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It's the Thought That Counts:

The Role of Hostile Cognition in Shaping Aggressive Responses to Social Exclusion

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Abstract

Prior research has confirmed a casual path between social rejection and aggression, but there has been no clear explanation of why social rejection causes aggression. A series of experiments tested the hypothesis that social exclusion increases the inclination to perceive neutral information as hostile, which has implications for aggression. Compared to accepted and control participants, socially excluded participants were more likely to rate aggressive and ambiguous words as similar (Experiment 1a), to complete word fragments with aggressive words (Experiment 1b), and to rate the ambiguous actions of another person as hostile (Experiments 2-4). This hostile cognitive bias among excluded people was related to their aggressive treatment of others who were not involved in the exclusion experience (Experiments 2 and 3), and others with whom participants had no previous contact (Experiment 4). These findings provide a first step in resolving the mystery of why social exclusion produces aggression.

Keywords

social rejection; social exclusion; aggression; hostile cognition; attribution

If the ideal of human social life consists of living together in peace and harmony, then two of its biggest foes are social exclusion (which thwarts togetherness) and aggression (which prevents peace and harmony). These two problems are sometimes linked. Aggressive people are often excluded; aggressive children are ostracized, and violent adults are imprisoned (Juvonen & Gross, 2005; Gottfredson & Hirschi, 1990). Social exclusion can also lead to aggression. Even seemingly minor or vague manipulations of social exclusion produce significant and sometimes substantial increases in aggressive behavior, even toward people other than the rejectors (Buckley, Winkel, & Leary, 2004; Kirkpatrick, Waugh, Valencia, & Webster, 2002; Twenge, Baumeister, Tice, & Stucke, 2001; Twenge & Campbell, 2003; Warburton, Williams, & Cairns, 2006; see Leary, Twenge, & Quinlivan, 2006, for a review). The link between social exclusion and violence has been dramatized in violent incidents such as school shootings; nearly all of the perpetrators had previously suffered both acute and

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chronic social rejection by peers or relationship partners (Leary, Kowalski, Smith, & Phillips, 2003).

It is therefore not surprising that groups or individuals often reject violent, aggressive people, because they make peaceful and harmonious coexistence difficult if not impossible. On the other hand, the fact that exclusion leads to aggression is puzzling. Social acceptance is central to human survival and happiness, as indicated by the pervasive and powerful need to belong (Baumeister & Leary, 1995). Aggression after rejection would seem to be counterproductive. In plain terms, if a person is rejected by one group, then aggressing toward others would seem a foolish, self-defeating strategy if one desires to gain acceptance. Why would people do this?

The present investigation tested the hypothesis that social rejection or exclusion activates a hostile cognitive mindset that promotes aggression. Specifically, we predicted that hostile cognition constitutes the vital link between social exclusion and aggressive treatment of others. That link is difficult to explain in motivational or emotional terms, but cognition offers a viable and testable explanation. We turn now to our hypotheses.

The Paradox of Rejection and Aggression

Basic principles of motivation suggest that when organisms become deprived of something they want or need, they should seek it more earnestly (Geen, 1995; Shah & Gardner, 2007). In that context, aggression is a paradoxical response to social exclusion. Human health and happiness, and even basic biological goals of survival and reproduction, are difficult to achieve alone, and so human beings are strongly motivated to form and maintain social bonds (Baumeister & Leary, 1995). Exclusion thwarts the need to belong, so rejected or excluded people ought to redouble their efforts to gain acceptance. Yet research has repeatedly shown that rejected people are sometimes aggressive toward partners other than the ones who rejected them, sometimes even innocent, neutral persons who have not provoked or offended them in any way (Buckley et al., 2004; Kirkpatrick et al., 2002; Twenge et al., 2001; Warburton et al., 2006).

One plausible—but now discredited—solution to this puzzle involved emotion. On an a priori basis, it seemed likely that social exclusion would lead to emotional distress (e.g., Baumeister & Tice, 1990) and that this distress would promote irrational, shortsighted, possibly even self-defeating behaviors (e.g., Keinan, 1987; Grilo, Shiffman, & Wing, 1989). In fact, multiple investigations sought to show that emotional distress (measured using self-report measures) would be the immediate consequence of social exclusion and might contribute to pathological behavioral responses. Yet these investigations repeatedly failed to show that emotional responses mediate the link between rejection and aggression. In several studies, emotional distress was not found to be an immediate response to experimentally administered rejection experiences (Baumeister, Twenge, & Nuss, 2002; Gardner, Pickett, & Brewer, 2000; Twenge et al., 2001; Twenge & Campbell, 2003; Twenge, Catanese, & Baumeister, 2002; Zadro, Williams, & Richardson, 2004). If anything, recent work has suggested that rejection leads to a lack of both pain and emotion (DeWall & Baumeister, 2006; MacDonald & Leary, 2005). A meta-analysis by Blackhart, Knowles, & Bierda (2007) concluded that the average effect of rejection on emotional distress was small (average effect size = .26), which could not easily explain the much larger increases in aggression that have been found. Moreover, and crucially, even studies that have found emotional changes in response to exclusion manipulations have not found that these emotions mediated the aggressive responses (e.g., Buckley et al., 2004; Twenge et al., 2001).

Another possibility is that social exclusion causes nonconscious emotional distress, which may in turn increase aggression. Exclusion thwarts a fundamental motivation for positive and lasting relationships, and if distress is not found using measures of conscious emotion, it is possible

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that such emotional reactions will be found using nonconscious emotion measures. Nonconscious responses often precede conscious ones (Wegner & Bargh, 1998) and hence emotional responses from social exclusion may begin as nonconscious distress and then later show up in conscious emotion. Nonconscious measures of emotion also are not subject to the possible explanation that is frequently leveled at conscious measures of emotion, namely that participants report emotional states that will make them look good (or not make them look bad) to people in their environment.

Recent evidence contradicts the alternative explanation that social exclusion produces nonconscious emotional distress, however. A series of studies by Twenge, Baumeister, DeWall, Marquez, Reid, and Koole (2007) used multiple measures of nonconscious affect (recalling memories from childhood, giving weight to emotions in judgments of word similarity, measures of emotional accessibility) in response to rejection manipulations (including the same manipulations used in the present studies). There was no sign of any effect on negative affect. Meanwhile, there were significant increases in nonconscious positive affect on all measures, which indicates that the procedures were effective at eliciting nonconscious affect. Thus, the nonconscious affective response to rejection appears to be a kind of coping by promoting positive affect. Parallel findings have begun to be reported with other threats, including mortality salience (DeWall & Baumeister, 2007) and threats of gender identity and implicit racism (Rudman, Dohn, & Fairchild, 2007). Although these investigations did not include measures of aggression, they do provide consistent evidence that social exclusion does not increase nonconscious negative affect.

Thus, the causal link from exclusion to aggression cannot easily be explained by either motivation or (conscious and nonconscious) emotion. We therefore turned to cognition for an explanation.

Hostile Cognitive Bias

Although the history of aggression theorizing has a long tradition of emphasizing motivation (as in aggressive instincts) and emotion (as in frustration), recent decades have seen an awakening of interest in the contribution of cognitive processes to aggression. The General Aggression Model proposed by Anderson and Bushman (2002) holds that situational influences on aggression often operate by activating cognitive structures, and people who are predisposed (by state or trait) to perceive aggression may be especially prone to respond with aggression even to neutral or ambiguous events. The hostile cognitive bias takes several forms, including the tendency to interpret ambiguous acts by others as reflecting aggression and hostility toward oneself (Tremblay & Belchevski, 2004), to perceive aggression as common in interactions among others, and to expect that many social interactions will be characterized by hostility and aggression (Bushman & Anderson, 2002; Dodge, 1980; Dodge & Coie, 1987; Dodge & Frame, 1982).

A recent meta-analysis concluded that there is a strong correlation between hostile attribution and aggressive behavior, such that people who perceive more hostility are more aggressive than others (Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002). Anderson, Benjamin and Bartholow (1998), for example, showed that the mere presence of a gun increased the accessibility of hostile cognitions in memory. Later work confirmed these findings and further showed that gun primes increased aggressive responding (Bartholow, Anderson, Carnagey, & Benjamin, 2005). The effect of hostile cognition on aggression was conditional, however, on existing knowledge structures. Specifically, participants who were hunters associated hunting rifles with positive outcomes (presumably because this type of gun was associated in memory with a positive evaluation of hunting) and hence were less likely than non-hunters to associate hunting rifles with aggressive concepts. Hunters were also less

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aggressive than non-hunters, presumably because seeing rifles did not activate as much hostile cognition. These studies suggest that activating hostile concepts in memory increases aggressive responding. Likewise, expecting an interaction partner to be aggressive or competitive can cause people to behave more aggressively themselves, thereby fueling an escalating cycle of hostile conflict (Snyder & Swann, 1978). In short, hostile cognitive biases could well contribute to elevated rates of aggression. The goal of the present investigation was to show that social exclusion would promote such cognitive biases.

