

# The Influence of the Opposite Sex on Hypothetical Aggressive Inclinations

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## Abstract

Previous research has supported the hypothesis that the presence of a potential mate influences social behavior; however, there is a paucity of work that has extended this to the study of aggression. Thus, the current research had participants ( $N = 1,035$ ) view a picture of an attractive or unattractive member of the opposite sex. Participants then imagined themselves in front of the imagined person in a social setting in which they were provoked or not before completing an assessment of aggressive intentions. Results from the 2 (sex of participant)  $\times$  2 (attractiveness of the picture)  $\times$  2 (provocation or not) analysis of variance showed that males viewing an image of an attractive female had higher aggressive intentions when provoked than males viewing a nonattractive female; however, these effects were not found for female participants.

## Keywords

aggression, opposite sex, aggressive inclinations, sex differences

Many animals alter their behavior in an attempt to attract members of the opposite sex. For example, a male peacock displays his extravagant plumage, while stags show off their impressively sized antlers to attract potential mates

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(McKeown, 2013). Human beings are no exception to altering their behaviors to attract potential mates. For instance, risk-taking behaviors increase for males when in the presence of an attractive female—a finding mediated by an increase in testosterone (Ronay & von Hippel, 2010). We are unaware of any published work testing whether the presence of an attractive or unattractive member of the opposite sex juxtaposed with a provocation is related to aggression-related outcomes. The current study randomly assigned male and female participants to read a hypothetical scenario in which participants were asked to imagine themselves in a provoking (or nonprovoking) situation in the presence (or absence) of an attractive member of the opposite sex before completing measures of hypothetical aggressive inclinations.

## **Aggression in the Presence of Potential Mates**

There are myriad social situations in which one socially interacts with a potential mate who is perceived as attractive. How one behaves to attract potential mates likely influences the mate's decision to begin or continue the social relationship. Aggression (behavior intended to harm another who is motivated to avoid that harm; Anderson & Bushman, 2002) enacted by a male while in the presence of a potential mate after a provocation may serve an evolutionary function. A large body of research has shown that provocations lead to aggression (see Anderson & Bushman, 2002, for review), but when in public aggressive retaliations may be heightened. Indeed, a study by Vasquez et al. (2013) showed that ruminating after a public (vs. private) provocation was related to higher levels of aggression. However, less is known about how experiencing a public provocation (or not) in the presence of an attractive (or unattractive) potential mate influences aggression, and whether participant sex moderates this effect. The purpose of the current study is to further our understanding of these effects. Overall, we predict that provoked males will be more likely to aggress in the presence of an attractive potential mate.

Theoretically, there are several reasons why the attractiveness of a potential mate may influence aggression-related outcomes after a provocation for males:

### ***Aggression Augmentation and the Challenge Hypothesis***

Males may use aggression after a perceived provocation as a way to portray strength and/or dominance to a member of the opposite sex. Research suggests that women have a preference for men who are tall, strong, and display power (Buss, 2003). Therefore, it may behoove a male to act aggressively against another male in the presence of an attractive female mate in order to display

the strength and power that women prefer. This position is consistent with Archer's (2006) Challenge Hypothesis, which posits that testosterone will likely increase when a male is in the presence of an attractive female (Roney, Maher, & Maestripieri, 2003) that will likely predict aggressive behavior during a competitive reaction time task (Berman, Gladue, & Taylor, 1993). Ainsworth and Maner (2012) randomly assigned participants to write about sexual desires (mating motive prime) or happiness (control prime) before engaging in a competitive reaction time task with a same or opposite-sex partner, and results showed that unprovoked aggression was highest for males primed with the mating motive when competing against a same-sex partner. This finding supports the Challenge Hypothesis and shows that male aggression may serve some evolutionary purpose. We built upon the Ainsworth and Maner (2012) studies myriad ways. First, they only sampled males (Studies 1 and 2<sup>1</sup>), and a true evolutionary test consistent with the Challenge Hypothesis will show that this effect is moderated by participant sex. Second, the mating prime was specific to writing about sexual desires. We attempted to use a more valid method by having male and female participants imagine themselves in a social situation (a bar) and present them with a picture of a member of the opposite sex before provocation (or not), which mirrors real-world situations.

