to focus only on the degree to which the woman is expressing sexual interest and to ignore her clothing style, her attractiveness, your personal reactions to the woman or her clothing, and so forth." When judging POD, raters were asked "to focus only on the sexual provocativeness of the clothing and to ignore characteristics of the model completely, including her affect, her attractiveness, how she looks in the clothing, your personal reactions to the woman or her clothing, and so forth." The interrater reliability of the undergraduate women's ratings was high (intraclass correlations = .97, .95). Four members of our larger research team with expertise in sexual perception also coded SI and POD. The average ratings of undergraduate women and experts converged strongly (r = .97, .96, respectively). Finally, a large sample of undergraduate men rated the women's attractiveness on a 10-point scale. An average normative value for SI, POD, and ATT was computed for each photo, based on the undergraduates' ratings. Correlations between normative ratings for the dimensions were minimized during stimulus selection (all rs < .15; see Figure A in the Supplemental Material for scatterplots).

Measures

Sexual-Interest Judgment Task

Participants viewed 130 stimuli for 2 s apiece in a random order. Participants were told that they would be "judging how sexually interested versus rejecting 130 women feel right now," using "a scale that ranges from -10 = *extremely rejecting*, to 0 = *neutral*, to 10 = *extremely sexually interested.*" Half of the participants received additional instructions prior to making ratings and on all response screens: "When making these ratings, you should focus on the woman's facial expression and body language. You should ignore other aspects of the model and her clothing completely, including her clothing style, her attractiveness, your personal reactions to the model or her clothing, etc.. Instead focus only on how sexually interested versus rejecting the woman feels right now, regardless of other characteristics of the woman and her clothing." Figure 2 provides a schematic representation of a single trial in the instruction condition.

Self-Reported Cue Utilization

Participants answered three questions about their utilization of ATT, POD, and SI when judging women's sexual interest: "When you were judging how sexually interested the women feel, how much were you influenced by their attractiveness/the provocativeness of their clothing/their nonverbal emotional cues (e.g., facial expression, body posture)?" The response scale ranged from 0 (*not at all influenced by their attractiveness/the provocativeness of their clothing/their nonverbal emotional cues*) to 10 (*extremely influenced by their attractiveness/the provocativeness of their clothing/their nonverbal emotional cues*).

Illinois Rape Myth Acceptance (IRMA)

The IRMA (Payne, Lonsway, & Fitzgerald, 1999) is a 45-item questionnaire that assesses endorsement of rape-supportive attitudes. Sample items include "Rape happens when a man's sex drive gets out of control" and "Being raped isn't as bad as being mugged and beaten." The average IRMA score was 87.66 (SD = 32.25). Men showed higher IRMA scores than women, $t(494)$ = 4.945, $p < .001$, d = .31. Receipt of explicit instruction was unrelated to IRMA scores.

Procedure

After completing an informed-consent statement, participants completed the tasks in the order described on a computer in a private booth.
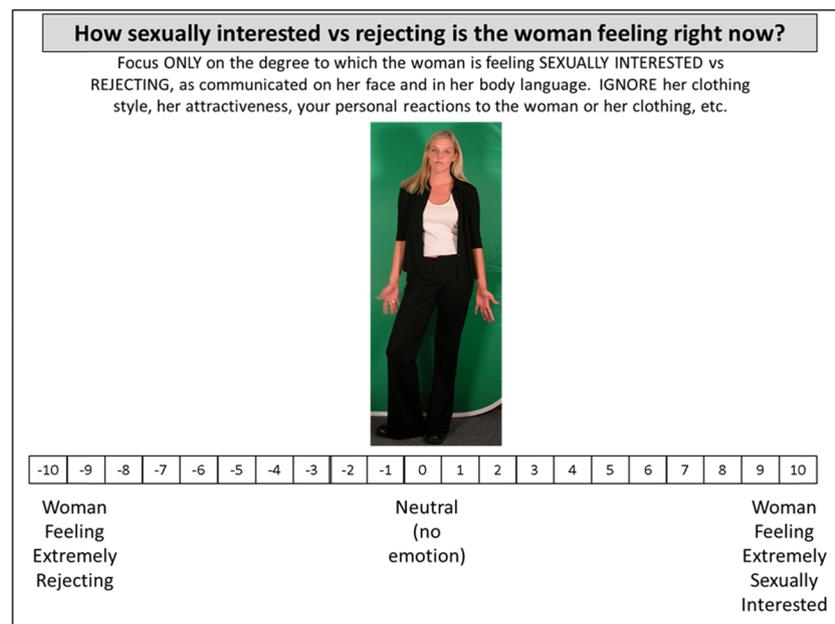
Fig. 2 Schematic representation of a single trial of the Sexual-Interest Judgment Task for participants who received instruction about women's sexual interest