Why might social exclusion foster a hostile cognitive bias? When offers or overtures of affiliation are rejected, it may be reasonable to infer that the other person is antagonistic. Indeed, a plausible evolutionary basis could be cited, insofar as humans have depended on group cooperation for their very survival, and being excluded from a group could entail death. Many early civilizations, such as the Greeks, treated exile and death as equivalent punishments. To be sure, rejection today rarely or never has such strong implications, but if evolution has instilled a natural tendency to regard social exclusion as a profound threat to one's welfare, then rejected persons may well become predisposed to see others as hostile.

Some previous empirical findings lend further plausibility to the hypothesis that social exclusion would activate knowledge structures pertaining to hostility. Correlational evidence has shown that loneliness is associated with a hostile perception bias. Jones, Freemon, and Goswick (1981), for example, found moderately strong relationships between loneliness and perceiving the world and others as hostile. Loneliness is also associated with the tendency to perceive negative intentions in the actions of roommates, family members, professors, and medical care professionals (Hanley-Dunn, Maxwell, & Santos, 1985; Wittenberg & Reis, 1982). Although the correlational design of these studies does not allow causal inference, these findings do at least make it plausible that rejection could promote hostile cognition.

Experimental work has provided indirect evidence that social exclusion increases hostile cognition. Williams, Case, and Govan (2003), for example, showed that ostracized people responded with higher levels of implicit racial prejudice compared to people who had not been ostracized. In that sense, exclusion in the form of ostracism fostered more negative cognitive attitudes toward others. Furthermore, studies with the prisoner's dilemma game, in which people choose between competitive and cooperative moves, have found that participants rejected by one person will adopt a more competitive and defensive/exploitative approach in dealing with others (Twenge, Baumeister, DeWall, Ciarocco, & Bartels, 2007). These findings all suggest that exclusion promotes generalized cognitive tendencies to perceive a broad range of interactions and interaction partners as antagonistic. What these previous studies have not investigated, however, is whether a hostile cognitive bias following social exclusion promotes aggressive treatment of others. The current studies did just that.

Present Research

The present studies were designed to test the hypotheses that rejection or social exclusion instills a broad inclination to perceive hostility in the social environment, and that that tendency in turn increases aggressive behavior. The studies reported here sought to show an increase in hostility-related cognitive processes following a manipulation of social exclusion. Experiments 2-4 also measured aggression, to test whether the predicted hostile cognitive bias would promote aggressive behavior.

To increase confidence in the conclusions, we relied on multi-method convergence. Social exclusion was manipulated in three different ways (by having a confederate refuse to interact with the participant, and by two different types of bogus feedback manipulations). Activation of hostile knowledge structures was measured in three different ways (rated similarity between aggressive and ambiguous words, completion of word fragments with aggressive words, and

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attributions of hostility based on an ambiguous vignette). Aggression was measured in two different ways (blasting a game opponent with aversive loud noise, and giving a damagingly negative evaluation to an ostensible job candidate).

Several additional procedures were included to address potential alternative explanations. We included measures of mood and emotion to ascertain whether they might contribute to the aggressive behaviors, either instead of or alongside the predicted cognitive processes. We included manipulations of projected future career failure or success alongside the manipulations of expected future aloneness versus belongingness, to ascertain whether the effects were specific to exclusion or might generalize to other forms of bad news. We sought to contrast acceptance, rejection, and neutral controls, to determine that the crucial impact came from rejection rather than acceptance.

Thus, the current work sought to resolve the paradox of why socially excluded people behave aggressively. The first goal was to test the hypothesis that social exclusion causes an increase in hostility-related cognitive processes. The second goal was to show that the hostile cognitive bias that follows social exclusion has implications for aggression.

Experiments 1a and 1b

Experiments 1a and 1b tested the hypothesis that social rejection creates a hostile cognitive bias. Both experiments used a manipulation of social rejection in which participants felt personally or impersonally excluded. For this, we adapted a procedure developed by Vorauer, Cameron, Holmes, and Pearce (2003). Participants expected to interact with a same-sex partner, and were instructed that they and their partner would first send video messages back and forth. By random assignment, half of the participants were told that their partner was unwilling to meet with him or her (rejection). The rest of the participants were told that they would be unable to meet with their partner because the partner had to leave the experiment early (control). Thus, half of the participants received feedback that they had been rejected by another person, whereas the other half of the participants received relatively neutral feedback that their partner would not be able to work with them. The control condition of this study thus also conveys a kind of exclusion, as the participant is left alone by the confederate, and in that sense this design provides a much more conservative test of the impact of rejection than would, for example, a condition involving social acceptance. In this manipulation, the difference is between being left alone as an apparently personal rejection and being left alone for reasons that seem to have nothing to do with the self.

In Experiment 1a, the measure of hostile cognitive activation consisted of rating pairs of words for similarity (Anderson, Carnagey, & Eubanks, 2003; Bushman, 1996). The word pairs contained one clearly aggressive word and one ambiguously aggressive word. The underlying assumption is that a person with a hostile mindset will see aggressive and ambiguous words as more similar than someone in a neutral or positive mindset. Experiment 1b measured activation of hostile cognition by having participants complete a series of word fragments, some of which could be completed with either aggressive or non-aggressive words. Previous research has shown that participants exposed to violent (vs. non-violent) song lyrics rated aggressive and ambiguous words as more similar and completed more word fragments with aggressive words (Anderson et al., 2003). Thus exposure to stimuli related to aggression causes people to perceive relatively ambiguous stimuli as hostile. We predicted that personal rejection would promote a hostile cognitive bias, as indicated by higher ratings of similarity between aggressive and ambiguous words and more word stems completed with aggressive words.

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Method

Participants—33 undergraduates (26 women) participated in Experiment 1a and 45 undergraduates (33 women) participated in Experiment 1b in exchange for partial course credit.

Materials and procedure—Participants were told that they would take part in a study investigating the processes involved in meeting other people. After giving informed consent, participants were told they would be interacting with a same-sex partner and would be sending videotaped messages back and forth with their partner before actually meeting. The experimenter explained that this would allow the experimenters to study how restrictions on initial meeting situations influence social communication. Participants were told that their partner had arrived early and was making the first video message with another experimenter down the hall. The experimenter then exited the participant's room, ostensibly to check on the status of the partner's videotape.

After approximately 5 minutes, the experimenter returned to the participant's room with a videotape ostensibly made by the other participant. The experimenter instructed participants to view the video message their partner had recorded. The contents of the video message were modeled after a procedure developed by Vorauer et al. (2003). The video message was approximately 3 min in length and portrayed a same-sex confederate answering a series of interview questions related to his or her personal and career goals (e.g., "What personal qualities are important to how you see yourself?"). Confederates expressed a warm and friendly demeanor throughout the video message. The experimenter left the room while the participant viewed the videotaped message.

After participants viewed the message, the experimenter returned and instructed the participant that he or she would record a video reply to the partner. Participants were asked to look directly into the camera as if they were actually talking to the other person and were told that they could respond to things that their partner said during his or her first message. The experimenter explained that since most people are not used to being videotaped, the participant would make a warm-up recording so that they could become accustomed to talking comfortably while being videotaped. During the warm-up recording, the experimenter asked the participant what their hometown was and what year they were in school. To bolster the credibility of the cover story, participants were shown their warm-up recording to make certain they believed that the experimenter was recording their responses. The experimenter then recorded the participant's responses to the same set of questions that were asked of the partner. When the participant had finished his or her responses, the experimenter said she was going to take the participant's video response to his/her partner to watch. The experimenter explained that it would take a few minutes for the participant's partner to watch the video; while they waited, participants completed a demographic questionnaire.

After approximately 5 minutes, the experimenter returned to the participant's room and delivered the rejection manipulation (based on Bushman, Bonacci, Van Dijk, & Baumeister, 2003). For participants assigned to the rejected condition, the experimenter said:

> "I am not sure what happened, but your partner doesn't want to meet you.... Um, do you guys know each other or something? (The experimenter waited for participants to say no, which they all did.) Well, hmm, I guess we won't be doing the task where you meet each other, because I cannot ask a participant to do something that s/he is not comfortable with. Um, okay, then I guess you will have to do the next tasks alone, and we'll just keep going with the experiment."