### *Inhibiting Aggression and the Courtship Hypothesis*

Males may want to inhibit their aggression in the presence of an attractive female mate after a perceived provocation. Indeed, Fiske, Cuddy, and Glick (2006) showed that traits related to aggression ("irritable," "dominating," "moody") are closely related to traits that are likely unfavorable to potential mates, such as "cold," "unsociable," "pessimistic," and "humorless." Therefore, it may be pertinent for a male to abstain from aggressing after a provocation in order to not appear unfavorable to a potential mate. Griskevicius et al. (2009; Study 1) randomly assigned males and females to read a hypothetical scenario that primed competition motives, courtship motives, or control before reading a provoking story and completing a measure of hypothetical direct aggression, and results showed that, for males, direct aggression was lowest after reading the courtship prime. This finding suggests that when faced with a provocation, but primed with romantic thoughts, hypothetical aggression is low—a finding not shown for females (Griskevicius et al., 2009). Furthermore, in a follow-up study, Griskevicius et al. (2009; Study 2) showed that male's hypothetical direct aggression was significantly lower if a female was watching the act relative to if a male was watching the aggressive act. Due to its theoretical importance, we will refer to these findings as the "Courtship Hypothesis."

Although the Griskevicius et al. (2009) study was imperative to our theoretical understanding of how the presence of a potential mate can influence aggressive responding, there are several theoretical gaps that still necessitate experimental attention. Akin to the procedures used in Griskevicius et al. (2009), we also used a hypothetical story that participants read regarding a social situation with a potential mate. However, a key limitation is that Griskevicius et al. (2009) did not experimentally manipulate whether the social situation was provoking or not. We want to make explicit that the lack of a provocation manipulation does not discredit the Griskevicius et al. (2009) work; however, research in the aggression domain has shown that a perceived provocation is one of the strongest situational predictors of aggression (cf. Anderson & Bushman, 1997), which is moderated by sex (Bettencourt & Miller, 1996)—males are more sensitive to provocations, especially minor provocations, than females (Bettencourt & Kernahan, 1997). The current study will address this limitation by experimentally manipulating provocation by having participants read a vignette that is either provoking or not provoking. Moreover, by including a nonprovocation condition, we are better able to compare the Courtship Hypothesis to the Challenge Hypothesis—a theoretical comparison that Griskevicius et al. (2009) could not make. Specifically, aggressive responding in the face of a nonprovoking situation allows for a baseline level of comparison for participant's aggression in the provoking situation. Statistically, this comparison will be imperative to include in an interaction term that tests the moderated effects of sex, attractiveness of a potential mate, and provocation level of the situation. If the Courtship Hypothesis (Griskevicius et al., 2009) is shown in our study, results would show that scores on aggression-related variables will be lower for males who are in the presence of an attractive other in the provocation condition, because these males will want to portray themselves as warm, friendly, and nonaggressive. Evidence for the Challenge Hypothesis will show that scores on our aggression measure will be higher under these same situations, because male participants will want to display their dominance after a provocation in the presence of an attractive other. In other words, we believe that adding a provocation manipulation is the next programmatic step in this research and simultaneously tests two related yet competing theories while adding to the Griskevicius et al. (2009) work.

## **Overview of the Current Research**

We randomly assigned male and female participants to read a hypothetical scenario involving a provocation (or not) while viewing either an attractive or unattractive photograph of a member of the opposite sex before completing

measures of hypothetical aggressive inclinations. If the Challenge Hypothesis is supported, then male participants will have higher levels of hypothetical aggressive inclinations after reading an imagined provoking situation coupled with an attractive female photograph. If the Courtship Hypothesis is supported, then male participants will be less likely to aggress after an imagined provocation while in the presence of a potential mate. We are unaware of any study pitting both hypotheses against each other.<sup>2</sup>

## Method

### *Participants*

A sample of 1,103 participants (598 male) from Mechanical Turk participated in the current study for US\$0.75. The age range of the sample was 18 to 75 years ( $M = 32.83$ ,  $SD = 10.95$ ).

### *Materials*

*Story scenarios.* To manipulate the provocation condition, two paragraphs of hypothetical situations were used. All participants read the statement “Imagine you are at a crowded bar talking to the person in the picture. The conversation is going well and you are both clearly enjoying each other’s company. The person is below [representing the picture].” Participants in the provocation condition read, “Suddenly another male/female who you do not know but is similar in age, ethnicity, and build to you bumps into you, carelessly spills their drink on you, and does not apologize. You are sure they did it on purpose” (adapted from Griskevicius et al., 2009). Participants in the nonprovocation condition read, “Suddenly another male/female who you do not know but is similar in age, ethnicity, and build to you brushes against you as they are trying to walk by, but apologizes afterwards.” The paragraphs were presented so that participants imagined interacting with a same-sex individual for all conditions (provocation and nonprovocation).