Results

Sexual-Interest Judgment Task

A mixed-effects model was fit to participants' sexual-interest judgments using the *lmer* function in the *lme4* package in R (Bates, Maechler, Bolker, & Walker, 2015; Kuznetsova, Brockhoff, & Christensen, 2013). R code for the primary analysis and the raw data are available as Supplemental Material. In the model, the normative SI, POD, and ATT values were used to predict within-subject variation in sexual-interest judgments across the 130 stimuli, which provided subject-specific estimates of utilization of SI, POD, and ATT. A full factorial combination of Instruction (effect-coded), Gender (effect-coded), and IRMA (centered) then was allowed to moderate the effect of each stimulus-specific characteristic (SI, POD, and ATT; centered) on sexual-interest judgments (i.e., on the utilization coefficients). The maximal random effects structure supported by the data included random intercepts for both subject and item, as well as random subject slopes for SI, POD, and ATT. Table A in the Supplemental Material presents full results for the omnibus analysis.

Intercept effects

The average sexual-interest judgment was .158, which did not differ reliably from the midpoint of the rating scale (0.0), $t(275.2) = 1.754$, $p < .10$, $d = .21$. Instruction did not influence judgments of the average woman, $B = -.043$, $t(487.9) = -.789$, $d = -.07$. Figure B in the Supplemental Material portrays the effects of Gender and IRMA on the intercept. Gender was unrelated to average judgments, $B = -.060$, $t(487.9) = -1.095$, $d = -.10$, but rape-supportive attitudes positively predicted average judgments, $B = .006$, $t(488.0) = 3.294$, $p < .01$, $d = .30$. Gender moderated the link between attitudes and the average judgment, $B = -.005$, $t(488.0) = -2.684$, $p < .01$, $d = -.24$; attitudes positively predicted the average judgment of women, $p < .001$, $d = .39$, but not men, *ns*, $d = .04$. In sum, rape-supportive attitudes positively predicted women's (but not men's) average sexual-interest judgments, and Instruction was unrelated to the average judgment.

Sexual-interest utilization effects

Participants relied strongly on women's affective cues when judging their momentary SI, $B = .633$, $t(374.7) = 32.448$, $p < .001$, $d = 3.35$. Instruction influenced SI reliance, $B = .074$, $t(488.0) = 5.406$, $p < .001$, $d = .49$; those receiving extra instruction relied more on SI, $p < .001$, $d = 2.61$, than those who did not, $p < .001$, $d = 2.00$. Figure 3 depicts Instruction effects on cue utilization. Gender affected SI utilization, $B = -.041$, $t(488.0) = -3.036$, $p < .01$, $d = -.27$; men relied less on SI, $p < .001$, $d = 2.04$, than women, $p < .001$, $d = 2.60$. Attitudes negatively predicted reliance on SI, $B = -.002$, $t(488.0) = -4.014$, $p < .001$, $d = -.36$. Figure 4 illustrates the effects of IRMA and Gender on cue utilization. In sum, Instruction enhanced SI reliance, women showed greater SI reliance than men, and rape-supportive attitudes negatively predicted SI reliance.
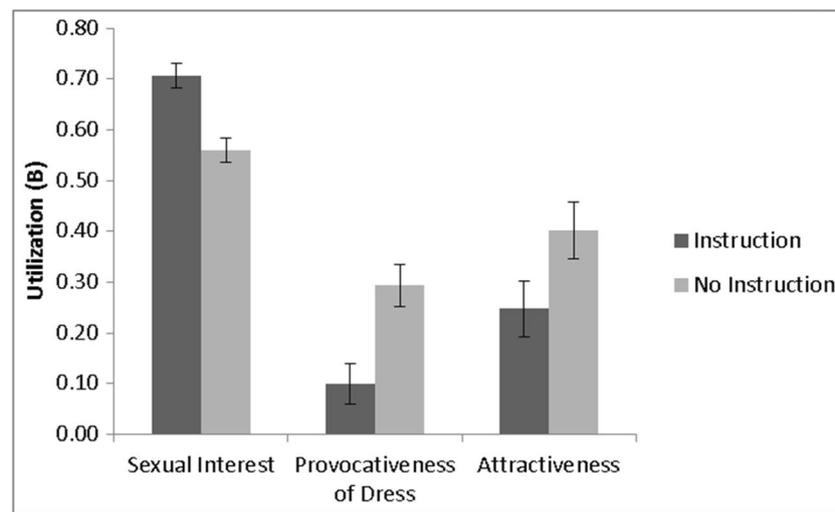
Fig. 3 Effects of Instruction on cue-utilization coefficients in the Sexual - Interest Judgment Task. Bars indicate standard errors of parameter estimates