Participants in the control condition, in contrast, were told:

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> "I am not sure what happened, but your partner won't be able to meet you.... I guess s/he has something s/he forgot about and will probably have to leave early.... well, hmm, I guess you won't be meeting each other. Um, okay, then I guess you will have to do the next tasks alone, and we'll just keep going with the experiment."

Participants then completed the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988), which is a 16-item self-report measure that includes mood valence (positive-negative) and arousal (calm-aroused) subscales. Next, participants were given the measure of hostile cognition. In Experiment 1a, participants rated the similarity of pairs of ambiguous and aggressive words. Bushman (1996) identified 10 words that had an unambiguously aggressive connotation (*blood, butcher, choke, fight, gun, hatchet, hurt, kill, knife*, and *wound*) and 10 words that could be perceived as either aggressive or non-aggressive (*alley, animal, bottle, drugs, movie, night, police, red, rock*, and *stick*). Participants were presented with all possible pairs of these 20 words and were instructed to rate how much each pair was "similar, associated, or related." All ratings were made using a 1(*not at all similar, associated, or related*) to 7 (*extremely similar, associated, or related*) scale. We computed the average similarity scores for the ambiguous-aggressive pairs. Scores ranged from 1 to 7, with higher scores indicating greater activation of hostile cognition. In Experiment 1b, participants were given a word completion task consisting of 22 word fragments. Half of the word fragments could be completed to form aggressive or non-aggressive words (e.g., "r _ pe" can become "rape" or "ripe"). The other half of the word fragments were fillers and can only be completed to form non-aggressive words (e.g., "e x _ e_ _" can become "exceed" or "extend"). Participants were instructed to fill in the missing letters to form a word. Hostile cognitive bias was measured by calculating the number of word stems participants completed to form aggressive words. When participants had completed the hostile cognition measure, participants were debriefed and then dismissed.

Results and Discussion

Hostile cognitive bias—To assess whether rejection produced a hostile cognitive bias, word similarity rating scores were compared using the average similarity rating participants made on aggressive-ambiguous word pairs (Experiment 1a) or the number of word stems participants completed to form aggressive words (Experiment 1b). Rejected participants (M=5.15, SD=1.44) made higher similarity ratings for the aggressive-ambiguous word pairs compared to control participants (M= 4.09, SD= .90), $F(1, 31)= 6.45$, $p < .02$. Compared to control participants (M= 4.32, SD= 1.29), rejected participants (M= 5.83, SD= 1.15) completed more stems with aggressive words, $F(1, 43)= 17.16$, $p < .001$. Thus, rejected participants showed a bias to perceive neutral or ambiguous stimuli as more hostile than did control participants.

Mood and emotion—Rejected participants did not differ from control participants in their reported mood valence or mood arousal, all Fs < 1, *ns*. Thus, the observed hostile cognitive bias among rejected participants was not due to differences in emotion.

The findings of Experiment 1a and 1b provided preliminary evidence that rejection leads to a hostile cognitive bias in perception. Control participants in this study experienced random exclusion in that they did not complete the anticipated interaction with their partner, yet they showed less activation of hostile cognition than did rejected participants. The independent variable was therefore not rejection per se, but rather personal versus random exclusion. Participants in the rejection condition completed the hostile cognitive measure alone ostensibly because of something negative about himself or herself, whereas participants in the control condition completed the hostile cognitive measures alone because of factors unrelated to him or her. Thus, the results of Experiments 1a and 1b suggest that people who are rejected ostensibly due to some fault of their own show increased activation of hostile cognitions.

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Experiment 2

The results of Experiments 1a and 1b demonstrated that social exclusion produced a hostile cognitive bias. Experiment 2 was designed to test whether the increased hostile cognition following rejection led to aggression.

The first procedural change of Experiment 2 was in the manipulation of social exclusion. Participants in Experiment 2 completed a personality test and were given bogus feedback regarding the implications of their personality type for the future belongingness status. In the crucial condition (Future Alone), participants were told that they possessed a personality type in which it was likely that they would end up alone in life. Two control groups were also included. In one (Future Belonging), participants were told that they had a personality type that was associated with having many lasting and meaningful relationships in life. Participants in the other group (No Feedback Control) were not given any feedback about their personality. We thought that this manipulation of social exclusion would provide an especially conservative test of our hypothesis, as participants in the Future Alone condition did not actually experience rejection by another person; they merely received ostensibly diagnostic feedback that they would likely end up alone in the future.

The second change was in the measure of hostile cognitive bias. The major theoretical claim of the current investigation is that rejected people behave aggressively because they perceive neutral or ambiguous information as relatively hostile. The previous experiments did not measure how participants perceive information about other people in their immediate environment, however. In Experiment 2, participants rated the degree to which they perceived the ambiguous actions of a person in their immediate environment as hostile. Participants read an essay that was ostensibly written by another participant in the laboratory, in which the author described behaviors that could be perceived as assertive or hostile in nature. Participants then rated the author on traits related to hostility.

To test whether increased hostile cognition promoted aggression following rejection, participants were given the opportunity to aggress toward a person not involved in the rejection experience. Participants were told that the author of the essay they had just read was applying for a competitive research assistantship and that they would be able to evaluate whether the author of the essay would be a viable candidate for the job. Participants were therefore given a chance to thwart another person's opportunity for acquiring a desirable job, which constituted the measure of aggression. The first prediction was that social exclusion would increase hostile cognition and aggression. The second prediction was that increased hostile cognition would promote aggression.

Method

Participants—Thirty undergraduates (22 women) participated in exchange for partial course credit.

Materials and procedure—Participants arrived at the laboratory individually for an experiment ostensibly concerned with the relationship between personality and performance. After giving informed consent, participants completed a brief demographic questionnaire and the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975). All participants then received accurate feedback regarding their extraversion score. Following a procedure developed by Twenge et al. (2001), participants were randomly assigned to one of three social feedback conditions: Future Alone, Future Belonging, and Control. Future Alone participants were told that they could anticipate a future devoid of meaningful relationships, whereas Future Belonging participants were informed that they could anticipate positive and lasting

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relationships. Control participants did not receive any additional personality feedback other than their extraversion score.

Participants then completed the BMIS mood measure. The experimenter then returned and said that there was another experiment being conducted in the same laboratory in which one participant writes an essay and another participant reads and responds to the essay. The experimenter explained that one of the other participants did not show up for the experiment and asked the participant to read and respond to the essay. Participants were given a large manila folder labeled "Partner Study" that contained an essay and essay rating sheet. The contents of the essay were adapted from the Donald essay used in Srull and Wyer (1979), in which a person's behavior is presented in a manner in which the person can be perceived as either assertive or hostile. To facilitate sympathy and identification, the other person's ostensible gender was matched to the participant's. The essay read:

> I ran into an old friend Lisa the other day, and she came over and visited me, since by coincidence we live in the same apartment complex. Right after she arrived, a salesman knocked at the door, but I wouldn't let him come in. I also told Lisa that I refused to pay my rent until my landlord repaints my apartment. Me and Lisa talked for a while, had lunch, and then went out for a ride. We used Lisa's car, since my car broke down that morning, and I told the garage mechanic that I would have to go somewhere else if he couldn't fix my car that same day. We went to the park for about an hour and then stopped at a grocery store. I bought a mechanical toothbrush but had to get my money back right away from the clerk because it wasn't the right one. I couldn't find what I was looking for, so we left and walked a few blocks to another store. The Red Cross had set up a stand by the door and asked us to donate blood. I lied by saying that I had diabetes and therefore couldn't give blood. It's funny that I hadn't noticed it before, but when we got to the store, we found that it had gone out of business. It was getting kind of late, so Lisa took me to pick up my car (which was finally ready) and we agreed to meet again as soon as possible.

Participants then rated their impression of the other participant on a series of adjectives related to hostility (i.e., angry, hostile, dislikable, unfriendly) on a scale from 0 (*does not describe the author of the essay at all*) to 10 (*describes the author of the essay very well*). When the participant had completed his or her rating of the other participant, the essay and essay rating sheet were placed in the manila folder and given back to the experimenter. The experimenter then left, ostensibly to take the envelope back to the person in charge of the other experiment, returning with an envelope and evaluation form. The experimenter explained that the participant whose essay he or she had just read was applying for a research assistant position. Since the research assistant position was quite competitive, the other participant was trying to get as many evaluations as possible from people who had come into contact with her. Participants were then given a candidate evaluation form. Participants rated the candidate from 1 (strongly disagree) to 10 (strongly agree) on 10 separate statements (e.g., "The applicant would be a dependable employee"). The internal reliability of the 10 statements was excellent (Crobach's alpha = .96), so responses were summed to create an index of aggressive responding. Higher scores indicated a positive evaluation of the job candidate and a low expression of aggression. A low score, in contrast, indicated a negative evaluation of the job candidate and a high expression of aggression. After participants had completed the evaluation form, they placed it in an envelope with Department of Psychology letterhead, sealed it, and gave it to the experimenter. Participants were then given a thorough debriefing and were dismissed.