*Attractive and unattractive images.* Accompanying each story was an image of an attractive or unattractive member of the opposite sex. The four images used in the current study were taken from an online database ([www.facity.com](http://www.facity.com)), which contains high-quality facial photographs from faces around the world and basic demographic information. During December 2011, 468 images (245 females) were downloaded from the site. All individuals are photographed front-on, with hair pulled back, minimal makeup, and with a neutral expression in full color. The website is based in Germany, so at the

time of data collection, images from German cities were the most numerous. Images were reviewed and downloaded if they were between 18 and 30 years of age and were of White ethnicity. This set of images has been used successfully in other studies (Kramer & Jones, 2015; Kramer, Jones, & Ward, 2012).

Subsequently, a sample of 31 participants (10 males, mean age = 23.63,  $SD = 4.04$ ) from a British university rated all images for attractiveness in a random order, using a 1 (*very unattractive*) to 7 (*very attractive*) rating scale. Ratings were averaged across participants to provide a mean attractiveness rating for each face. From these ratings, we selected the highest and lowest rated female (highest  $M = 6.20$ ,  $SD = 0.8$ ; lowest  $M = 2.35$ ,  $SD = 0.76$ ) and male (highest  $M = 6.40$ ,  $SD = 0.99$ ; lowest  $M = 1.55$ ,  $SD = 0.47$ ) faces with the lowest standard deviations (i.e., highest agreement on attractiveness) to serve as the accompanying images. As a final check, we took the individual ratings of the four faces and examined whether there were systematic differences in the ratings assigned by female or male participants—for example, if female participants rated the attractive male face as more attractive than male participants rated the attractive female face, then this could lead to differences in behavior when provoked. Ratings were submitted to a 2 (Attractiveness: High, Low)  $\times$  2 (Face Sex: Female, Male)  $\times$  2 (Rater Sex: Female, Male) mixed model analysis of variance (ANOVA). A three-way interaction between these variables would suggest these systematic differences. However, we found no evidence of this,  $F(1, 28) = 3.11$ ,  $p = .089$ ,  $\eta_p^2 = .10$ , indicating ratings were similar for attractive and unattractive female and male faces by participants of either sex. Images used in the next stage were sized 3  $\times$  3 inches, and displayed the individual's face from midforehead to the bottom of the chin, and extend to the edge of the faces' sides at the hairline.

**Manipulation checks.** As our first manipulation check, participants rated the attractiveness of their assigned image using a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale to a single item, "The person in the photograph is attractive." Second, after participants read their assigned story passage, they responded to the following question, "How angry do you feel?" on the same rating scale to determine the effectiveness of our provocation. Finally, we asked participants how easy it was to imagine the story scenario happening in real life on a 1 (*not at all*) to 5 (*extremely*) rating scale.

**Hostile attribution bias.** Hostile attribution bias assesses the degree to which individuals perceive a provocation (Bailey & Ostrov, 2008) and is important to measure because our manipulation and measure are hypothetical. A hostile attribution bias questionnaire (Lobbestael, Cima, & Arntz, 2013) consisted of

eight scenarios (e.g., “You are at a local dance club. While you are dancing someone bumps into you”). After each scenario, participants rated their personal likelihood of responding across four different types of behavior. Only one behavioral response to each question targeted hostility (e.g., “He did this to provoke a fight”). Hostile attribution bias was calculated by summing the responses of the hostile response across all eight scenarios, such that higher scores indicate a higher hostile attribution bias.

*State hostility.* To assess state hostility, the State Hostility Scale (Anderson, Deuser, & DeNeve, 1995) was used. This is a 35-item measure that asks participants to indicate how they would feel right now on a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale. We modified the instructions to have participants apply their anger if they were in the situation they just read about. A sample item included, “I feel furious.” Certain items were reverse scored and then summed, such that higher scores indicate more hostility ( $\alpha = .98$  for this sample).

