

Jealousy and the Threatened Self: Getting to the Heart of the Green-Eyed Monster

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Several theories specifying the causes of jealousy have been put forth in the past few decades. Firm support for any proposed theory, however, has been limited by the difficulties inherent in inducing jealousy and examining any proposed mediating mechanisms in real time. In support of a theory of jealousy centering on threats to the self-system, 2 experiments are presented that address these past limitations and argue for a model based on context-induced variability in self-evaluation. Experiment 1 presents a method for evoking jealousy through the use of highly orchestrated social encounters and demonstrates that threatened self-esteem functions as a principal mediator of jealousy. In addition to replicating these findings, Experiment 2 provides direct evidence for jealousy as a cause of aggression. The ability of the proposed theory of jealousy to integrate other extant findings in the literature is also discussed.

Keywords: jealousy, self-esteem, aggression, emotion

Jealousy, it seems, is a fundamental aspect of human social life. For as far back in time or as widely across civilizations as one can peer, the green-eyed monster has reared its head. From Gilgamesh's romps retold in the first millennium B.C.E. to Othello's throes portrayed in the middle part of the last millennium, to modern day soap operas and drama series, fascination with the jealousy motif has not waned among artists and audiences alike. From cultures representing geographically and socially disparate milieus, research documents the pervasiveness of jealousy among men and women from childhood to old age (e.g., Bryson, 1991; Buunk, Angleitner, Oubaid, & Buss, 1996; Geary, Rumsey, Bow-Thomas, & Hoard, 1995; Hupka et al., 1985; Masciuch & Kienapple, 1993). Jealousy's ubiquity is so well accepted that even Freud (1922/1955) himself suggested that its absence, not its presence (at least within normal levels), is a sign of pathology.

From a functional perspective, jealousy stands as an exemplary candidate for a fundamental social emotion. Emotions, like many psychological phenomena, are theorized to exist because they serve some adaptive purpose. That is, although their specific components and sequelae may operate on many different levels (e.g., neurochemical, interpersonal, cultural), emotions are designed to increase the success with which an organism meets specific challenges by shunting cognition and behavior toward

certain outcomes (Frijda, 2000; Keltner & Gross, 1999; Keltner & Haidt, 1999; Lazarus, 1991; LeDoux & Phelps, 2000; Öhman & Wiens, 2003). The cognitive and physiological changes associated with fear and anxiety, for example, prepare an organism to detect and/or escape from an impending danger more efficiently (LeDoux & Phelps, 2000; Öhman, 2002). It is important to note, however, that organisms whose existence is characterized by high degrees of collective or social living confront not only challenges involving the successful navigation of the physical environment but also those involving the social one (e.g., social exchange, coalition building, social bonding, and relationship maintenance; Bartlett & DeSteno, 2006; Cosmides & Tooby, 2000; Darwin, 1872/1998; Keltner & Busswell, 1997; Keltner & Haidt, 1999; Lewis, 2000). The importance of such challenges suggests the need for specific emotional responses that are intrinsically tied to sociality.

Jealousy: Form and Function

For humans, adaptive functioning is intrinsically tied to social interactions through which myriad needs are met (e.g., protection, resource acquisition, reproduction). Accordingly, engagement in interpersonal relationships stands as a fundamental predictor of human physical and psychological health (Baumeister & Leary, 1995; Berscheid & Reis, 1998; Cacioppo et al., 2002) and is fostered by the seemingly universal motive to belong to social groups and be a member of interpersonal relationships (Baumeister & Leary, 1995). Indeed, involvement in social relationships is of such central value to adaptive functioning that it has been documented to increase psychological well-being (Diener, 1984; Myers & Diener, 1995), resistance to cardiovascular disease (Berkman, Vaccarino, & Seeman, 1993), resistance to cancer (Glanz & Lerman, 1992), and immune system function (Booth & Pennebaker, 2000; Kennedy, Kiecolt-Glaser, & Glaser, 1990; Kiecolt-Glaser, 1999).

Given the benefits provided by relationships, competition for them frequently arises (Salovey, 1991). Consequently, the exis-

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tence of a specific emotion designed to protect these relationships from the advances of rivals is to be expected. Accordingly, most researchers agree that jealousy functions to evoke somatic, cognitive, and behavioral responses designed to address relationship threats (Buss, Larsen, Westen, & Semmelroth, 1992; DeSteno & Salovey, 1995; Salovey, 1991; White, 1991).¹ With respect to phenomenology, most researchers also agree that the subjective experience of jealousy is quite aversive and best described as a combination or blend of the feelings of anger, anxiety, betrayal, and hurt (Buck, 1999; Hupka, 1984, 1991; Parrott & Smith, 1993; Sharpsteen, 1991; Sharpsteen & Kirkpatrick, 1997). The ubiquity and agony of jealousy stand in direct correspondence to the fundamental threats posed by its eliciting events.

For many, the prototypical jealousy-evoking situation involves a romantic triad: An individual becomes jealous as he or she suspects or actually learns that a partner is interested in a rival (Salovey, 1991). Asking individuals about actual or imagined instances of this type of scenario has been one of the more widely used methods in studies of jealousy (e.g., Buss, Larsen, Westen, & Semmelroth, 1992; DeSteno, Bartlett, Braverman, & Salovey, 2002; DeSteno & Salovey, 1996; Harris, 2003; Salovey, 1991). Yet, there is no requirement that the relationship being threatened needs to be a romantic one. All that is central is that a valued relationship of any type may be usurped by a rival (DeSteno, 2004). Research clearly supports the fact that jealousy is not limited solely to romantic relationships but can occur within any type of triadic relationship. Developmental research, for example, has shown that children may be jealous of siblings' relationships with parents (Masiuch & Kienapple, 1993; Volling, McElwain, & Miller, 2002); workers have been shown to be jealous of their coworkers' relationships with superiors (Vecchio, 2000). In each case, the nature of the fundamental threat is the same, although the specifics differ. Parents possess a finite amount of personal (e.g., emotional, attentional) and substantive (e.g., economic, food) resources that can be divided among offspring; superiors, likewise, possess a finite amount of privileges they can offer. In both instances, the strength of one's relationship with such partners holds important implications for survival and advancement. The strength of the relationship dictates the allocation of resources. Accordingly, jealousy aimed at safeguarding such relationships can be expected to play an important role during all phases of life. Indeed, it is a more efficient process to have a single emotion that is sensitive to rival-induced threats to any established or budding relationships than to have discrete systems designed for each specific type of relationship challenge (DeSteno, 2004; DeSteno et al., 2002).

This assertion identifies jealousy as a discrete emotional response to a specific type of anticipated or actual social rejection: rejection by a relationship partner in favor of a rival. Yet it is important to note that although social rejection can take many forms (e.g., ostracism from a group, refusal of admission to a group, relationship dissolution not due to a rival), jealousy and any associated behavioral sequelae can be expected to be intrinsically tied only to the triadic relationship pattern noted in the preceding sentences. Put simply, jealous distress stems from a motivation to protect a relationship from being usurped, and resulting behaviors (e.g., derogation of rivals) center on preventing successful advances of rivals (Salovey, 1991). Other types of social rejection may induce negative emotional states (e.g., shame, anger); how-

ever, these states differ from jealousy and any associated behaviors do not center directly on issues of usurpation.

Chasing the Monster

Given both its prevalence and painfulness, it is not surprising that jealousy has become one of the more studied social emotions during the past few decades (DeSteno, 2004; Salovey, 1991). Broad interest in this emotion stems not only from the distress it engenders but also from its association with aggressive behavior. Indeed, jealousy, more so than many negative emotions, is thought to lead to hostile and abusive behavior aimed at relationship partners (De Weerth & Kalma, 1993; Mullen, 1996; Paul, Foss, & Galloway, 1993; Schackelford, 2001; White, 1991) and stands as a likely contributing factor to homicide-related deaths among women, with over 40% of such female deaths in 2000 stemming from conflict with relationship partners (U.S. Department of Justice, 2003).