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Results and Discussion

Hostile cognitive bias—Participants who received a future diagnostic forecast of social exclusion perceived the ambiguous actions of another person as significantly more hostile than participants in the other conditions. A hostility index was created by summing responses to the adjectives *hostile, unfriendly, angry*, and *dislikable* (Crobach's alpha = .83) Results revealed significant variation among the three experimental groups, $F(2, 27)= 17.19$, $p < .001$. A 2 -1 -1 a-priori contrast showed that Future Alone participants rated the author of the essay as significantly more hostile than both Future Belonging and No Feedback control participants, $F(1, 27)= 34.37$, $p < .001$. Planned comparisons showed that Future Alone participants ($M= 27.00$, $SD= 4.19$) were significantly different from Future Belonging participants ($M= 13.10$, $SD= 6.74$), $F(1, 27)= 25.97$, $p < .001$. In addition, Future Alone participants ($M= 27.00$, $SD= 4.19$) were significantly different from No Feedback control participants ($M= 13.20$, $SD= 6.97$), $F(1, 27)= 25.59$, $p < .001$. Future Belonging and No Feedback control participants did not differ in their hostility ratings of the author, $F < 1$, *ns*. Thus, social exclusion led people to perceive the ambiguous actions of another person as hostile, even when that person was not involved in the social exclusion experience.

Aggressive responding—Participants who believed they would end up alone later in life responded more aggressively toward the job candidate than participants in the other two conditions. Results showed significant variation between the three experimental groups, $F(2, 27)= 7.43$, $p= .003$. A 2 -1 -1 a-priori contrast confirmed that Future Alone participants evaluated the prospective job candidate significantly more negatively than both Future Belonging and No Feedback control participants, $F(1, 27)= 14.82$, $p= .001$. Planned comparisons showed that Future Alone participants ($M= 46.00$, $SD= 14.52$) were significantly different from Future Belonging participants ($M= 70.60$, $SD= 19.64$), $F(1, 27)= 10.51$, $p= .003$. Similarly, Future Alone participants ($M= 46.00$, $SD= 14.52$) were significantly different from No Feedback control participants ($M= 72.00$, $SD= 16.35$), $F(1, 27)= 11.74$, $p= 001$. Future Belonging and No Feedback control participants did not differ in terms of their job candidate evaluations, $F < 1$, *ns*.

Mood and emotion—There was no significant variation among the three experimental groups in mood valence, $F(2, 27)= 1.12$, $p= .34$ or arousal, $F < 1$, *ns*. Thus, the hostile cognitive bias and aggressive behavior among Future Alone participants was not due to differences in reported mood.

Did cognition promote aggression?—We used regression to test whether ratings of hostility had consequences for aggressive responding among socially excluded participants. For ease of interpretation, we reversed the scoring so higher scores on the total evaluation index indicated higher levels of aggression. As noted above, exclusion increased hostile cognition and aggression. Hostile cognition uniquely predicted aggression, $\beta= .67$, $t(27)= 5.78$, $p < .001$. When hostile cognition was included simultaneously with exclusion in the regression model, the relationship between exclusion and aggression was no longer significant, $\beta= .10$, $t(27)= .50$, $p= .62$. A Sobel test (Sobel, 1982) confirmed that the aggressive responding among socially excluded participants was mediated by their hostile perceptions of the author of the essay, $z= 2.96$, $p= .003$ (see Figure 1).

Thus, Future Alone participants perceived the ambiguous actions of another person as more hostile than participants in the other conditions, and this hostile cognitive bias led rejected participants to behave aggressively toward this person.

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Experiment 3

The findings from the previous studies provided consistent evidence that social rejection led to a hostile cognitive bias. This hostile cognitive bias, in turn, accounted for the link between rejection and aggression. Still, there are several possible alternative explanations for these findings. The purpose of Experiment 3 was to replicate and extend the findings of Experiment 2 using methods and measures that would allow us to rule out these possible alternative explanations.

One possible alternative explanation for the results of Experiment 2 is that the social exclusion feedback (i.e. anticipating a lonely future) merely constituted a form of undesirable feedback compared to the other feedback conditions (i.e., anticipating a future filled with positive relationships or no feedback), as opposed to being responses specific to social exclusion. To address this possibility, we modified a procedure from Carvallo and Gabriel (2005). Some participants received personality feedback in which they could anticipate individual success (i.e., professional success) and interpersonal failure (i.e., lack of relationship fulfillment), whereas other participants received the opposite feedback (that they could anticipate interpersonal success in the future but would experience failure in their professional life). Thus one group anticipated interpersonal failure, and the other individual failure. A third group of participants (control condition) did not receive any personality feedback related to their future interpersonal or individual failure.

A second possible alternative explanation for the results is that the previously used measure of mood and emotion (BMIS) did not tap specific emotions relevant to rejection and aggression. From this perspective, the lack of mediation by mood in the previous studies could have been due to participants reporting their mood on measures that might not assess rejection- and aggression-relevant affects (e.g., anger, hostility). In Experiment 3, we included measures of both positive-negative and aroused affect (using the BMIS) and hostile affect using the State Hostility Scale (SHS; Anderson Deuser, & DeNeve, 1995). If the lack of mood mediation in the previous studies was due to activation of affect directly related to rejection and aggression (as opposed to general positive, negative, or aroused affect), then interpersonal failure participants should experience the highest level of hostile affect and this should mediate the link between social exclusion and aggression. If emotional response (including hostile affect) plays no role in mediating the link between social exclusion and aggression, however, then interpersonal failure participants should not report increased levels of hostile affect compared to individual failure and control participants.

Method

Participants—Fifty undergraduates (32 women) participated in this study in exchange for partial course credit.

Materials and procedure—Participants arrived at the laboratory for a study ostensibly concerning the relationship between personality and performance. After giving informed consent, participants completed a brief demographic questionnaire and the EPQ (Eysenck & Eysenck, 1975). After participants had completed the demographic questionnaire and the EPQ, the experimenter informed participants that he or she would score their test on a series of dimensions and that it was important for the participant to understand the dimensions that would be scored. One of these dimensions was extraversion and the other was a personality trait called “surgency.” Participants were first asked if they were familiar with the meaning of extraversion and, if they stated that they were unfamiliar with its meaning, were given a short definition of the meaning of extraversion. Next, participants were instructed to read a brief article ostensibly published in the magazine “Psychology Today” regarding the personality trait surgency while the experimenter scored the personality test. By random assignment,

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participants were assigned to one of three personality feedback conditions: Interpersonal failure, Individual failure, or Control.

For participants in the Interpersonal Failure condition, the article read (in part):

> A new study conducted at Washington University (WU) in St. Louis shows how an individual's future success can be predicted by measuring how high or low they are on surgency. An individual's level of surgency, for example, can tell us how they will generally perform in individual tasks. People who score high on surgency often accomplish a great deal, publish books, discover new things, or make contributions to whatever their professions are. It does not, however, tell us how they will function with others. We cannot measure surgency to predict future relationship satisfaction or interpersonal failure. A person who scores high on surgency will most likely become an accomplished individual, but he or she may or may not experience relationship fulfillment"

Participants in the Individual Failure condition, in contrast, read the following:

> A new study conducted at Washington University (WU) in St. Louis shows how an individual's future individual failure can be predicted by measuring how high or low they are on surgency. An individual's level of surgency, for example, can tell us how they will generally fare in interpersonal relationships. A person who scores high on surgency will often have lots of friends and long lasting fulfilling romantic relationships. It does not, however, tell us how they will function independently. We cannot measure surgency to predict future professional accomplishments. A person who scores high on surgency will most likely experience fulfilling relationships, but he or she may or may not become an accomplished individual."

Participants in the control group received no information regarding surgency. The experimenter then provided participants with their personality feedback. Interpersonal failure participants were given accurate feedback regarding their extraversion level (high or low) and were informed that research has confirmed that the participant's level of extraversion is not a good thing for relationships and is linked to difficulties keeping relationships together in life. Interpersonal failure participants were then told that they scored high on surgency and therefore could anticipate a future filled with professional accomplishment but may experience a dearth of long and lasting interpersonal relationships. Individual failure participants, in contrast, were given accurate extraversion feedback and were told that the participant's level of extraversion is a good thing for relationships and is linked to having an easy time keeping relationships together. Individual failure participant were then informed that their high surgency score meant they could anticipate successful interpersonal relationships but might experience a lack of professional accomplishment. Control participants were given their extraversion score, but they did not receive any information regarding the implications of their extraversion score for their future interpersonal relationships. Hence individual failure and interpersonal failure participants received unambiguous feedback regarding the relationship between their level of extraversion and their future belongingness. The main difference was that interpersonal failure participants (whose extraversion score was linked to difficulty keeping relationships together) anticipated a large number of professional accomplishments, whereas individual failure participants (whose extraversion scores was linked to having an easy time keeping relationships together) were led to believe that they may or may not experience professional accomplishments.