*Hypothetical aggressive inclinations.* The Voodoo doll paradigm was used to measure hypothetical aggressive inclinations (DeWall et al., 2013). Participants were told that the doll represented the other (same-sex) individual in the scenario they read. Participants selected between 0 and 20 pins to stick into the doll. Instructions made it clear to participants that if Voodoo really works, each pin will actually harm the person the doll represents. Higher scores indicate more hypothetical aggressive inclinations.

*Demographics.* A short questionnaire to measure demographics (age, ethnicity, marital status) was also included. We also used a commonly used attention check by asking participants to indicate what sports they played in high school; however, the instructions explicitly indicated that the participant was to select “soccer” and in the “other” box to type the word “goal-keeper.” Failure to follow these directions eliminated those participants from our primary analyses. Fifty-six (5.1%) of the sample were not analyzed for failure to answer the attention check correctly. This left a sample that consisted of 1,035 participants (565 male) with an age range between 18 and 75 years ( $M = 33.05$ ,  $SD = 11.06$ ), and the majority of participants were Caucasian (73.14 %). Results from several statistical tests showed no difference between excluded versus retained participants on hypothetical aggressive inclinations,  $t(1082) = 1.53$ ,  $p = .13$ ,  $d = .09$ , anger after the provocation,  $t(1087) = .09$ ,  $p = .93$ ,  $d = .01$ , what picture was viewed,  $\chi^2 = .95$ ,  $p = .33$ ,  $r = .03$ , and what story (provocation vs. no provocation) was read,  $\chi^2 = .57$ ,  $p = .45$ ,  $r = .02$ .

## Procedure

All surveys were administered online. Following the online informed consent, participants completed questionnaires measuring hostile attribution bias and demographics. Then, participants were randomly assigned to one of four conditions: attractive image/provocation, unattractive image/provocation, attractive image/no provocation, and unattractive image/no provocation. The overall design of the study was a 2 (participant sex: male, female)  $\times$  2 (provocation: yes, no)  $\times$  2 (image: attractive, unattractive) between-subjects design. After reading the scenarios coupled with their respective picture, participants completed the three manipulation check items, the State Hostility Scale, and then the Voodoo doll task before being thanked, debriefed, and fully compensated.

## Results

### Correlations

Results showed that state anger, state hostility, and hostile attribution bias positively correlated with aggressive intentions ( $r = .40, p < .001$ ;  $r = .45, p < .001$ ;  $r = .27, p < .001$ , respectively). State anger positively correlated with hostile attribution bias and state hostility ( $r = .16, p < .001$ ;  $r = .82, p < .001$ , respectfully). Finally, state hostility and hostile attribution bias were correlated ( $r = .17, p < .001$ ; see Table 1).

### Sex Differences

Several independent samples *t* tests were conducted to investigate sex differences. Results showed that males had a significantly higher hostile attribution bias ( $M = 11.67, SD = 3.63$ ) than females ( $M = 10.48, SD = 2.85$ ),  $t(1001) = 5.68, p < .001, d = .36$ . Furthermore, males exhibited significantly more aggressive intentions ( $M = 2.86, SD = 5.51$ ) than females ( $M = 1.63, SD = 4.05$ ),  $t(1031) = 4.04, p < .001, d = .25$ , on the Voodoo task.

### Manipulation Checks

First, an independent samples *t* test assessed the effect of the provocation manipulation on anger. Participants in the provoked condition ( $M = 3.46, SD = 1.06$ ) were significantly more likely to report feeling angry than those who were in the neutral condition ( $M = 1.31, SD = .65$ ),  $t(1033) = 39.30, p < .001, d = 2.45$ . In short, our provocation manipulation was successful.



**Table 1.** Correlation Matrix.

	1	2	3	4
1. Hypothetical aggressive inclinations	—			
2. Hostile attribution bias	.27**	—		
3. State anger	.40**	.16**	—	
4. State hostility	.45**	.17**	.82**	—
<i>M</i>	2.28	11.12	2.39	89.74
<i>SD</i>	4.90	3.35	1.39	32.28

\* $p < .05$ . \*\* $p < .01$ .

A second independent samples *t* test assessed the effect of the picture stimuli on attractiveness. Participants viewing photos of an attractive person ( $M = 4.26$ ,  $SD = .73$ ) were significantly more likely to rate the stimuli as attractive than participants who viewed photos of a nonattractive person ( $M = 2.37$ ,  $SD = .90$ ),  $t(1032) = 37.09$ ,  $p < .001$ ,  $d = 2.31$ . In short, the pictures used were appropriately labeled.