In light of the distress and violence associated with jealousy, the need to better understand the psychological mechanisms that determine its intensity is of high import. At present, however, little empirical evidence exists that provides strong support for a specific model of jealousy. Researchers possess an understanding of jealousy's most general environmental elicitors and phenomenological results but lack clear evidence regarding the intrapsychic processes underlying it. Indeed, the previously prevailing view that jealousy stems from sex-specific, evolved modules sensitive to reproductive threats (see Buss et al., 1992) has encountered formidable theoretical and empirical difficulties that limit its viability (DeSteno, Bartlett, & Salovey, in press; DeSteno et al., 2002; DeSteno & Salovey, 1996a; Harris, 2003; Harris & Christenfeld, 1996; Sabini & Green, 2004). In the absence of evidence supporting a specific theoretical model, it becomes difficult to provide a clear and parsimonious account for the intra- and interindividual variation in jealousy known to exist.

A primary reason for this void is that the majority of previous research, our own included (e.g., DeSteno & Salovey, 1996b), has relied on predictions regarding the intensity of jealousy one would feel if a relationship partner were, hypothetically, to act in some specified way (DeSteno, 2004; Salovey, 1991). Forecasts of emotional intensity in response to hypothetical events have been shown, unfortunately, to be subject to several biases (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Wheatley, Meyers, Gilbert, & Axson, 2000), and, therefore, their use as a primary dependent variable to test models of jealousy is problematic. Simply put, how one thinks she or he may feel in response to the presence of a rival need not necessarily reflect reality. Indeed, attempting to understand the functional influence of an emotion on subsequent cognition and behavior without a true *in vivo* induction of the emotion is a tenuous enterprise at best. Emotions exert their influence on cognition and behavior through conscious and non-

¹ Although the term *jealousy* is also used in modern parlance to connote begrudging feelings toward another individual due to his or her possession of some desired object or attribute, this feeling state is more appropriately labeled as *envy* (Parrott, 1991; Smith, 1991). Jealousy is defined as the negative emotional state generated in response to a threatened or actual loss of a valued relationship due to the presence of a real or imagined rival (DeSteno & Salovey, 1995, 1996b; Parrott & Smith, 1993; Salovey, 1991).

conscious processes (DeSteno, Dasgupta, Bartlett, & Caidric, 2004; LeDoux & Phelps, 2000; Öhman & Wiens, 2003; Schwarz & Clore, 1996). It seems unlikely, therefore, that the mediators and associated processes stemming from simply estimating how one would feel if the emotion in question were to be evoked would mirror the effects of the true emotional experience. This argument applies equally to studies that use retrospective assessments of jealousy; in addition to memory biases involving intensity, accurate assessment of proposed mediators becomes problematic, as it is unlikely that such mediators would be properly engaged through simple recall of the event in question.

Of course, jealousy researchers recognize these problems. The limiting factor to studying jealousy in real time has been the difficulties inherent in inducing it in the lab. Nonetheless, the induction of *in vivo* jealousy in an experimental context is necessary in order to test hypotheses regarding mediating mechanisms. Only with the ability to manipulate jealousy and subsequently measure a proposed mediator and behavioral outcomes in real time can strong evidence for a specific theory be marshaled. In its absence, one is left with a reliance on data from hypothetical scenarios or the use of correlational measures that may suggest potential mediators or moderators of jealousy (e.g., personality traits, cultural membership) but are, in themselves, insufficient to establish causality. In the present article, we accept this challenge and attempt to test initial hypotheses derived from a theory of jealousy based on threatened self-esteem through real-time experimental inductions of this emotion. In so doing, we hope not only to provide strong support for a specific theory of jealousy but also to suggest how the proposed theory may hold the potential to integrate previous and seemingly disparate findings regarding the influence of idiographic and cultural factors on this emotion.

Self-Esteem Threat as the Mediator of Jealousy

It is our contention that threatened self-esteem is the principal mediating mechanism of jealousy. Schematically, this model shares similarities with many appraisal theories of emotion: Awareness of an event is followed by an appraisal of its significance and then by an ensuing emotional state designed to lead to an adaptive response (cf. Ellsworth & Scherer, 2003; Frijda, 1986; Lazarus, 1991; LeDoux & Phelps, 2000). In the specific case of jealousy, events that have the possibility to arouse this emotion must involve the real or imagined interaction of a relationship partner with a rival. Once an individual becomes aware of any such interaction, an appraisal is made regarding the self-esteem threat posed by it. This event serves as the proximate cause for jealousy, which then leads to behaviors designed to remove the threat. Such an appraisal, of course, need not involve a conscious attempt at assessment; appraisals of emotion-relevant stimuli often occur automatically (Ellsworth & Scherer, 2003; LeDoux & Phelps, 2000). Our central point is that the appraisal centers on the self-system, and variations in momentary levels of self-esteem stand as the driving force for jealousy. Although it is a relatively parsimonious model, the question of why the induction of jealousy should depend on or use the self-system necessarily arises.

The candidacy of threatened self-esteem as a mediator for jealousy is supported by work suggesting self-esteem's importance in assessing status in social relationships. Indeed, many have noted that a primary and pancultural determinant of self-esteem is the

perception and evaluation provided by others (Cooley, 1902/1956; A. P. Fiske, Kitayama, Markus, & Nisbett, 1998; Goffman, 1959) and that one of self-esteem's central functions is to provide an ongoing gauge of one's status vis-à-vis relationship partners (Leary & Baumeister, 2000; Leary, Tambor, Terdal, & Downs, 1995). Correspondingly, many emotions related to functioning within the context of interpersonal relationships (i.e., social emotions) have been shown to involve awareness and appraisals of self (Leary, 2003; Tangney & Fischer, 1995; Tracy & Robins, 2004).

Knowledge involving other individuals' evaluations of oneself and their motivations for certain behaviors certainly stands as an integral variable in correctly appraising a given social situation (Flavell, 2004; U. Frith & Frith, 2001; Saxe, Carey, & Kanwisher, 2004). Indeed, differences in theory of mind (i.e., the ability to infer and understand the mental states of others) have been directly linked with social emotions involving self-appraisal. For example, autistic individuals evidence a deficit in recognizing self-conscious emotions (e.g., embarrassment, shame) as opposed to more basic ones (e.g., anger, disgust; Heerey, Keltner, & Capps, 2003). Similarly, individuals with damage to the orbitofrontal cortex demonstrate marked deficiencies in the appropriate experience and regulation of several social emotions (Beer, Heerey, Keltner, Scabini, & Knight, 2003). Given the theorized associations of several interlinked regions of the prefrontal cortex with theory of mind, experience of social emotions, and self-reflective abilities (e.g., Beer et al., 2003; Berridge, 2003; Damasio, 1994; C. D. Frith & Frith, 1999; Gallagher & Frith, 2003; Kelley et al., 2002; Macrae, Moran, Heatherton, Banfield, & Kelly, 2004), such evidence suggests a possible role for the self-system in the experience of social emotions. Awareness and evaluation of the self vis-à-vis one's social context may stand as a primary gauge for assessing one's place within changing social environs and, as such, may be intrinsically tied to the induction and regulation of emotions emergent from social interaction. This view is buttressed by developmental studies demonstrating age-related convergences in the appearance of social emotions, individuated self-awareness, and theory of mind abilities in human development (Dunn, 2003; Lewis, 2000).

With respect to jealousy, the role played by self-evaluation may be quite specific. Given that the attention one receives from a partner in a valued relationship is usually taken to signify self-worth (Murray, Griffin, Rose, & Bellavia, 2003; Parrott, 1991; cf. Leary & Baumeister, 2000; Leary, Koch, & Hechenbleikner, 2001), a partner's interest in a rival stands as a signal that the rival is superior in some way to the self, and, consequently, the integrity of the present relationship may be threatened by the value the partner places on the rival (DeSteno & Salovey, 1996b). Accordingly, jealousy occurs not only when relationships are in the active stage of dissolution but also in the lead up to such an eventuality (Parrott, 1991). If jealousy is to prevent the usurpation of a relationship, then one must be privy to the mental states of partners in order to gauge what their behaviors indicate with respect to their evaluations of possible rivals. That is, individuals must be able to assess what, for instance, a smile or a touch signifies with respect to their partners' intentions and evaluations. These assessments, then, may function to modulate self-esteem so that what constituted a relatively high level of self-esteem within the domain of the relationship suddenly becomes threatened by certain actions of a partner toward a rival. This threat, in turn, results in a negative emotional state, jealousy, designed to redress the threat (cf. Tesser,

1988). Of course, devaluations in self-esteem based on the perceived approval of others may also lead to other negative emotions such as shame (Tangney & Fischer, 1995). It is the coupling of self-esteem threat with the appraisal that it stems from the presence of a rival that provides the requisite factors for jealousy as opposed to other aversive social emotions (e.g., embarrassment).