Results from a validation study confirmed that the interpersonal failure and individual failure feedback had the intended effects. In the validation study, 65 participants were given the interpersonal failure feedback sheet and individual failure feedback sheet and rated how much the feedback would make them feel excluded and accepted, and how much the feedback would

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cause them to anticipate professional success and professional failure. Compared to the individual failure feedback, participants rated the interpersonal failure feedback as more likely to make them feel excluded (*M*s= 4.87 vs. 2.82) and less likely to make them feel accepted (*M*s= 4.45 vs. 7.72), both *p*s < .001. Participants also rated the interpersonal failure feedback, compared to the individual failure feedback, as more likely to cause them to anticipate professional success (*M*s= 7.85 vs. 5.48) and less likely to cause them to anticipate professional failure (*M*s= 2.79 vs. 3.55), both *p*s < .01.

After receiving their personality feedback, participants completed the SHS and the BMIS. The experimenter then returned and said there was another experiment being conducted in the same laboratory in which one participant writes an essay and another participant reads and responds to the essay. As in Experiment 2, the experimenter explained that one of the other participants did not show up and asked the participant to read and respond to the other person's essay. Participants were then handed a large manila envelope labeled "Partner Study" that contained the same participant essay and rating sheet used in Experiment 2. The "other person's" gender was matched to the participant by having one version of the essay written in male handwriting and another version written in female handwriting. This was done to facilitate sympathy and identification with the participant.

After completing his or her rating of the other participant, the essay and essay rating sheet were placed in the manila folder and were given back to the experimenter. The experimenter then left, ostensibly to take the envelope back to the other experimenter. When the experimenter returned, the participant was informed that the author of the essay was applying for a research assistant position. Participants then completed the same candidate evaluation form used in Experiment 2. The internal reliability of the 10 statements was excellent (Cronbach's alpha = .96) and therefore responses were summed to create an index of aggressive responding. Higher scores indicated a positive evaluation of the job candidate and a low expression of aggression. A low score, in contrast, indicated a negative evaluation of the job candidate and a high expression of aggression. After participants completed the evaluation form, they placed it in an envelope with Department of Psychology letterhead, sealed it, and gave it to the experimenter. Participants were then given a thorough debriefing and then were and dismissed.

Results and Discussion

Hostile cognitive bias—Interpersonal Failure participants perceived the author of the essay as more hostile than both Individual Failure and Control participants. A hostility index was created by summing responses to the adjectives *hostile, unfriendly, angry,* and *dislikable* (Cronbach's alpha = .87). Results revealed significant variation between the three groups, $F(2, 47) = 6.77$, $p < .01$. A 2 -1 -1 a-priori contrast confirmed that Interpersonal Failure participants rated the author of the essay as significantly more hostile than both Individual Failure and Control participants, $F(1, 47) = 13.54$, $p < .001$. Planned comparisons demonstrated that interpersonal failure participants (*M*= 27.47, *SD*= 5.54) perceived the author of the essay as more hostile than individual failure participants (*M*= 19.14, *SD*= 8.94), $F(1, 47) = 10.26$, $p = .002$. Interpersonal failure participants (*M*= 27.47, *SD*= 5.54) also perceived the author of the essay as more hostile than control participants (*M*= 19.94, *SD*= 7.79), $F(1, 47) = 9.33$, $p = .001$. Individual failure participants did not differ from control participants in their hostility ratings, $F < 1$, *n.s.* Thus, participants who anticipated a future filled with professional success and a lack of flourishing relationships perceived an ambiguous person's behaviors as more hostile than participants who expected an interpersonally successful, though professionally unsuccessful, future.

Aggressive responding—Interpersonal Failure participants gave lower job candidate evaluations than participants in both of the other conditions. Results showed significant

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variation between the three groups, $F(2, 47) = 8.18$, $p = .001$. A 2 -1 -1 a-priori contrast confirmed that interpersonal failure participants responded more aggressively than both individual failure and control participants, $F(1, 47) = 15.82$, $p < .001$. Planned comparisons showed that interpersonal failure participants ($M = 37.71$, $SD = 13.69$) gave significantly lower job candidate evaluations than individual failure participants ($M = 53.50$, $SD = 18.69$), $F(1, 47) = 9.23$, $p = .004$. In addition, interpersonal failure participants ($M = 37.71$, $SD = 13.69$) rated the job candidate more negatively than control participants ($M = 56.59$, $SD = 19.09$), $F(1, 47) = 14.05$, $p < .001$. Individual failure participants did not differ from control participants in terms of their job candidate evaluations, $F < 1$, *ns*. Thus, participants who expected to have professional success but unsuccessful relationships behaved more aggressively than both control participants and those who anticipated individual failure but a lack of professional success.

Did cognition promote aggression?—To test whether hostile perceptions promoted aggression following anticipated interpersonal failure, regression analysis was used. Conditions were coded with interpersonal failure assigned a "1" and the individual failure and control conditions combined assigned a "0." For ease of interpretation, we reversed the scoring so that higher scores on the total evaluation index indicated higher levels of aggression. As noted above, anticipated interpersonal failure increased hostile cognition and aggression. Hostile cognition uniquely predicted aggression, $\beta = .35$, $t(47) = 2.62$, $p < .02$. When hostile cognition was included simultaneously in the regression model, the relationship between rejection and aggression was still statistically significant, $\beta = .34$, $t(47) = 2.55$, $p < .02$. Results from a Sobel test (Sobel, 1982) confirmed that the hostile cognitive bias partially mediated the link between interpersonal failure condition and aggression, $z = 2.14$, $p = .03$ (see Figure 2). Partial mediation suggests the operation of multiple mediating factors (Baron & Kenny, 1986, p. 1176). It is therefore likely that one or more factors other than hostile cognition served as partial mediators of the link between interpersonal failure condition and aggression. Thus, a hostile cognitive bias partially mediated the link between anticipated interpersonal failure and aggression.

Hostile affect, mood valence, and mood arousal—The three conditions differed significantly in hostile affect, $F(2, 47) = 3.58$, $p < .04$. In post-hoc comparisons, interpersonal failure ($M = 57.47$, $SD = 12.51$) participants reported *less* hostile affect than control participants ($M = 68.12$, $SD = 12.66$), $F(1, 47) = 6.82$, $p = .01$ and showed a trend toward less hostile affect than individual failure participants ($M = 60.88$, $SD = 10.07$), $F(1, 47) = 3.09$, $p < .09$. Individual failure participants did not differ from control participants in their reported hostile affect, $F < 1$, *ns*. There was no significant variation in either mood valence or mood arousal on the BMIS, both Fs < 1, *ns*.

Although the drop in hostile affect among interpersonal failure participants was not predicted, this finding is consistent with recent work showing that social exclusion produces decreased physical and emotional sensitivity (DeWall & Baumeister, 2006). To test the possibility that reduced hostile affect mediated aggression, regression analysis was used. Conditions were coded with interpersonal failure assigned a "1" and the individual failure and control conditions combined assigned a "0." As noted above, anticipated interpersonal failure was negatively associated with hostile affect. Hostile affect did not uniquely predict aggression, however, $\beta = .06$, $t = .43$, $p = .63$. This precludes the possibility that hostile affect mediated the relationship between anticipated interpersonal failure and aggression (Baron & Kenny, 1986). Including hostile affect and hostile cognition simultaneously in the regression model left the coefficients for hostile cognition ($\beta = .35$, $t(46) = 2.56$, $p < .02$) and interpersonal failure ($\beta = .35$, $t(46) = 2.56$, $p < .02$) essentially unchanged. These findings suggest that the results related to hostile cognition and aggression cannot be attributed to differences in hostile, negative, or aroused affect.