Provocativeness-of-dress (POD) utilization effects

Participants relied strongly on women's clothing style when judging their sexual interest, $B = .196$, $t(186.5) = 5.348$, $p < .001$, $d = .78$. Instruction affected POD utilization, $B = -.097$, $t(487.1) = -5.857$, $p < .001$, $d = -.53$; reliance on POD was lower when participants received extra instructions, $p < .01$, $d = .31$, rather than standard instructions, $p < .001$, $d = .89$ (see Fig. 3). Gender influenced POD utilization, $B = -.098$, $t(487.1) = -5.948$, $p < .001$, $d = -.54$, with women focusing more on clothing style, $p < .001$, $d = .96$, than men, $p < .05$, $d = .29$ (see Fig. 4). Gender also moderated the Instruction effect on POD utilization, $B = .058$, $t(487.1) = 3.519$, $p < .001$, $d = .32$; women showed a stronger Instruction effect, $p < .001$, $d = -.64$, than men did, *ns*, $d = -.14$. Those endorsing more rape-supportive attitudes showed greater utilization of clothing style, $B = .002$, $t(487.2) = 2.793$, $p < .01$, $d = .25$ (see Fig. 4). In sum, Instruction reduced POD reliance among women, women showed greater POD reliance than men did, and rape-supportive attitudes positively predicted POD reliance.

Attractiveness (ATT) utilization effects

Participants relied strongly on women's ATT when judging their momentary sexual interest, $B = .324$, $t(181.1) = 6.329$, $p < .001$, $d = .94$. Instruction altered reliance on ATT, $B = -.077$, $t(487.8) = -3.444$, $p < .001$, $d = -.31$; those receiving extra instructions relied less on ATT, $p < .001$, $d = .57$, than those who received standard instructions, $p < .001$, $d = .91$ (see Fig. 3). Gender influenced reliance on ATT when judging sexual interest, $B = .158$, $t(487.8) = 7.078$, $p < .001$, $d = .64$, with men focusing more on ATT, $p < .001$, $d = 1.05$, than women, $p < .01$, $d = .40$ (see Fig. 4). Attitudes positively predicted reliance on ATT, $B = .003$, $t(488.0) = 4.422$, $p <$

$.001$, $d = .40$ (see Fig. 4). In sum, Instruction reduced ATT reliance, men showed greater ATT reliance than women, and rape-supportive attitudes positively predicted ATT reliance.

Self-Reported Cue Utilization

When judging how sexually interested the women felt, participants reported being influenced much more by SI ($M = 8.09$, $SD = 2.16$) than by POD ($M = 5.39$, $SD = 2.84$) and ATT ($M = 5.08$, $SD = 2.92$). Self-reported and observed cue utilization correlated moderately for SI, $r(494) = .380$, $p < .001$; POD, $r(494) = .321$, $p < .001$; and ATT, $r(494) = .396$, $p < .001$. In sum, participants showed a moderate degree of insight into their cue-utilization patterns. Figure C (in the Supplemental Material) displays scatterplots of observed versus self-reported cue utilization.

Discussion

College students' perceptions of women's momentary level of sexual interest are compromised both nomothetically and idiographically. On average, college students relied markedly not only on women's nonverbal affect but also on the provocativeness of women's clothing and attractiveness. This replicates prior work with college males (Treat et al., 2016) and extends it to college females for the first time. Our reliance on well-characterized still photos potentially constrains the generalizability of these findings, but their strength and replicability highlight the information value present in "thin slices" of sexual perception as it unfolds in the "real world" (Ambady & Rosenthal, 1992) and strengthen our confidence in the inferences that we draw.