Protection of self-esteem, therefore, serves as an efficient proxy mechanism for the benefits accrued through relationship maintenance; its protection leads to successful navigation through challenges to the integrity of valued relationships and, in so doing, to the protection of the physical and psychological benefits associated with relationships (cf. Baumeister & Leary, 1995; Leary et al., 1995; Schackelford, 2001). Put simply, maximizing self-esteem derived from the views of relationship partners safeguards the more tangible resources stemming from these relationships.

Linkage of threatened self-esteem with jealousy also provides an explanation for why jealousy is associated with aggression (Mullen, 1996; Parker, Low, Walker, & Gamm, 2005; Paul et al., 1993). As work by Baumeister and colleagues has revealed, threatening an individual's self-esteem has the potential to produce an aggressive response, especially when that self-esteem is based on external sources (Baumeister, Bushman, & Campbell, 2000; Baumeister, Smart, & Boden, 1996). Self-esteem threats based on the evaluation of a partner certainly qualify as an external source. Jealousy and associated aggression resulting from such threats, therefore, can be understood to impel one to redress the wrong to one's sense of honor caused by the partner's attention to a rival. Such aggression, though normally not socially appropriate or acceptable, may nonetheless serve an adaptive function from an individual's standpoint if it does prevent the relationship and its associated benefits from being usurped.

The Present Studies

As noted, almost all previous research investigating jealousy and any proposed mediators has relied on predictions of jealousy intensity to hypothetical events or on correlational methodologies involving retrospective reports.² Such strategies limit confident testing of candidate models of jealousy. For instance, our past work investigating the links between self-esteem and jealousy revealed that individuals believe they will be more jealous of rivals who excel in areas of high import to these individuals' self-concepts (DeSteno & Salovey, 1996b). Individuals who, for example, place great value on their athletic prowess predict they will be more jealous in response to their partner interacting with an athlete rather than with a musician. Taking a self-esteem maintenance perspective, we argued that jealousy intensity is linked to the threat posed by a rival along dimensions central to self-definition; a partner's attention to such a rival implies that he or she is superior in the domain of import. However, without a measure of variation in the proposed mediator in real time, such conclusions are difficult to substantiate, especially when they are based on imagined as opposed to actual experiences of jealousy. Several other alternative accounts for our findings could easily be put forth. For instance, individuals might be most jealous of rivals who excel in domains important to their self-definitions simply because they believe that their partners find people who excel in these areas attractive. Self-esteem concerns might not play any role; individ-

uals might simply be making strategic judgments about which potential rivals are most likely to peak their partners' interests.

To address such limitations, the current experiments differ substantially from past attempts to link self-esteem to jealousy in two important ways. First and foremost, rather than relying on retrospective or prospective reports of jealousy we had participants experience a jealousy-evoking scenario in the lab through the formation and dissolution of a working relationship. Though effortful to orchestrate, an in vivo experience of jealousy is necessary to infer the causal linkages among the variables in question. In addition to providing the ability to manipulate partner and rival behaviors in ways that would not be readily accomplished through the use of preexisting relationships, the use of this technique also allowed us to control for idiographic factors that may have moderated jealousy intensity if existing relationships were used (e.g., relationship duration, level of commitment). Although these working relationships represented new relationships for participants, they were designed to be very enjoyable and productive. The threatening of such a budding relationship by a rival, consequently, would constitute a relevant scenario for jealousy.

Second, we decided to assess self-esteem with both implicit and explicit measures; previous work in this area has only involved explicit measures. Assessment of self-esteem through implicit measures promised to provide a more accurate measure in the present experiments given that an implicit measure is more likely to reflect momentary changes in one's evaluative stance toward one's self as a function of one's salient contingency of self-worth (Crocker & Wolfe, 2001; Greenwald & Banaji, 1995; Greenwald & Farnham, 2000). Indeed, past research has clearly documented the sensitivity of implicit measures of evaluation to changes in context that make different features of a concept more salient (Dasgupta & Greenwald, 2001; Lowery, Hardin, & Sinclair, 2001; Wittenbrink, Judd, & Park, 2001). Therefore, as self-evaluation within the context of the current relationship becomes the salient contingency of worth, corresponding alterations in self-evaluation should be readily captured by using implicit measures of self-esteem (cf. Koole, Dijksterhuis, & Knippenberg, 2001).

It is important to note that in using an implicit measure, we are not making any assumptions regarding a lack of conscious awareness of self-esteem. As noted by Greenwald and Banaji (1995), *implicit self-esteem* may be defined as an attitude toward the self that is either inaccurately identified or outside of awareness. In the present studies, individuals may have been aware of their views and feelings toward the self in response to their partners' actions or, if not immediately aware, may have had ready access to such information upon reflection. The primary benefit of the use of an implicit measure is that it reduces bias stemming from either a lack of awareness or motivation for positive self-presentation. Explicit measures, given the static and more global nature of their questions, may not be as sensitive to context-induced flexibility. Consequently, they may be less sensitive to the threats that our jealousy manipulation may produce. Threats to self resulting from the manipulations we used would not be expected to alter self-esteem for nonrelationship-relevant contingencies of self-worth (e.g., self-

² Work by Volling and colleagues has examined sibling jealousy through in vivo inductions with child samples; however, mediational hypotheses were not examined in these studies (Volling et al., 2002).

evaluations that are based on intellectual, athletic, or other abilities; cf. Crocker & Wolfe, 2001). Additionally, explicit measures of self-esteem usually require a more deliberate consideration of the self. Such measures, because of their greater controllability, are more amenable to strategic attempts meant to obscure threats to self-esteem (Greenwald & Banaji, 1995; Koole et al., 2001).

The basic structure of the two studies is quite similar and involved the formation and subsequent threatening of a valued relationship through the interaction of participants with two confederates: one playing the role of partner and one the role of rival. The jealousy manipulation involved whether the partner indicated interest in working with the rival and ended his or her working relationship with the participant. Following this manipulation, participants completed measures of self-esteem and jealousy. In addition, the second study examined the links between jealousy and direct aggression aimed at partners and rivals.

Study 1

The primary goals of this study were to demonstrate that jealousy can be evoked in a laboratory setting and to investigate whether jealousy is mediated by threats to self-esteem. As noted earlier, the occurrence of jealousy is not limited to romantic relationships; it occurs in relationships of all types involving a valued partner. Accordingly, we expected that after participants formed a novel and pleasant relationship with a work partner, threats to that relationship posed by a rival should produce jealousy. Moreover, we expected that jealousy intensity would vary as a direct function of decreases in self-esteem. The intensity of any resulting jealousy can be expected to be relatively mild as the relationship is quite new. Nonetheless, jealousy should occur whenever there is a threat to even a budding relationship of potential value and, thereby, provide an opportunity to examine the functioning of this emotion in real time.

Method

Participants

Forty-six female undergraduates at Northeastern University participated in this experiment in partial fulfillment of a course requirement.³ Participants were randomly assigned to either the jealousy or the control condition.

Manipulations and Measures

Jealousy manipulation. In order to induce jealousy *in vivo*, a complex triadic interaction involving the participant was staged through specific actions by two confederates playing the respective roles of the partner and the rival. The details of the induction are noted in the procedure description in the following section as they are integrated with the unfolding of the experimental paradigm. In brief, a confederate playing the role of the partner forms an enjoyable working relationship with each participant. At a later point in the experimental session, the bonds of this relationship are threatened and broken because of either the usurpation of the relationship by a confederate playing the rival (i.e., the jealousy condition) or fate (i.e., the control condition). In all conditions, the partner was male and the rival was female.

Implicit self-esteem. Implicit self-esteem (ISE) was assessed with an implicit association test (IAT) based closely on that developed by Greenwald and Farnham (2000). This measure has been shown to possess good reliability and predictive validity with respect to both self-report and

behavioral measures (Bosson, Swann, & Pennebaker, 2000; Greenwald & Farnham, 2000). For example, ISE measures that use the IAT have been demonstrated to predict defensive behavior in response to threats to self-esteem when used to assess narcissism in consort with explicit self-esteem measures (Jordan, Spencer, Zanna, Hoshino-Browne, & Correll, 2003; McGregor & Marigold, 2003). This measure has also been shown to predict clinical status with respect to depression and susceptibility of depressed individuals to contextual changes in self-evaluation and mood (Gamar, Segal, Sagrati, & Kennedy, 2000).