The third manipulation check was to test whether the overall sample could perspective take with the story scenario by analyzing data from the question asking how easy was it for the participant to imagine the scenario happening in real life. Results from a single sample *t* test showed that participants were able to visualize this scenario ( $M = 3.93$ ,  $SD = 1.07$ ) significantly higher,  $t(1033) = 42.84$ ,  $p < .001$ ,  $d = 2.67$ , than the midpoint of the scale (2.5). Furthermore, a 2 (provocation: yes, no)  $\times$  2 (picture: attractive, nonattractive)  $\times$  2 (sex: male, female) ANOVA showed only a significant main effect of provocation,  $F(1,1026) = 80.57$ ,  $p < .001$ ,  $\eta_p^2 = .07$ , such that it was harder for provoked ( $M = 3.64$ ,  $SD = 1.12$ ) participants to imagine the scenario than nonprovoked participants ( $M = 4.22$ ,  $SD = .95$ ), which likely reflects the fact that these intense provocations are less commonplace, but still both means are substantially above the midpoint.

### State Hostility

A 2 (provocation: yes, no)  $\times$  2 (picture: attractive, nonattractive)  $\times$  2 (sex: male, female) analysis of covariance (ANCOVA), controlling for hostile attribution bias, was conducted with state hostility as the outcome. Results showed a significant main effect of provocation, such that participants who read the provoking scenario ( $M = 111.73$ ,  $SE = 1.11$ ) had higher state hostility than participants who read the nonprovoking scenario ( $M = 67.16$ ,  $SE = 1.10$ ),

$F(1, 832) = 812.85, p < .001, \eta_p^2 = .49$ . The main effects of sex,  $F(1, 832) = .02, p = .90, \eta_p^2 = .00$ , and picture,  $F(1, 832) = .44, p = .51, \eta_p^2 = .00$ , were not significant. Furthermore, all two-way interactions—Picture  $\times$  Provocation:  $F(1, 832) = .15, p = .70, \eta_p^2 = .00$ ; Picture  $\times$  Sex:  $F(1, 832) = .00, p = .95, \eta_p^2 = .00$ ; Provocation  $\times$  Sex:  $F(1, 832) = 2.03, p = .16, \eta_p^2 = .00$ —and the three-way interaction,  $F(1, 832) = .80, p = .37, \eta_p^2 = .00$ , were not significant. Therefore, state hostility was not analyzed as a mediator.

### *Hypothetical Aggressive Inclinations*

A 2 (provocation: yes, no)  $\times$  2 (picture: attractive, nonattractive)  $\times$  2 (sex: male, female) ANCOVA, controlling for hostile attribution bias, was conducted with hypothetical aggressive inclinations as the outcome. Results showed a significant main effect of sex, such that males ( $M = 2.53, SE = .20$ ) had higher hypothetical aggressive inclinations than females ( $M = 1.87, SE = .21$ ),  $F(1, 980) = 5.09, p = .024, \eta_p^2 = .01$ . There was also a main effect of provocation, such that participants who read the provoking scenario ( $M = 3.54, SE = .20$ ) had higher hypothetical aggressive inclinations than participants who read the nonprovoking scenario ( $M = .86, SE = .20$ ),  $F(1, 980) = 87.86, p < .001, \eta_p^2 = .08$ . There was no main effect for picture,  $F(1, 980) = .08, p = .78, \eta_p^2 = .00$ , and all two-way interactions were not significant (Picture  $\times$  Provocation:  $F(1, 980) = 1.54, p = .22, \eta_p^2 = .00$ ; Picture  $\times$  Sex:  $F(1, 980) = .52, p = .47, \eta_p^2 = .00$ ; Provocation  $\times$  Sex:  $F(1, 980) = .96, p = .33, \eta_p^2 = .00$ ).

However, these effects were qualified by a significant three-way interaction,  $F(1, 980) = 9.47, p = .002, \eta_p^2 = .01$  (see Table 2). To probe this interaction, two 2 (provocation)  $\times$  2 (picture) ANCOVAs were conducted, one for each sex while controlling for hostile attribution bias. For males, the two-way interaction was significant,  $F(1, 980) = 5.98, p = .01, \eta_p^2 = .02$ . Simple effects revealed that the effect of picture on hypothetical aggressive inclinations was significant for males in the provoked condition,  $F(1, 980) = 6.11, p = .01, d = .16$ , but not for males in the unprovoked condition,  $F(1, 980) = 3.69, p = .055$ . The ANCOVA with female participants yielded a nonsignificant two-way interaction,  $F(1, 980) = 1.58, p = .21, d = .08$ .