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Experiment 4

Experiment 4 was a conceptual replication of Experiment 3 that allowed us to address a possible limitation of Experiments 2 and 3. Participants in Experiments 2 and 3 were given an opportunity to aggress toward a person who was not involved in the social exclusion experience, but the aggression was directed toward the person whose ambiguous actions were perceived as relatively hostile. Thus, a hostile cognitive bias might predict aggressive responding following social exclusion only when the excluded person has had an opportunity to perceive the person toward whom s/he is aggressing as hostile. In the current study, participants received social exclusion feedback from one source (i.e., the experimenter), rated the degree to which they perceived the ambiguous actions of another participant as hostile, and then were given an opportunity to aggress toward a different participant with whom they had no previous contact. Participants were led to believe that they were playing a competitive reaction time game by computer with another person in the laboratory. In the game, the loser of each trial was forced to listen to a blast of white noise through a set of headphones. Participants were informed that they would be given the opportunity to set the intensity level and duration of the blast of white noise to which the other person would be forced to listen to if the other person lost the trial. This method of measuring aggression has been used in numerous experiments (e.g., Bartholow, Bushman, & Sestir, 2006; Bushman & Baumeister, 1998; see Giancola & Chermack, 1998) and has been shown to have good construct validity (e.g., Giancola & Zeichner, 1995). We predicted that socially excluded participants would rate the ambiguous actions of another participant as more hostile than participants in the other conditions, and this hostile cognitive bias would promote aggressive responding even toward a new person.

Method

Participants—Thirty-two undergraduates (22 women) participated in this study in exchange for partial course credit.

Materials and procedure—Participants arrived at the laboratory individually for a study ostensibly concerning the relationship between personality and performance. After giving informed consent, participants were led to believe that they had a same-sex partner with whom they would play a reaction time game later in the study. Participants then completed the EPQ and were exposed to the same social exclusion manipulation as in Experiment 3 (modeled after that used in Carvallo & Gabriel, 2005). Specifically, some participants read a bogus article describing the trait “surgency,” were given accurate extraversion/introversion feedback, were told that they scored high on “surgency,” and were led to believe that they could expect to have professional success but interpersonal failure (Interpersonal failure condition) or that they could expect to have interpersonal success but professional failure (Individual failure condition). A third group of participants simply received accurate extraversion/introversion feedback (Control condition).

Participants then completed the SHS and BMIS. The experimenter then returned to the room and, as in Experiments 2 and 3, informed the participant that they would read and respond to an essay written by a same-sex participant from a different study. Participants were then handed a large manila envelope labeled “Partner Study” that contained the same participant essay and rating sheet used in Experiments 2 and 3. As in Experiments 2 and 3, the other person’s gender was matched to the participant’s gender by having one version of the essay written in male handwriting and another version written in female handwriting.

After reading and responding to the essay, participants were informed that their partner had to leave the experiment unexpectedly and that they were going to play the reaction time game with a same-sex person who was making up credit for a missed study. In actuality, the computer

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was programmed to mimic a person's responses. The experimenter explained that participants would have to press a button as quickly as possible on a series of trials, and that whoever responded slower on a given trial would hear a blast of white noise. Each participant set the level of noise to be heard by the other person, including both volume (a level ranging from 0 to 10) and duration (determined by holding down the mouse button).

A Macintosh computer controlled the events in the reaction time task and recorded the duration and volume that participants administered for each of 25 trials. Previous research has shown that the first trial provides the best measure of unprovoked aggression because participants have not yet received aversive blasts of noise from their opponent (Bushman & Baumeister, 1998; Twenge et al., 2001). Therefore, the standardized noise intensity and duration levels from the first trial were summed and used as the composite measure of aggression. Once participants had completed the reaction time game, they were debriefed and then dismissed.

Results and Discussion

Hostile cognitive bias—As in Experiment 3, participants who anticipated interpersonal failure perceived the ambiguous actions of the essay author as more hostile than participants in the other conditions. A hostility index was created by summing responses to the adjectives *hostile*, *unfriendly*, *angry*, and *dislikable* (Crobach's alpha = .63). Results revealed significant variation among the three experimental groups, $F(2, 29) = 8.50$, $p = .001$. A 2 -1 -1 a-priori contrast confirmed that interpersonal failure participants perceived the author of the essay as more hostile than both individual failure and control participants, $F(1, 29) = 16.92$, $p < .001$. Planned comparisons demonstrated the interpersonal failure participants ($M = 25.45$, $SD = 6.59$) rated the essay author as more hostile than individual failure participants ($M = 15.64$, $SD = 6.83$), $F(1, 29) = 13.50$, $p = .001$. Interpersonal failure participants ($M = 25.45$, $SD = 6.59$) also rated the essay author as more hostile than control participants ($M = 16.10$, $SD = 5.11$), $F(1, 29) = 11.73$, $p = .002$. Individual failure and control participants did not differ in terms of their hostility ratings, $F < 1$, *ns*. Thus, these findings replicate those of Experiment 3, showing that interpersonal failure participants perceived the ambiguous actions of another person as more hostile than both individual failure and control participants.

Aggression—Interpersonal failure participants behaved more aggressively than both individual failure and control participants, blasting a higher level of painful noise. Results revealed significant variation on the noise intensity, $F(2, 29) = 4.02$, $p < .03$, noise duration, $F(2, 29) = 3.27$, $p = .05$, and composite aggression measures, $F(2, 29) = 6.77$, $p = .004$. 2 -1 -1 a-priori contrasts confirmed that interpersonal failure participants administered a higher level of noise intensity, $F(1, 29) = 7.73$, $p = .009$, a longer duration of noise, $F(1, 29) = 6.45$, $p < .02$, and had higher composite aggression scores, $F(1, 29) = 13.20$, $p = .001$, than both individual failure and control participants. Thus, participants in the interpersonal failure condition behaved more aggressively than participants in the other two conditions.

Hostile affect, mood valence, and arousal—There was no significant variation among the three experimental groups on hostile affect, mood valence, or arousal, all Fs < 1, *n.s.* The null effect for hostile affect suggests that the tendency for interpersonal failure participants to report less hostile affect in Experiment 3 was not a reliable effect. These findings contradict the alternative explanation that differences in hostile affect, mood valence, or arousal contributed to the hostile cognition and aggression that accompanied anticipated interpersonal failure.

Did cognition promote aggression?—The main purpose of Experiment 4 was to test whether anticipated interpersonal failure would lead to hostile perceptions of another person's ambiguous actions and whether this hostile cognitive bias would be related to aggressive

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behavior toward another person with whom they had no previous contact. As in Experiment 3, conditions were coded with interpersonal failure as "1" and individual failure and control conditions combined under "0." A regression analysis revealed that, as reported above, interpersonal failure predicted hostile cognitive bias scores, $\beta = .61$, $t(30) = 4.19$, $p = .001$, and composite aggression scores, $\beta = .55$, $t(30) = 3.65$, $p = .001$. As predicted, hostile cognitive bias scores predicted aggression, $\beta = .38$, $t(30) = 2.27$, $p = .03$. The association between hostile cognition and aggression was not significant when condition was included in the model, however, $\beta = .07$, $t < 1$, n.s. Hence the hostile cognitive bias that accompanied anticipated interpersonal failure promoted aggressive responding, but hostile cognition did not mediate the relationship between anticipated interpersonal failure and aggression. These findings provide further evidence that hostile cognition relates to aggression in response to social exclusion, even toward a person with whom participants had no previous contact.

General Discussion

Social exclusion and aggression are often linked. People who behave aggressively are often excluded from groups. At the same time, social exclusion frequently causes increases in aggressive behavior. Rejection poses a serious and fundamental threat to human existence and meaning, and it seems logical that rejected people would behave in a way that would garner future acceptance. Against that line of reasoning, psychologists have amassed a large body of evidence confirming a causal path from social rejection to aggression (Buckley et al., 2004; Kirkpatrick et al., 2002; Twenge et al., 2001; Warburton et al., 2006). It is less clear, however, *why* rejection causes aggression. Previous work has suggested that the link from exclusion to aggression cannot easily be explained by either motivation or emotion (e.g., Buckley et al., 2004; Twenge et al., 2001). One possibility is that rejection leads to increased activation of hostile cognitions, which in turn has consequences for aggressive treatment of others. The experiments reported here provide consistent support for this hypothesis.

Participants who experienced social exclusion, compared with socially accepted and control participants, showed substantial increases in hostility-related cognitive processes. This took the form of rating aggressive and ambiguous words as similar (Experiment 1a), completing word fragments with aggressive words (Experiment 1b), and rating the ambiguous actions of another person as hostile (Experiments 2-4). Hostile cognition was found only among participants who experienced or anticipated social exclusion. Among participants who anticipated interpersonal success but individual failure, no hostile cognitive bias emerged. Thus, social exclusion promoted a generalized cognitive tendency to perceive a broad range of information as antagonistic.