In this task, the self-versus-other category was represented by 10 self-relevant versus 10 nonself-relevant items. The evaluative attribute was represented by 10 pleasant (e.g., joy, peace) and 10 unpleasant (e.g., agony, vomit) words (see the Appendix for the complete stimulus set). Stimuli were presented by using DirectRT software (Jarvis, 2004) on PC-type desktop computers (Intel Pentium III, 550 MHz processors) equipped with CRT color monitors.

At the start of the ISE task, each participant provided the self-relevant information items (e.g., last name, student ID) in response to prompts by the computer (see the Appendix for the complete set of prompts). Of importance, these items did not possess any intrinsic positive or negative qualities; any valenced associations would only arise through their association with the self. In order to disallow any sense of personal association with the nonself-relevant stimuli, a set of 10 items matching the form of the self-relevant items was provided for all participants (see the Appendix for the complete list). The assumption of lack of any self-association was checked both through the comparison of generated items and debriefing.

After providing this information, participants completed an IAT that assessed self-esteem. Participants were instructed to categorize four types of stimuli (self-relevant vs. other-relevant information, pleasant vs. unpleasant words) by using two designated response keys. Errors were always noted by the appearance of the word *error* on the screen, after which participants had to press the appropriate key to continue to the next trial. Response latencies for error trials were recorded as the time from stimulus onset to the time of correct categorization (Greenwald, Nosek, & Banaji, 2003). In the first block (20 trials), participants categorized items as belonging to the self or other category. In the second block (20 trials), participants categorized words as pleasant or unpleasant. In the third block (20 practice trials followed by 40 critical trials), participants completed a combined categorization task by classifying informational items as self or other and words as pleasant or unpleasant by using the two keys (for a randomly selected half of the participants, pleasant was paired with self and unpleasant with other; for the other half, this pairing was reversed). In the fourth block (20 trials), participants had to categorize pleasant versus unpleasant words by using the opposite keys to those used in the earlier blocks. Finally, in the fifth block (20 practice trials followed by 40 critical trials), participants again completed a combined categorization task by classifying information items as self or other and words as pleasant or unpleasant by using the two keys. In this block, all participants categorized self–nonself and pleasant–unpleasant stimuli in a manner that was opposite to the stimulus pairing combination used in the third block.

To the extent that participants held a positive evaluation of themselves, they should have been faster at associating self-related words with pleasant stimuli and slower at associating self-related words with unpleasant stimuli (Dasgupta, Greenwald, McGhee, & Banaji, 2000; Greenwald & Farnham, 2000; Greenwald et al., 1998, 2003). Scoring of the ISE measure was done in accordance with the *D* algorithm developed by Greenwald et al. (2003). Each participant's *D* was computed by subtracting the mean response time for Block 3 from Block 5 and dividing the resulting quantity by the pooled standard deviation of the two blocks. The *D* measure may be conceptually understood as an index of individual differences in the degree to which

³ The sample was limited to women due to gender constraints in the participant pool.

responses for the Self + Bad trials were slower than those for the Self + Good trials adjusted for individual differences in the variability of response times. Higher *D* values indicate higher self-esteem as indexed by increased difficulty in completing the Self + Unpleasant as compared with the Self + Pleasant trials.

The *D* metric has been shown to be free from contamination effects due to stimuli ordering and to group differences in task-switching ease (Mierke & Klauer, 2003). Therefore, any resulting differences between the experimental conditions that use this metric cannot be attributed to the effects of simple distraction arising from the use of the jealousy manipulation. That is, differences in *D* scores did not occur because the jealousy manipulation simply occupied cognitive resources in the jealousy group (e.g., rumination) and, thereby, made it more difficult for individuals to respond to the changing stimulus pairings inherent in the IAT.

Explicit self-esteem. Explicit self-esteem was assessed by using the State Self-Esteem Scale (Heatherton & Polivy, 1991).

Jealousy. Jealousy was assessed by using a feeling state questionnaire in which participants indicated the degree to which each of 10 adjectives described their current state. The questionnaire consisted of both positive and negative items, embedded in which were four items that specifically targeted jealousy: jealous, angry, betrayed, and hurt (Cronbach's $\alpha = .81$). Parrot and Smith (1993) have demonstrated that these feeling descriptors capture the multifaceted experience of jealousy in a way that is distinct from other related negative emotions (e.g., envy). Participants' jealousy scores reflect the mean score on these four items.

Procedure

Participants were run individually for all sessions. Upon arrival at the lab, the participant (S) was greeted by the experimenter and asked to sit in a chair in front of a cubicle containing a PC. The room contained five such cubicles with an accordion wall that partially expanded so as to separate two cubicles from the other three. Immediately after S entered the room, a confederate playing the role of the partner (P) arrived and was similarly greeted. The experimenter then informed them that two other participants were also scheduled to arrive and that they would therefore wait a few minutes before beginning the session. At this point, P introduced himself to S and began use of predetermined conversational probes that were designed to initiate a sense of familiarity and liking. After 3 min, the experimenter returned and noted that the experiment would begin without the other participants.

The experimenter informed S and P that the study in which they would take part was designed to examine differences in task performance levels as a function of working alone or in pairs. Moreover, as some of the tasks would be conducted on computers, the experiment would also involve S and P taking two hand-eye coordination tests that would allow the experimenter to adjust scores for individual differences in hand-eye acuity for computer use. After the first such test, S and P would be free to choose to work together or alone on the first problem-solving task.

At this point, S and P were instructed to turn to their computers to complete the first hand-eye coordination task. In actuality, this task was an IAT taken from Greenwald et al. (1998) that assesses positive attitudes toward flowers versus insects. Its only purpose was to familiarize participants with the IAT so that it would require less instruction to complete the ISE measure after the introduction of the critical manipulation.

When S and P had finished this IAT, the experimenter returned to the room and provided instructions for the first problem-solving task (in actuality, participants would only complete one such task). This was a word unscrambling task. P and S were handed sheets of paper that contained letter matrices at the top of each. The task was to find as many words as possible that were contained in each matrix. After reminding them that as there were only 2 of them they could choose to work together or alone, the experimenter left the room. P then turned to S and asked if she would like to work together.⁴

The problem-solving task served only as a vehicle to foster the formation of a pleasant working relationship. During the next 5 min, P's task was to ensure that S enjoyed working with him. He did this through repeated smiling and the use of a set of verbal responses. For example, he would provide encouragement (e.g., "let's see if we can figure out this one") and validation (e.g., "that's a good one" and "I'm glad we're doing this together") to the participant. After 5 min had passed, a knock was heard at the door and the experimenter appeared from a side room to answer it. The confederate playing the rival (R) then entered the room and apologized to the experimenter for being late. The experimenter informed R that she would complete the earlier hand-eye coordination task at the end of the experiment, handed her a clipboard containing the materials for the word scramble task, gave brief instructions for it, and left the room. R then grabbed a chair and sat next to S and P. For the next 3 min, the three individuals worked together. However, R was instructed to devote most of her attention and interactions (i.e., validations and encouragements) to P.

At this point, the critical manipulation occurred. In the jealousy condition, P suddenly noted that he thought the experimenter said they could only work alone or in pairs. After expressing concern that this could be a problem, he went into the next room and asked the experimenter. The experimenter and P returned to the room at which point the experimenter noted that they could only work in pairs or alone before turning to leave. P then turned toward R and asked if she would like to continue as his partner. R agreed and the two moved to the other side of the room (i.e., behind the partially expanded accordion wall) and continued working within earshot of S for 1 min. In the control condition, P suddenly noted that he had an appointment at the campus medical center that he had forgotten. He then went into the next room to tell the experimenter who could be heard excusing him with the caveat that he return later to finish the study. In this way, the enjoyable working relationship was severed in both conditions. However, in one it was due to the presence of a rival and in the other to consequences of fate.

At this point in both conditions, the experimenter then returned to the room and instructed the individuals to turn toward their individual PCs and to follow the instructions provided. Participants then completed the implicit and explicit measures of self-esteem, the jealousy scale, and a questionnaire concerning demographic information. The confederate(s) always left the experimental room before the participant had finished. Upon completion of the study, participants were extensively debriefed and given a small gift of candy for their participation.