### **Discussion**

The current research investigated the interaction between a potential mate's attractiveness and provocation on aggressive inclinations, and whether participant sex was a moderator. Based on the past literature, two opposing hypotheses were pitted against each other. The first was the Challenge Hypothesis (Archer, 2006), which posits that when a male is provoked in the

**Table 2.** Mean Number of Pins for Males and Females by Provocation and Picture.

	Males		Females	
	Nonattractive	Attractive	Nonattractive	Attractive
Provoked	3.50 (5.44)	4.88 (6.56)	3.34 (5.83)	2.26 (4.34)
Unprovoked	1.93 (5.20)	0.62 (2.35)	0.46 (1.72)	0.50 (2.36)

presence of an attractive potential mate, aggression is likely to occur. Theoretically, this hypothesis argues that aggression serves as an evolutionary tool to display power and strength to females, which females are attracted to (Buss, 2003). The second hypothesis, termed as the Courtship Hypothesis (Griskevicius et al., 2009), posits that males use of aggression will be less likely when in the presence of a potential mate after a provocation, because those who aggress are likely to be perceived negatively (cf., Fiske et al., 2006) if courtship is the primary motive for the social interaction.

Results from the current study showed a significant Sex × Picture × Provocation interaction for hypothetical aggressive inclinations. Simple effect analyses showed a Picture × Provocation interaction for male participants, but not for female participants. Examination of the means showed that provoked males had higher hypothetical aggressive inclinations while in the presence of an attractive female other versus an unattractive female other. These findings align with the Challenge Hypothesis. The fact that male participants responded more aggressively after a provocation when an attractive female picture was presented suggests that aggression may be used to display their strength and dominance.

Our data support the Challenge Hypothesis, but we are not claiming that the Courtship Hypothesis is discredited. Indeed, results from our simple effects analysis showed that males who were unprovoked were marginally less likely to aggress in the presence of an attractive potential mate compared with the unattractive potential mate. Although the finding was marginal ( $p = .055$ ), these trends seem to suggest that in the absence of a provocation, males may be motivated to show that they are not aggressive, which is related to other favorable personality perceptions (Fiske et al., 2006). The male participants who are not provoked (i.e., given an apology by the other hypothetical person) in the presence of an attractive potential mate may want to be perceived as understanding, reasonable, and/or friendly, which are all favorable traits that may attract another mate, which supports the Courtship Hypothesis. Moreover, in addition to showing that direct aggression was lowest for males primed with courtship motives, Griskevicius et al. (2009) also showed that male’s direct aggression was highest when primed with competition motives.

Thus, perhaps our provocation manipulation primed competition and was more salient than the attractive picture prime, which may prime courtship. Moreover, Griskevicius et al. (2009) operationalized courtship motives as meaningful conversations and romantic dinners. Perhaps the bar scenario we used was insufficient to fully capture the courtship construct. Despite these alternative hypotheses, our findings more clearly support the Challenge Hypothesis rather than the Courtship Hypothesis.

Interestingly, the three-way interaction between participant sex, provocation, and picture was not found for state hostility. This eliminated aggressive affect as a possible mediator in the relations between our predictors and hypothetical aggressive inclinations. Perhaps other mediators, such as competition or courtship motives (Griskevicius et al., 2009), aggressive attitudes and biases (Anderson & Bushman, 2002), or ratings of preferred attractive traits (Buss, 2003), are better at explaining why our effects were observed. Indeed, the presence of an attractive potential mate may make participants want to demonstrate dominance, attract sexual partners, or display their physical stature, independent of a provocation. Unfortunately, our data do not show evidence for a Sex  $\times$  Picture interaction for aggressive inclinations to verify this claim; however, the Challenge Hypothesis posits that the presence of an attractive potential mate can heighten testosterone independent of whether the situation is provoking or not—an interesting theoretical position that our data cannot test. Overall, future research should continue to test these, and other, possible mediators that explain why provocations and the presence of an attractive other can influence aggressive responding in males.