The second goal of the current investigation was to demonstrate that the hostile cognitive bias that accompanied social exclusion had implications for aggression. Replicating previous research, socially excluded participants were more aggressive; in addition, the hostile cognitive bias that followed the exclusion consistently predicted aggressive responding. In Experiments 2 and 3, the relationship between social exclusion and aggression was mediated by hostile cognition. Experiment 4 showed that the hostile cognition bias following social exclusion predicted aggression toward a third person who was not involved in the exclusion experience and with whom participants had no previous contact. The results from Experiment 4 demonstrated a crucial boundary condition to the effects observed in Experiments 2 and 3: the effect of hostile cognition in mediating the relationship between rejection and aggression was conditional upon the opportunity to perceive hostility in the target of aggression. When the hostile cognitive bias was directed toward the target of aggression (as in Experiments 2 and 3), hostile cognition mediated the rejection-aggression link. In contrast, when the hostile cognitive bias was directed at a person other than the target of aggression, hostile cognition was related to—but did not mediate—aggression toward another target. The implication is that

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hostile cognition plays a mechanistic role in the rejection-aggression link when that cognition is directed toward the target of aggression, whereas hostile cognition that is not directed toward the target of aggression relates to later aggression but is not independent of whether a person has been rejected.

How might the current findings be reconciled with other evidence suggesting desirable, prosocial responding following social exclusion? Past findings have shown that excluded people are eager to connect with potential sources of renewed affiliation, but only with individuals who appear to represent immediate and promising prospects for social acceptance (Maner, DeWall, Baumeister, & Schaller, 2007). When others appear to be less promising in terms of the potential for social connection, excluded people behave in a relatively hostile manner (e.g., Twenge et al., 2001). This depiction of the excluded person is consistent with the findings from the current experiments, in which the targets that excluded people perceived as hostile and toward whom excluded people behaved aggressively did not represent potential sources of social acceptance. Excluded people might not show such a strong hostile cognitive bias toward others for whom the likelihood of renewed affiliation was relatively high.

More broadly, writers dating back at least to Freud (1930) have emphasized the idea that human social life depends on an implicit bargain. Individuals must restrain their impulses, sacrifice some of what they want, and effortfully bring their behavior into agreement with social standards; in exchange, they reap the rewards of belonging to the group. Recent work has begun to confirm that this bargain can break down on either side. Failing to control oneself and to behave in socially prescribed fashion leads to social exclusion, whether in the form of ostracism by childhood peers (Kupersmidt, Burchinal, & Patterson, 1995; McDougall, Hymel, Vaillancourt, & Mercer, 2001) or formal imprisonment as a criminal (Gottfredson & Hirschi, 1990). Conversely, laboratory manipulations of social exclusion cause people to lose the will to regulate their behavior according to external standards (Baumeister, DeWall, Ciarocco, & Twenge, 2005; DeWall, Baumeister, & Vohs, in press; Oaten, Williams, Jones, & Zadro, in press). Applied to the present investigation, these results suggest that social exclusion creates a sense that one has been betrayed by others, as one's efforts to behave properly and seek acceptance have been met instead with rejection and exclusion. This sense of betrayal causes excluded people to perceive neutral information in the environment as relatively hostile, which then has consequences for their aggressive treatment of others.

Alternative Explanations, Limitations, and Future Directions

These results provide consistent evidence that social exclusion causes a hostile cognitive bias, which has direct implications for aggression. Despite the consistency and strength of these effects, there are several alternative explanations that deserve consideration. A first possibility is that social exclusion simply constitutes a form of bad news. If this is true, then participants who received any form of positive feedback should not show a hostile cognitive bias or aggressive behavior. The results from the Interpersonal Failure and Individual Failure conditions in Experiments 3 and 4 contradict this explanation. Interpersonal Failure participants were informed that they would have successful professional accomplishments later in life, but they would also experience difficulty having successful interpersonal relationships. Individual Failure participants anticipated a future marked by interpersonal success but possible professional failure. Although participants in the Interpersonal Failure condition received positive feedback regarding their future professional accomplishments, these participants showed a pronounced hostile cognitive bias and behaved quite aggressively. Social exclusion appears to be such a basic threat that it increases hostile cognitive biases and aggression even in the presence of anticipated professional success.

It is also possible that the effects of social exclusion on hostile cognition and aggression could be attributed to differences in emotional response. According to this perspective, social

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exclusion produces increased negative emotions, which in turn causes hostile cognition and aggression. In each experiment, participants completed the BMIS, which provided measurements of mood valence and arousal. Negative emotion and arousal have both played prominent roles in classic social psychological theories of aggression (Berkowitz, 1982; Zillman, 1983). It was still possible, however, that the BMIS may not have measured emotional responses that were theoretically relevant to aggressive responses. To address this possibility, we included the State Hostility Scale in Experiments 3 and 4 (Anderson et al., 1995). However, these experiments provide no support for a mood mediation explanation. In all but one case, excluded participants did not report emotional states that differed from socially accepted and control participants. The only exception was Experiment 3, in which excluded participants reported somewhat *less* hostile affect than non-excluded participants. Thus, the current findings suggest that hostile cognition is a far better predictor of aggression following social exclusion than negative emotion.

We hasten to add that the current investigation was limited in the number of emotions that were measured and the type of emotion measurement technique that was used. We did not test whether our social exclusion manipulations influenced the amount of shame participants felt nor did we include measures of shame proneness, both of which may have had implications for aggression (see Tangney, Wagner, Hill-Barlow, Marschall, & Gramzow, 1996). Some prior work has shown that social exclusion does not increase shame (Twenge, Catanese, & Baumeister, 2003, Experiment 1), but it is still possible that future work may benefit from considering state or trait shame as a potential mediator or moderator of the rejection-aggression link. Also, we relied solely on self-report measures of emotion. Using physiological measures (e.g., electroencephalogram, electromyography, functional magnetic resonance imaging) may have allowed for more fine-grained measurements of participants' current emotional state compared to self-report measures. Prior work, for example, has shown that anger correlates with greater left than right frontal electroencephalographic activity (Harmon-Jones & Sigelman, 2001). Although not all anger leads to aggression (Averill, 1982), recent evidence indicates that this frontal cortical asymmetry can play a causal role in predicting aggressive behavior (Peterson, Shackman, & Harmon-Jones, 2008). It is possible that asymmetrical frontal cortical activity or other physiological responses may play a mediating role in the rejection-aggression link (in addition to hostile cognition).

One might also question whether our manipulations provided sufficiently impactful forms of social rejection to produce the requisite emotional reactions. Possibly other, more direct forms of rejection would produce greater emotional distress than what we found (e.g., Gaertner, Iuzzini, & O'Mara, in press; Twenge et al., 2001). To be sure, we have used the terms rejection and social exclusion somewhat interchangeably, and the total set of manipulations used in these studies would be more precisely described as social exclusion rather than rejection per se. Only the procedure of Experiments 1a and 1b included a direct personal rejection of the participant, in the sense that the partner ostensibly decided not to interact with the participant after viewing the participant's video. The other manipulations (e.g., bogus feedback predicting a lonesome future) might be regarded as not actual rejection per se.

There are however several arguments to be made in support of the present procedures. First, in the present studies and in other investigations that have used them, they have repeatedly produced large effects on behavior, so they are highly impactful, even though the impact may not include emotion. Second, the future alone manipulation has consistently produced results that parallel a direct and immediate group rejection manipulation (e.g., Twenge et al., 2001). Third, as noted earlier, a meta-analysis combining results from many studies has found at best only a small average effect of exclusion on emotion (Blackhart et al., 2007).

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Fourth, another recent investigation by some of the present authors included a study in which some participants were asked to intuitively imagine how they would respond to the same "Future Alone" manipulation that was used here, and they predicted strong emotional distress — whereas those who actually experienced it reported no significant increase in distress. (Note: The effect size in our studies has been in the neighborhood of the .26 effect found in Blackhart et al.'s meta-analysis; that size effect simply fails to reach significance without very large samples.) If the lack of emotion were due to the weakness of this manipulation, then persons who imagine experiencing it ought to spot its weakness and say they would not feel upset. That is not what they say. Instead, people expect that this manipulation will be very upsetting, but in reality it turns out to be much less so. Moreover, this pattern is hardly unique to our manipulations and in fact conforms to what has repeatedly been shown in research on affective forecasting, which is that people predict strong, lasting emotional reactions when imagining a broad variety of events — but they experience much less emotion when these events actually occur (Wilson & Gilbert, 2003).

In short, we cannot completely rule out that emotion might mediate between rejection and aggression in some other studies with other procedures, but we by now have ample evidence that multiple manipulations of social exclusion produce strong aggressive reactions without any sign of emotional mediation. We sympathize with those who may still advocate the emotional mediation theory, because it was our own initial hypothesis, but we have abandoned it after repeated failures. More generally, accumulating evidence has come to question the widespread assumption that emotion is the common mediator between situational events and behavioral responses (for review, see Baumeister, Vohs, DeWall, & Zhang, 2007; also Schwarz & Clore, 2007). Emotion is undoubtedly a vitally important part of human functioning, but its functions may be other than the direct causation of behavior.