Results and Discussion

In accord with expectations, the termination of a relationship due to a partner leaving to work with a rival as opposed to leaving for a scheduling conflict was successful in evoking jealousy. Participants reported higher levels of jealousy in the jealousy condition ($M = 1.65$, $SD = 0.89$) than in the control condition ($M = 1.21$, $SD = 0.30$), $t(44) = 2.21$, $p = .03$. It is instructive to note that the variation in reported jealousy is quite large in the jealousy condition relative to the control condition.⁵ Thus, even though the mean level of self-reported jealousy in the jealousy condition falls in the mild to moderate range, it masks a high degree of variability. Such differences in variability are to be expected given the lack of jealousy in the control condition and individual differences in self-presentational concerns related to the stigmatizing nature associated with admitting to jealous feelings

⁴ In all cases except one, this proposal was accepted. Data from the participant who chose to work alone were discarded from all analyses.

⁵ A *t* test assuming unequal variances for the two groups also showed a significant difference in jealousy ($t = 2.29$, $p = .03$).

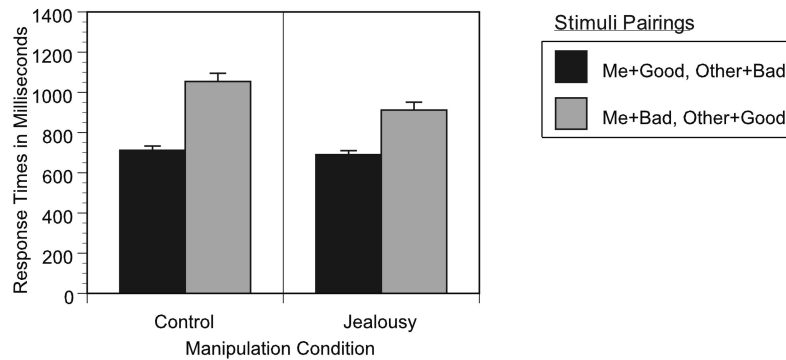


Figure 1. Implicit self-esteem as a function of the jealousy manipulation in Study 1. Error bars depict standard errors.

(Mathes et al., 1982; Wiederman, Allgeier, & Ragusa, 1995). Nonetheless, the manipulation was quite strong (Cohen's $d = 0.73$), indicating that the two distributions were relatively separable.

Given that jealousy had been successfully induced in the lab, the next question centered on the potential of threatened self-esteem to function as the mediator of this emotion. In accord with predictions, a partner's leaving for a rival resulted in a decrease in implicit self-esteem. That is, participants demonstrated lower ISE scores when the partner left for the rival ($M_D = 0.55$) than when he left for an appointment ($M_D = 0.82$), $t(44) = 2.57$, $p = .01$, $d = 0.75$. For ease of interpretability, Figure 1 presents the response latencies in the ms metric for the IAT (Me + Good and Me + Bad) blocks as a function of jealousy condition.⁶ The extent to which Me + Bad response times exceed Me + Good in the control as compared with the jealousy condition stands at 120 ms, thereby indicating a lowered association of the self with positivity in the jealousy condition.⁷ Examination of explicit self-esteem scores revealed no differences as a function of jealousy condition. As noted, this finding was to be expected given the broader focus of most self-esteem scales across individuals' sets of contingencies of self-worth.

Demonstration of condition differences in ISE do not, of course, directly imply mediation of jealousy by threatened self-esteem. We therefore conducted a mediation analysis following the usual procedures (Kenny, Kashy, & Bolger, 1998). Zero-order correlations and regression beta weights are shown for the predicted mediational model in Figure 2. As expected, significant zero-order

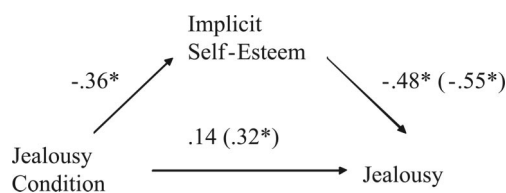


Figure 2. Implicit self-esteem as a mediator of jealousy. Coefficients in parentheses indicate zero-order correlations. Coefficients not in parentheses represent parameter estimates for a recursive path model containing both predictors. Asterisks indicate parameter estimates that differ from zero at $p < .05$. Jealousy condition is dummy coded (control = 0, jealousy = 1).

correlations existed among all three variables. However, when jealousy intensity was regressed on ISE and condition, only ISE remained a reliable predictor. Supporting the view of complete mediation, the ability of the actions of the partner and the rival to induce jealousy possessed no causal efficacy beyond that explained by the manipulation's ability to threaten self-esteem (Sobel $Z = 2.08$, $p = .04$). Indeed, as self-esteem decreased in response to the partner's interest in the rival, jealousy intensity correspondingly increased.

These findings provide strong initial support for the theory of jealousy that we advocate. They represent the first direct evidence of the role played by threatened self-esteem in the evocation of jealousy. Of great import, they demonstrate a rapid decrease in self-esteem in response to the favorable interaction of the partner and rival that is directly associated with the intensity of jealousy experienced. Nonetheless, given the novelty of the methodology and findings, they bear replication and extension before greater confidence can be placed in the proposed theory.

Study 2

In this study, we sought not only to replicate the findings of Study 1 but also to assess further the proposed theory of jealousy through examining its predictive validity with respect to a frequent behavioral correlate of this emotion: aggression aimed at partners and rivals (Mullen, 1993, 1996; Parker et al., 2005). Finding a positive association between the jealousy induced in our participants and any aggressive behavior would further support the construct validity of both our procedures and model of jealousy. Of greater theoretical import, however, would be the ability of the

⁶ Although we used the psychometrically more robust D scoring procedure for ISE, it is instructive to note that the Condition \times Block Type interaction is also significant ($p < .05$).

⁷ Karpinski (2004) has noted that use of IAT techniques to assess ISE may be influenced not only by participants' self-evaluations but also by their evaluation of the target other. That is, participants' ISE could appear, as opposed to be, lower if the target other varied across individuals. This concern is not relevant in the present case. The information about the other (e.g., name, nationality, student ID) was constrained to be anonymous and held constant across groups. Thus, any resulting group differences in ISE must reflect changes in self-evaluation.

experimental nature of our paradigm to examine the causal relations between self-esteem threat, jealousy, and any resulting aggression in this triadic interaction. It is precisely the correlational nature of past research that has suggested an association between jealousy and aggression that has limited its ability to demonstrate that jealousy causes aggression. Indeed, several plausible alternatives exist. Specific individuals, for example, might be both more susceptible to jealousy and more aggressive without one factor mediating the other; threats to self-esteem might influence each factor directly (cf. Baumeister et al., 1996; Twenge, Baumeister, Tice, & Stucke, 2001). The inclusion of a direct aggression measure in the present study has the potential to illuminate propositions concerning the causal efficacy of jealousy to produce hostile behavior and, in so doing, will provide a clear test of the proposed model of jealousy.

Method

Participants

Forty-three undergraduates (30 female, 13 male) at Northeastern University participated in this experiment in partial fulfillment of a course requirement. Participants were randomly assigned to either the jealousy or the control condition.

Manipulations and Measures

With the exception of the aggression measure, all manipulations and measures were identical to those used in Study 1. Given that this sample contained members of both genders, the confederate playing the partner was always of the opposite gender to the participant; the confederate playing the rival was always of the same gender.

To assess aggression, we used a paradigm slightly modified from that developed by Lieberman, McGregor, and colleagues (Lieberman, Solomon, Greenberg, & McGregor, 1999; McGregor et al., 1998) in which participants were given the opportunity to inflict pain on others through deciding on the amount of hot sauce, a substance known to be potentially painful and disliked by the target others, that would be placed in the others' mouths. The primary modification involved changes necessary for assessing aggressive behavior toward two individuals as opposed to one. The details of this measure are explained in the procedure section below. The amount of hot sauce was measured in grams by using preweighed containers on an Ohaus Adventurer Pro digital scale (Model AV212, Pinebrook, NJ) with a maximum weight capacity of 210 g and precision of 0.01 g.

Procedure

With the exception of two changes necessary for implementing the aggression measure, the procedure was identical to that used in Study 1. One change, involving a ruse needed to collect taste preferences for the aggression measure occurred before the beginning of the Study 1 procedure. The second, involving the opportunity to engage in aggression, occurred at the conclusion of the Study 1 procedure. Between these two events, the Study 1 procedure unfolded as previously described. The two changes are detailed below.