Men and women showed very similar average sexual-interest ratings, which is inconsistent with the hypothesis that
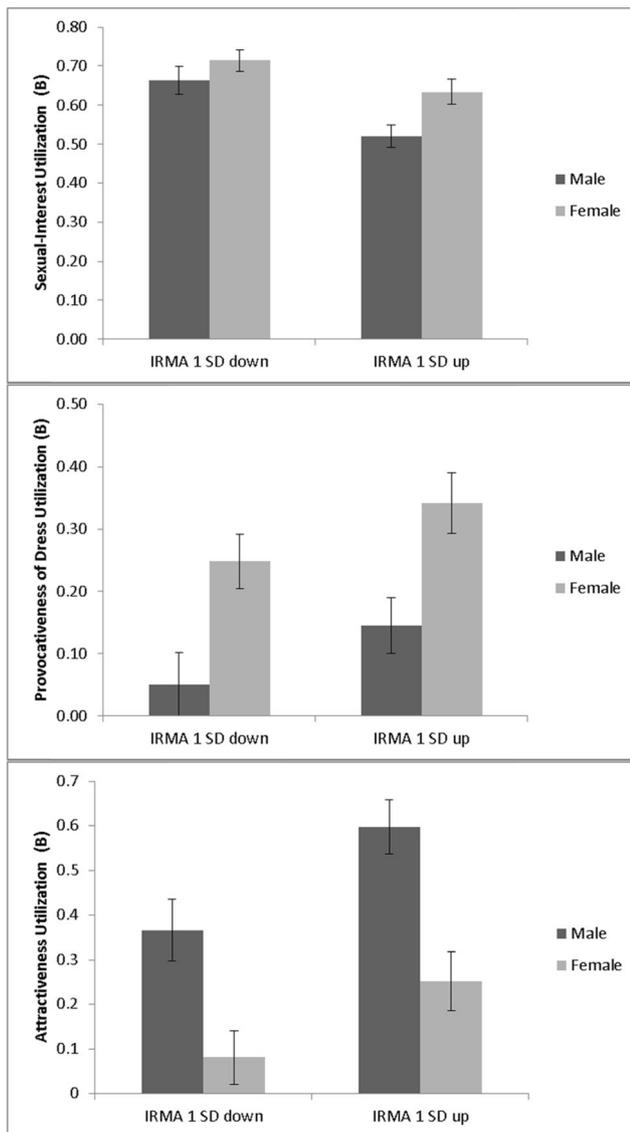
Fig. 4 Effects of Gender and Rape-Supportive Attitudes (IRMA) on cue-utilization coefficients in the Sexual - Interest Judgment Task. Bars indicate standard errors of parameter estimates

men overperceive women's sexual interest (Perilloux et al., 2012; Farris et al 2008b), but consistent with other work demonstrating that men and women showed similar average ratings based on visual (Farris et al., 2008a) or verbal cues (Perilloux & Kurzban, 2015) of other women's sexual intent. Women relied more than men on women's nonverbal affective cues, however, consistent with prior work documenting that men showed lower sensitivity than women to women's sexual-interest cues (Farris et al., 2008a). In contrast, men relied more than women on women's attractiveness. This gender difference may reflect the projection of one's own affect onto the affect of others in a way that is consistent with interpersonal goals (e.g., Maner, Miller, Moss, Leo, & Plant, 2012), given the average man's greater presumed sexual interest in attractive women than the average woman. In contrast,

women relied to a greater degree than men on the provocativeness of women's clothing. Future research might fruitfully explore gender differences in beliefs about the meaning of provocative clothing for women's level of sexual interest, as such beliefs may be stronger among women than men. Overall, the pattern of results shows the value of using methods that distinguish average ratings of sexual interest and the perceptual processes (i.e., cue utilization) that give rise to those ratings. Men and women made similar average ratings when judging women's momentary sexual interest, but differed in the perceptual processes that got them there: in their use of affective cues of interest, as well as the degree to which they were influenced by distracting cues of attractiveness and provocativeness of clothing.