Finally, our results showed that the Provocation  $\times$  Picture interaction was not significant for female participants. This finding is consistent with both the Challenge and Courtship Hypotheses. Indeed, both theoretical positions posit the importance of displaying (or not) physical aggression and females are less likely to use aggression as a tool to show off desirable traits, such as beauty, youth, and so forth (Buss, 2003). However, Griskevicius et al. (2009) showed that when primed with either competition or courtship motives after a provocation, females are more likely to enact indirect aggression tactics. Therefore, we do not believe that females are passive recipients of male advances, but rather they engage in different behaviors for possibly different motivated reasons than males.

### *Limitations and Future Research*

The main limitation of any study involving hypothetical assessments in which participants are asked to imagine themselves is the inability to assess aggressive behavior. We had to rely on aggressive intentions due to the online

nature of the data collection. Although we do not believe that measuring intentions rather than behavior is damning to our findings or the theoretical advances our research makes, it does limit the external validity of our findings. Researchers rely on the authenticity and accuracy of responses in these situations, but it is difficult to determine how well such results extrapolate, until a real competitor and a real member of the opposite sex are involved. Therefore, future research should attempt to use similar procedures and materials in a controlled laboratory setting that affords the ability to measure aggressive behavior to see whether our results replicate.

Second, we did not statistically control for other aggression-related personality variables beyond hostile attribution bias. Constructs such as aggressive beliefs, attitudes toward violence, cognitive scripts, and trait aggression are all factors that could moderate the relations observed in the current study. It may be advantageous to control for other variables to eliminate possible alternative explanations of our effects. Future research should control for other aggression-related variables to determine whether our findings are robust to variation in these constructs.

Finally, the study was limited by not asking participants about their sexual orientation, which may have influenced the attractiveness ratings of the pictures. In our study, all participants viewed an opposite-sex picture, and if a participant was homosexual, then they may not have rated the attractiveness of the pictures accurately. We chose not to assess participant's sexual orientation for ethical reasons, especially given the online nature of the data collection juxtaposed with our inability to provide specific names and/or locations of health care professionals for each participant in the debriefing. If such ethical measures can be taken, then future work should assess sexual preference and either include that in as a key predictor variable or statistically control for any variation.

We believe that the next step of this line of research is to correct for the hypothetical nature of our study by implementing an experiment in which male and female participants interact with a same-sex confederate while in the presence of an attractive or unattractive member of the opposite sex. In this study, participants would be randomly assigned to be provoked by the confederate before completing a valid laboratory measure of aggressive behavior (e.g., the Competitive Reaction Time Task; Giancola & Parrott, 2008). However, such a study necessitates male and female confederates who are deemed extremely attractive and unattractive to participants. Due to myriad individual differences on what people perceive as attractive appearances, much care would be needed to ensure that the attractive confederate is perceived as a professional model while the unattractive confederate is not. Also, clothing choices, hair and make-up considerations (if applicable), body-type, and accessories (e.g., jewelry) would have to be carefully considered.

## **Final Remarks**

Overall, the results of this study indicate that the presence of a potential mate is indeed an important variable to consider in aggression research. Our findings support aggression and evolutionary theories while highlighting the previously overlooked influences of the sex, attraction, and provocation interaction to predict aggression. Like radiant plumage and magnificent antlers, it appears as though human males may be using aggression against another male competitor as an opportunity to display strength and power to (hopefully) impress a female.

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## **Notes**

1. Study 3 of Ainsworth and Maner (2012) did sample both male and female participants; however, the results are unclear regarding the role that participant sex had on aggression due to the interaction with target sex, priming condition, and sociosexuality. Results from their Study 3 showed that unprovoked aggression was highest when a male participant who was sexually restricted and primed with a mating motive was allowed to aggress against a male target; however, we are unclear whether the moderated effect of participant sex and provocation was found—an effect tested in the current study and of theoretical importance.
2. For both the Challenge and Courtship Hypotheses, multiple motivations, attitudes, thoughts, and feelings may be causal mechanisms mediating the predicted effects. For instance, Felson (1978) argued that an attempt to restore face among other impression management techniques may explain why provoked individuals aggress or not. In addition, the General Aggression Model (Anderson & Bushman, 2002) posits that multiple norms, attitudes, expectations, and thought processes govern the decision to aggress or not in the face of provocations. However, delineating the causal mediating mechanisms is beyond the scope of this article, but is an area for future work.

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