At the start the experiment, the participant and confederate playing the role of partner entered the room. After waiting to no avail for the arrival of the "other participants," they were informed that they would be taking part in two unrelated studies: one investigating the effects of working alone or in pairs on task performance and one involving the relation of personality to taste preferences and acuity. At the start of the experiment, they would first complete a brief personality measure (i.e., a bogus 5-item measure

asking about hours per day spent watching television, enjoying outdoor pursuits, working on academic endeavors, etc.) and then a questionnaire that was designed to assess their degree of liking for several tastes: sweet, sour, creamy, salty, spicy, and fruity. Liking was assessed by using a 21-point scale ranging from 1 (*don't like at all*) to 21 (*extremely like*). Participants were then informed that later in the session, each of them would be randomly assigned to provide a taste sample for other participants of a single item from a smaller subset of these categories. In order to provide an explanation for why participants would be making the taste sample, they were told that this procedure would allow the experimenter to remain blind to certain aspects of the experiment. After completing the personality and taste preference measures, the remainder of the procedure unfolded as in Study 1. The only modification in this section involved the rival completing the personality and taste preference measures before joining the participant and partner in the word scramble task.

After completing the remainder of the Study 1 paradigm, the participant and the remaining confederate or confederates (both the rival and the partner in the jealousy condition or only the rival in the control condition) were told that it was now time to complete the taste preferences study. In the control condition, the participant and confederate were told that the partner had agreed to return to complete the taste preference study after his or her medical appointment. The experimenter then handed each of them a box that contained three food items, two empty sample containers, information regarding the food item they were to prepare for each of the other participants (i.e., the partner and the rival), the taste preference questionnaires of the two other people in the session, and the food category that they (i.e., each participant) were assigned to taste. Participants were informed that they would be allowed to see the others' preferences as people are often curious about what others' taste preferences might be. At this point, the experimenter told them that each person would go to a separate room to place the samples in the containers. After everyone had finished, the experimenter would return to each of them, place the designated samples as produced by the other participants into their mouths and ask them to fill out questionnaires regarding their attitudes toward these food items. Of importance, they were told that the entire contents of the sample containers would be placed in each of their mouths. At this point, the experimenter told the real participant that he or she would create the sample in the current room and offered the food item box. The other confederate(s) was then led out to a supposed different location.

Upon opening the box, the participant saw the two food preference questionnaires from the partner and rival. They had no names indicated on them, but were identifiable by the first item: the gender of the person. Both questionnaires indicated a liking of 3 on the 21-point scale for spicy foods (on which 1 indicated no liking at all). After removing these questionnaires, the participants saw a written set of instructions, two sample containers, and three labeled food items: sweet (chocolate syrup), fruity (fruit punch), and spicy (hot sauce bottle with a fiery label and "hotness" warnings). The instructions noted that each of the two other participants (confederates) had been randomly assigned to receive spicy samples. Participants were reminded that the others would not know who had prepared each sample and that the entire amount in each sample cup would be placed into each of the other's respective mouths. Participants were then instructed to pour any amount of the hot sauce into two containers labeled male and female, respectively. They were then to place a cover on the sample containers, place them in the box, and return the box to the experimenter. At this point, the experiment ended and participants were fully debriefed.

Results and Discussion

As in Study 1, the jealousy manipulation resulted in increased jealousy, $t(41) = 2.46, p = .02, d = 0.78$, and lowered self-esteem,

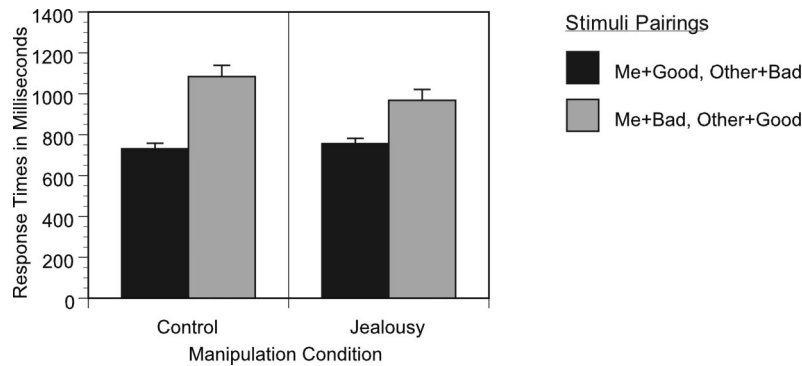


Figure 3. Implicit self-esteem as a function of the jealousy manipulation in Study 2. Error bars depict standard errors.

$t(41) = 2.08, p = .04, d = 0.64$.⁸ Participants reported more jealousy when the partner left for a rival ($M = 1.57, SD = 0.61$) than for a medical appointment ($M = 1.19, SD = 0.35$).⁹ Similarly, they also evidenced lower ISE in response to the partner leaving for a rival ($M_D = 0.53, SD = 0.47$) than leaving for an appointment ($M_D = 0.80, SD = 0.37$). For ease of interpretability, Figure 3 depicts the response latencies in the ms metric for the IAT Me + Good and Me + Bad blocks as a function of jealousy condition.¹⁰ The degree to which Me + Bad response times exceeds Me + Good in the control as compared with the jealousy condition is 141 ms, thereby indicating, as was the case in Study 1, a lowered association of the self with positivity in the jealousy condition. Once again, no differences were evident on the explicit self-esteem measure.

In turning to an examination of the aggression measure, a 2 (jealousy condition) \times 2 (gender) \times 2 (target: partner vs. rival) mixed ANOVA provided clear evidence for the predicted main effect. Participants aggressed toward the partner and the rival to a much greater degree in the jealousy condition ($M = 3.41$ g) than in the control condition ($M = 1.44$ g), $F(1, 39) = 8.60, p < .01, d = 0.77$. No differences emerged as a function of the target of the aggression; hostility was aimed equally at the partner and the rival. A main effect of gender also emerged; hot sauce samples produced by men were larger on average ($M = 4.24$ g) than were those produced by women ($M = 1.67$ g) across conditions, $F(1, 39) = 8.31, p < .01, d = 0.87$. This effect, though not explicitly predicted, may reflect either a stable gender difference in taste preference or portion allotment, or a more general tendency among men to act more aggressively irrespective of provocation (Eagly & Steffen, 1986).¹¹ No other reliable effects emerged.

The findings involving jealousy and ISE closely mirror those of Study 1 and, in so doing, provide strong support for the proposed role of self-esteem. Moreover, the demonstrated differences in aggression provide the first experimental evidence documenting a link between jealousy and aggressive behavior. Two important and intertwined issues, nonetheless, remained. These involved a repeated demonstration of the mediational role played by self-esteem in jealousy intensity and, more importantly, an examination of whether jealousy resulting from threatened self-esteem would mediate aggression aimed at the partner and rival. To examine these issues, we specified the recursive path model depicted in Figure 4. In this model, each of the respective potentially causal variables

(i.e., the jealousy manipulation, ISE, and jealousy intensity) is allowed to influence all downstream variables. That is, we allowed direct causal paths from the jealousy manipulation to ISE, jealousy intensity, and aggression; from ISE to jealousy intensity and aggression; and from jealousy intensity to aggression. In this way, the potential causal influence of each variable on those that are subsequent to it in the causal sequence can be assessed, thereby allowing us to test the viability of the proposed causal model. In addition, given the influence of gender on aggressive behavior irrespective of the jealousy manipulation, we also specified a direct path capturing this relation. Aggression here was defined as the mean level directed against partners and rivals.

AMOS (Version 5.0; Arbuckle, 2003) was used to generate parameter estimates with a maximum likelihood algorithm. The resulting model fit the data quite well, $\chi^2_{\text{exact fit}}(3, N = 43) = 2.66, p = .45$; root-mean-square error of approximation $< .01$.¹² As can be seen in Figure 4, the causal chain that emerged matched the predicted model: A partner leaving for a rival led to lowered self-esteem, which led to greater jealousy, which led to increased aggression aimed at the partner and rival. These findings are of great import, as they not only replicate Study 1's demonstration of the mediating role played by threatened self-esteem in the evocation of jealousy but also provide empirical evidence of the mediating role of jealousy in eliciting aggression. Threatened self-esteem did not directly lead to hostility aimed at the sources of the threat but rather engendered an aversive emotional state that, in

⁸ Although we did not expect participant gender to have any individual or interactive effects on jealousy and threatened self-esteem, we also submitted the data to a factorial ANOVA with gender as a second predictor to examine this possibility. Gender did not differentially influence either variable.