Future research may investigate how hostile cognitive biases develop and shape aggressive behavior within the context of close personal relationships. As is typical with much of the empirical work in the social exclusion literature, our studies were conducted with individuals who were unacquainted with each other before entering the laboratory. Of course, people often experience social exclusion within the context of longer lasting—and presumably more meaningful—relationships than the exclusion our participants experienced at the hands of a stranger. Experiencing social exclusion from close friends, family members, or a romantic relationship partner may promote a hostile cognitive bias and aggression, but such responding will likely depend on the importance of the relationship and the specific interpersonal domain that has been threatened (see Kirkpatrick & Ellis, 2001). If someone experiences social exclusion from an important romantic relationship partner, for example, then the excluded person may perceive hostility and hence behave aggressively toward others who appear similar to the relationship partner and who represent no potential source of reconnection.

Another possible avenue for future inquiry may involve identifying other types of hostile cognition that play a role in promoting aggression following social exclusion. We found evidence of partial mediation in Experiment 3, which by definition indicates that other processes were involved in fostering aggressive responses to social exclusion. Also, we found no evidence that hostile cognition mediated the rejection-aggression link when the hostile cognition was not directed toward the target of aggression (Experiment 4). The current investigation measured accessibility of hostile cognition (Experiment 1a) and hostile attribution bias (Experiments 1b-4), but it is possible that other types of hostile cognition may have impacted the aggression we observed. One possibility is that social exclusion primes aggressive behavioral scripts. Scripts refer to concepts stored in memory that guide actions, plans, and social interactions (Schank & Abelson, 1977). Social exclusion and aggressive behavioral scripts may be closely linked in memory, which would give rise to aggression when people experience social exclusion.

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Concluding Remarks

The current investigation sought to resolve the paradox of why socially excluded people behave aggressively. Although one might expect (and hope) that social exclusion would promote desirable and prosocial responses, an abundance of evidence suggests that social exclusion frequently results in aggression. Explanations based on motivational or emotional processes have been consistently discredited. Psychologists have therefore been left wondering what, if any, process may help to explain the link between social exclusion and aggression.

The current findings may offer a first step in resolving the mystery of processes that promote aggression following social exclusion: excluded people see the world through blood-colored glasses. Socially excluded people find words related to violence and aggression easily accessible and perceive others as antagonistic and hostile. Moreover, the activation of hostile cognition is directly related to the aggression that is so often observed in people who have been rejected. Though it is potentially disturbing to observe the relative ease with which rejected participants in our studies abandoned their normal inclination toward cooperative and prosocial behaviors, it is also encouraging to understand one reason why they became aggressive. It is our hope that the present findings lead to a better understanding of why rejection causes aggression and what measures can be taken to prevent such unwanted and harmful behavior.

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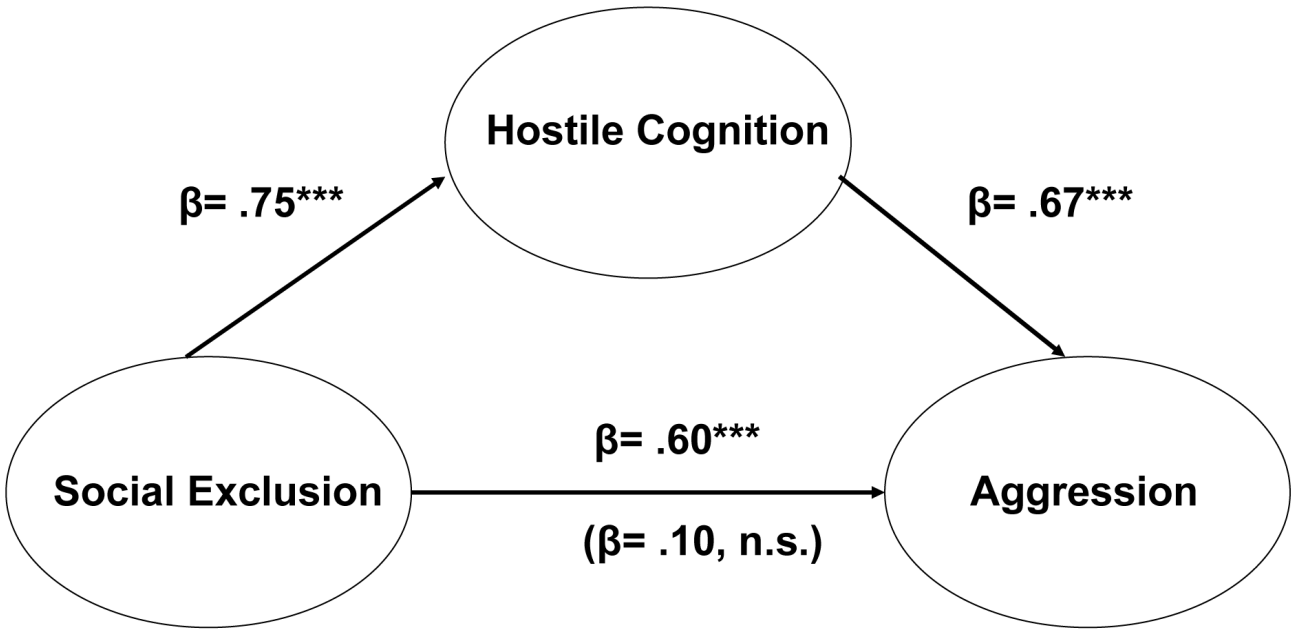

*** $p \leq .001$

Figure 1.
Hostile cognition fully mediates the link between social exclusion and aggression. Experiment 2.

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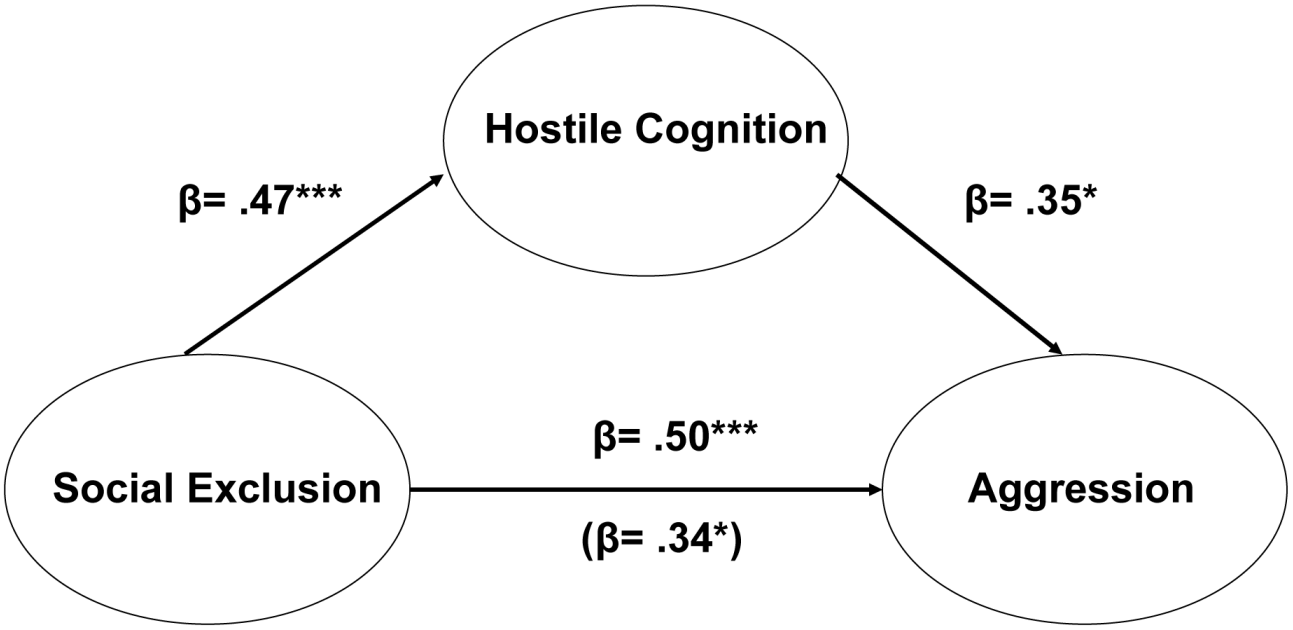

*** $p \leq .001$

* $p < .05$

Figure 2.
Hostile cognition partially mediates the link between social exclusion and aggression. Experiment 3.