Endorsement of rape-supportive attitudes negatively predicted reliance on affective cues and positively predicted reliance on clothing style and attractiveness, consistent with prior work with a college-male sample (Treat et al., 2016). Notably, however, gender did not moderate the attitudinal links with cue utilization in this study. Thus, this study documents for the first time that rape-supportive attitudes predict less reliance on affective cues and more reliance on nonaffective cues for both men and women. Women's attitudes also positively predicted their average judgment of women's sexual interest, whereas men's attitudes were unrelated to average judgments. The latter finding is consistent with the generally weaker risk-linked associations with affective threshold than sensitivity-like parameters among men: we have observed negative associations between rape-supportive attitudes and affective reliance or sensitivity in each relevant study that we have conducted (Farris, Viken, Treat, & McFall, 2006; Farris, Viken, & Treat, 2010; Treat et al., 2015; Treat et al., 2016), but attitudes and average judgments have correlated more weakly, if at all. The finding that rape-supportive attitudes among women predict poorer affective processing in this study is consistent with other work showing that such attitudes predicted women's reduced reliance on risk information when making explicit judgments of women's sexual risk in heterosocial situations (Yeater, Treat, Viken, & McFall, 2010). Thus, rape-supportive attitudes appear to impede both women and men's use of cues that guide effective decision making in heterosocial interactions. Potential social, sexual, and clinical implications of such attitudes among men already are well-articulated (e.g., Abbey et al., 2011; Farris et al., 2008b), but future research might profitably examine the implications of women's endorsement of rape-supportive attitudes for their interactions with both men and women.

Explicit instruction regarding the greater validity of women's affective than nonaffective cues for estimation of momentary sexual interest indeed moderately enhanced focus on nonverbal affective cues and decreased focus on clothing style and attractiveness. The instruction effect on clothing-style utilization was stronger for women than for men,

consistent with women's greater focus than men's on clothing style. Rape-supportive attitudes did not moderate any of the instruction effects, however, indicating that explicit instruction benefits even higher-risk participants. This is a crucial consideration, because the value of a similar manipulation in a future prevention program depends on the technique being effective for high-risk participants. These findings highlight the generalizability of the well-established effects of explicit instruction on category learning to sexual perception (e.g., Karelaia & Hogarth, 2008) and may ultimately foster the development of procedures that could be included in augmented prevention programs.

Notably, the effects of explicit instruction on men's cue utilization in this study were weaker than the effects of trial-by-trial feedback in a prior study (Treat et al., 2016): Instruction produced small-to-moderate magnitude changes in utilization of affect, clothing style, and attractiveness among men (ds = .37, -.37, -.33), whereas feedback produced moderate-to-large magnitude changes in utilization of two of these three cues among men (ds = 1.72, -.40, -.65).[1] Self-reported cue utilization in this study also correlated only moderately with observed cue utilization, and receipt of instruction was unrelated to self-reported cue utilization, suggesting relatively limited insight. Thus, both procedural and declarative processes appear to play a role in sexual perception and its potential modification in the laboratory, but modification efforts that rely solely on methods designed to enhance declarative learning may be less powerful. Future work should examine whether the verbal and conceptual scaffolding provided by explicit instruction potentiates the effect of feedback.

Conclusions

The inclusion of female participants in this study broadens our understanding of the role of affective and nonaffective cue utilization in perception of women's momentary sexual interest. First, the provocativeness of women's clothing and women's normative attractiveness influence both male and female college students' judgments of women's momentary sexual interest, even though these relatively stable and broadly visible cues are less likely to be diagnostic of a woman's fluctuating responsiveness to a particular man at a particular point in time. Second, male and female college students differ in their patterns of cue utilization, even though their average ratings do not differ, with women relying on affect and clothing style more than men and on attractiveness less than men. Third, both male and female students who endorse rape-supportive attitudes rely on nonaffective cues to a greater degree than their peers, and they focus less than their peers on

the presumably more valid affective indicators of a woman's current responsiveness.

This work also underscores the potential promise of cognitive-training approaches that leverage explicit instruction and trial-by-trial feedback to modify these maladaptive cue-utilization patterns in the laboratory, particularly among men for whom sexual misperception places them at greater risk of exhibiting sexual aggression. Of course these experimental probes into the operation of sexual-perception processes are not in and of themselves interventions (see Treat et al., 2016, for further discussion). The practical utility of these efforts will hinge on the future development and evaluation of the impact of more comprehensive training approaches across multiple sessions on sexual behavior both inside and outside the laboratory, as well as the robustness of what is learned to alcohol consumption, given its central role in sexual aggression on college campuses (Abbey et al., 2011). If prospective studies demonstrate the generalizability of these effects, both to theoretically relevant transfer tasks inside the laboratory, and to frequency of sexual misperception and sexually coercive behavior outside the laboratory, however, this work may inform the development of improved prevention efforts that incorporate more active-learning components in addition to traditional methods of challenging cognitions or changing attitudes (DeGue et al., 2014). In the meantime, this work significantly advances our understanding of the operation and malleability of sexual-perception processes and their links to rape-supportive attitudes among both male and female college students.

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[1] Comparative effect sizes for the data from Treat et al. (2016) are based on a reanalysis using a model parallel to the one in this study.

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