⁹ This difference was also significant using a t test assuming heterogeneity in group variances ($t = 2.49, p = .02$).

¹⁰ A mixed ANOVA treating the IAT blocks as a repeated factor also produced a significant Condition \times Block interaction ($p < .05$).

¹¹ A similar gender difference with the hot sauce measure was reported by Evers, Fischer, Mosquera, and Manstead (2005).

¹² Supporting this view, constraining the nonsignificant paths to zero also resulted in a well-fitting model, $\chi^2_{\text{exact fit}}(6, N = 43) = 9.86, p = .13$, and a negligible decrement in fit, $\Delta\chi^2(3, N = 43) = 7.20, ns$.

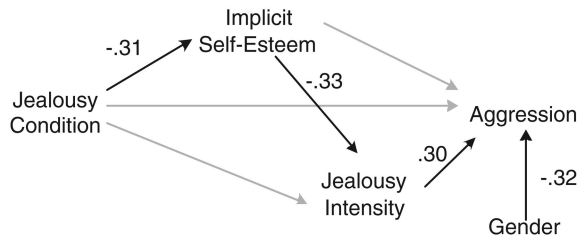


Figure 4. Recursive path model specifying linkages among each predictor and all downstream variables. Black paths and coefficients indicate parameters that reliably differ from zero at $p < .05$. Grayscale paths represent nonsignificant relations. Jealousy condition and gender are dummy coded (control = 0, jealousy = 1; men = 0, women = 1).

turn, led individuals to inflict pain on those responsible for the threat.

General Discussion

The findings of these two studies provide evidence for a theory of jealousy based on threatened self-esteem. In each case, a decrease in self-esteem occurred in real time as a function of a partner showing favor for a rival, and, of central import, this decrease directly mediated the intensity of jealousy experienced. Jealousy, moreover, was shown to mediate actual aggression aimed at partners and rivals, thereby providing construct validation for our jealousy induction procedure and identifying, for the first time, a direct causal link between jealousy and aggressive behavior. As we noted earlier, previous work has revealed a link between threatened self-esteem and aggression (Baumeister et al., 1996). This relation, we believe, supports the identification of threatened self-esteem as a principal mediator of jealousy, and in light of the current findings, points to the important role that may be played by emotion in mediating such outcomes.

It is also worth reiterating that our use of an implicit measure of self-esteem is not meant to imply that individuals will not possess a conscious awareness of lowered self-evaluation or a feeling of inferiority. Our primary reason for the use of an implicit measure to assess alterations in self-evaluation involves its sensitivity to rapid context-induced changes with respect to currently salient features of self. In essence, it provides a measure of self-esteem that is responsive to whichever features of self constitute the working self-concept at a given moment (cf. Crocker & Wolfe, 2001; DeSteno & Salovey, 1997). It is possible that a carefully designed and validated explicit self-esteem measure targeted to a self-contingency directly related to the individual-partner-rival interaction might produce parallel findings. However, one would also need to consider the influence on this measure of strategic attempts to obscure evidence of feelings of threat.

Jealousy and Social Rejection

The present findings may indicate an important role for jealousy in the study of social rejection. We believe that jealousy represents a specific emotional response to a specific form of social rejection: the actual or looming rejection by a partner in favor of a rival. In accord with our expectations, the present findings demonstrate the occurrence of this specific emotion and associated hostile behav-

iors.¹³ These findings raise the question of how jealousy relates to the expanding literature examining the phenomena of rejection and ostracism (e.g., Leary & Baumeister, 2000; Twenge et al., 2001; Williams, 1997; Williams et al., 2000). For example, work by Baumeister and colleagues (Baumeister, DeWall, Nathan, & Twenge, 2005; Twenge et al., 2001) has demonstrated that rejection often leads to several negative behavioral outcomes, including aggression. It is interesting that findings demonstrating emotional responses to rejection and their role in mediating subsequent behavior have been more mixed. Research by Baumeister and colleagues has repeatedly found little if any increases in self-reported negative affect in response to manipulations of rejection. Given that a motivation to engage in social relationships appears to be a fundamental drive (Baumeister & Leary, 1995; S. T. Fiske, 2004), the lack of strong evidence for an emotional response to relationship threats is somewhat surprising. However, recent work by Eisenberger, Lieberman, and Williams (2003) has produced evidence suggesting a link between rejection and a negative emotional response. Participants in their study who experienced rejection from a social triad demonstrated heightened activation of brain centers associated with the experience of pain.

One reason underlying these divergent findings may involve the different methods commonly used to induce rejection. For example, false feedback that one is likely to be lonely in the future may hold different affective consequences as compared with active exclusion by social beings. Another reason may involve a reliance on measures of negative affect (e.g., global negative mood scales that assess general negativity or dysphoria) to assess participants' emotional states as opposed to more discrete negative experiences such as jealousy. Active exclusion, for example, might well lead to feelings of anger but not to feelings of anxiety or sadness. Measures of global negativity might therefore be less sensitive to intensity differences in specific negative states (see Tracy & Robins, 2004, for a similar argument). To our mind, the type of emotional response that is elicited depends greatly upon the exact form of social rejection that is experienced. All social rejection is threatening and to be avoided; however, the adaptive responses and associated emotional states that are required vary depending on the specific nature of the threat.

Similar mixed findings occur with respect to the effect of rejection on self-esteem. Work by Twenge and colleagues (Twenge et al., 2001; see also Baumeister et al., 2005) found little evidence that rejection influences self-esteem. Yet, work by Williams suggests that self-esteem is lowered in response to rejection (Williams, Cheung, & Choi, 2000; see also Leary et al., 1995). Here again, we suspect that some of these differences may depend

¹³ Given that our composite jealousy measure did contain descriptors of feeling items that might be relevant to any type of social rejection (i.e., hurt, anger), we also undertook an item-by-item analysis to be certain that the reported jealousy differences were not stemming solely from differences with respect to these feeling states. Through the use of Stouffer's meta-analytic test on data from both studies, it is clear that the emotional states experienced by participants were characterized by jealousy. The jealousy manipulation produced significant differences on the items jealous ($Z = 2.30, p = .02$) and betrayed ($Z = 3.21, p < .01$) and marginal differences on the items angry ($Z = 1.68, p = .10$) and hurt ($Z = 1.77, p = .08$).

on the manipulations used to induce rejection as well as on the nature of the measurement of self-esteem.

The present research offers a unique perspective on these issues. To our knowledge, there has been little research in this area that has simultaneously investigated the causal links between the three constructs examined here: self-esteem threat, emotional response, and aggression. Rather, research has focused on subsets of linkages between these constructs. Some evidence supports each link: (a) self-esteem has been shown to be threatened by rejection, (b) rejection has been shown to produce aggression, and (c) rejection has been shown to be emotionally painful. Several different causal models specifying the relations among these variables could be proposed on the basis of these findings. In fact, excluding the present findings, there is no extant evidence that, as we would propose, rejection leads to a decrement in self-evaluation which leads to jealousy (in the case of rejection from an existing relationship in favor of a rival), which leads to aggression. Indeed, the potential for a negative feeling state to occur and mediate aggression in response to social exclusion was examined only in Twenge et al. (2001), in which little support was provided for this view. In that study, however, negative affect was assessed by using a global as opposed to a discrete measure.

Jealousy, we believe, may be a linchpin that holds many of these phenomena together. The current findings suggest that it may function as the warning and impetus to protect valued relationships from being usurped. As self-esteem fluctuates in response to a partner showing greater interest in a rival, it serves as a proxy to assess the adaptive challenges resulting from threats to the relationship and, in turn, spurs a highly aversive emotional state designed to shunt thought and action toward preservation of the relationship. Jealousy, of course, is not the only negative emotion that may result from rejection. The presence of an existing relationship is required for its evocation, but, as noted, one may experience rejection in other ways as well. Other situations (e.g., refusal of admission into a social group) would, in all probability, lead to the experience of aversive states but not jealousy per se. The functional purpose of jealousy is intrinsically tied to behaviors designed to protect the integrity of a relationship (e.g., derogation of rivals, aggression toward partners and rivals). Given that rejection from an existing relationship due to the presence of a rival stands as one of the canonical sources of rejection in human life, the present findings suggest that jealousy may play a fundamental role in linking self-esteem threats from interpersonal rejection to aggression. Threats of loss not due to a rival may be expected to engender other emotion-mediated behaviors aimed at maintaining the relationship (e.g., greater attempts at attraction, tears or other signs of a need for succor).

Integrating a Disparate Literature

At the outset of this article, we noted that the jealousy literature lacks consensus with respect to a broad theoretical framework. Although researchers agree on jealousy's phenomenology, consensus regarding its underlying causes and mechanisms has been much more difficult to find. To date, jealousy's causal mechanisms have been posited to depend on evolved sex-specific modules (Buss et al., 1992; Buunk et al., 1996; Wiederman & Allgeier, 1993), stable idiographic traits (Bringle, 1991), correlates of the attachment system (Collins & Read,

1990; Sharpsteen & Kirkpatrick, 1997), self-evaluation maintenance processes (DeSteno & Salovey, 1996b; Salovey & Rodin, 1984), and culturally learned syndromes (Hupka, 1991; Hupka & Ryan, 1990). Although not constituting an overarching theory, findings associated with each perspective clearly document variability in jealousy as a function of individual and cultural differences.

In the current studies, although we provided evidence that threatened self-esteem mediates jealousy, we investigated none of these other factors (e.g., cultural membership, attachment style), leading questions to arise concerning whether these disparate findings can be integrated by using the proposed framework. In considering this issue, it is important to note that any mechanisms that underlie jealousy must evidence a high degree of flexibility. Individuals' relationship partners, whether they be lovers, friends, parents, or coworkers, regularly interact with scores of people in myriad ways. Spouses socialize with business associates, parents play with multiple siblings, and friends have dinner with other friends. Sometimes such events evoke jealousy; sometimes they do not. Some individuals habitually react jealously; others often display a confident security. Events that cause jealousy among members of a certain culture are of no concern to members of another. Therefore, although the interest of a partner in a rival stands as the most basic factor in the elicitation of jealousy, many influences may function to modulate the resulting emotional experience. Thus, in the face of such countless and seemingly irreconcilable variants (see Salovey, 1991, for a comprehensive overview), contextual plasticity must be the essence of any potential mediator.

It is our contention that a model of jealousy based on threatened self-esteem readily provides a mechanism to allow for the incorporation of universal, dispositional, and cultural influences in the determination of what types of actions by one's partner evoke jealousy and, thereby, has the ability to explain many extant findings in the literature. For example, significant cultural and subcultural variability exists with respect to the types of behavior that evoke jealousy (Buunk & Hupka, 1987). Among the Todas of India or the "swinger" subculture in Europe and the United States, for instance, extra-dyadic interactions of certain types are accepted practice (Buunk, 1991; Rivers, 1906). It is interesting that jealousy is often staved off in such cultures through affirmations that a partner's extradyadic liaisons reflect recreational needs and not a devaluation of the nonparticipating partner's worth (Buunk, 1991). Moreover, cultures of honor regularly view certain types of extra-dyadic liaisons by one's partner as resulting in one's loss of honor and self-esteem and, correspondingly, also accept and expect more frequent aggression aimed at partners and rivals in such situations (Vandello & Cohen, 2003). In light of these and other related findings, a logical argument for the mediating role of self-esteem may be made. For example, individuals reared in a culture of honor acquire a heightened sensitivity to events that might result in a challenge to their status or public standing (Nisbett & Cohen, 1996). Consequently, one might readily expect their self-esteem to be more threatened by a partner showing interest in another, resulting in the more intense jealousy and associated aggression seen in members of this cultural group (cf. Vandello & Cohen, 2003). Similar actions by a partner, though certainly not pleasant

to anyone, might be expected to result in a less intense threat to an individual raised in a culture of law.

The case is similar with known idiographic effects on jealousy. For example, variation in attachment styles has been linked with differential jealousy (Buunk, 1997; Sharpsteen & Kirkpatrick, 1997) and with differential self-esteem (Bartholomew & Horowitz, 1991; Brennan & Bosson, 1998; Collins & Read, 1990). More specifically, individuals who are not securely attached exhibit more intense or frequent jealousy (Guerrero, 1998; Sharpsteen & Kirkpatrick, 1997), lower self-esteem (Bartholomew & Horowitz, 1991; Collins & Read, 1990), and increased odds of aggressive behavior toward partners (Dutton, Saunders, Starzomski, & Bartholomew, 1994). Given that attachment styles can be conceptualized as mental models of the self in relation to significant others and that they have been found to shape interactions with valued relationship partners at all stages of life (Bartholomew & Horowitz, 1991; Bowlby, 1973; Fraley, 2002; Hazan & Shaver, 1987; Pietromonaco & Barrett, 1997), it seems likely that such models may color the interpretations of a partner's interactions with a rival. Individuals whose attachment is characterized by more anxiety may be more likely to believe given interactions of their partner with potential rivals signal a greater valuation of such rivals vis-a-vis themselves. Thus, threatened self-esteem might play a role in the relation between jealousy and aggression in less securely attached individuals.

A similar argument may pertain to individual differences in rejection sensitivity. Rejection sensitivity refers to a dispositional tendency to expect, readily perceive, and anxiously or angrily react to rejection (Downey & Feldman, 1996). In line with this tendency, heightened rejection sensitivity has been associated with heightened jealousy and aggression aimed at relationship partners (Downey & Feldman, 1996; Downey, Feldman, & Ayduk, 2000). Here again, a dispositional tendency toward rejection sensitivity may exert its influence on jealousy through increasing the likelihood that interactions by one's partner with a potential rival are interpreted as threats to one's self-esteem; rejection, here, implies a sense of inferiority to the partner's other options.

Given the complexity and variability of human social systems, we believe that threat assessment must be based on inputs from multiple systems. That is, self-esteem threats must be assessed with respect to universal, idiographic, and cultural determinants. For example, becoming aware that one's partner is holding the hand of his or her sibling presents a very different threat possibility than becoming aware of his or her holding the hand of an unrelated individual. Similarly, specific interactions of men and women in one culture may portend distinctly different consequences than in another culture. Accordingly, self-esteem threat assessments may be derived from appraisal systems shaped by universal signals (e.g., nonverbal cues emitted by a partner and rival), idiographic factors (e.g., attachment style, rejection sensitivity), and cultural expectations (e.g., proscribed types of contact). In short, threats to self-esteem may be jointly determined by systems working in a synergistic or oppositional dynamic. Herein lies the benefit of using self-esteem as a proxy to assess threat. Although the motive to protect self-esteem (i.e., valuation by others) most likely stands as a biological universal, tuning of the system with respect to the factors that imply threat remains open for much input through idiographic social learning and acculturation. Put simply, social experience functions to fine tune interpretations of threat based on

one's environs, resulting in greater efficiency at predicting and preventing a problem of significant adaptive consequence.

Future Priorities and Directions

The present studies open wide avenues for examining jealousy and its behavioral sequelae. As just noted, investigation of the interplay of universal, idiographic, and cultural factors on jealousy stands as an area of high import both for further validation of the advocated theory and for increased understanding of the ways in which such multilevel factors shape the experience of social emotions in general. Humans are a social species, but we are also one that shows large variation with respect to cultural ethos. Social emotions, therefore, can be expected to be sensitive to these interwoven influences and the unique requirements they hold for adaptive functioning.

These initial findings also call for replications involving relationships of a more long-standing nature. The ability to find jealousy within newly formed relationships is not surprising. In order for any relationship to become established, it must pass through initial formation stages. If a motive to protect such budding relationships did not exist, the benefits that are yet to come could not be realized. Consequently, jealousy aimed at guarding such relationships makes great sense, as these initial stages may represent one of the most vulnerable periods for filching by rivals. Nonetheless, it will be important to assess further the degree to which threatened self-esteem functions as the sole mediator of jealousy. One could argue that the complete, as opposed to the partial, mediation demonstrated for self-esteem in the current paradigm may stem from the use of novel relationships. That is, the loss of the partner to a rival possessed no risks beyond those to self-esteem. The relationship was not associated with other benefits or resources; there were no issues involving finances, mutual friends, or progeny.

It is our expectation that more intense jealousy would occur with relationships of greater value and investment. However, we do not expect the causal efficacy of self-esteem to change. More intense jealousy most likely results from the greater weight one places on the views of well-loved partners in determining self-evaluation (cf. Murray et al., 2003). It may be quite true that financial or familial concerns with respect to relationship dissolution lead to intense negative emotions such as fear or sadness. These emotions, however, are likely to occur whether or not a relationship is threatened by a rival. Such concerns are relevant if a partner is ending a relationship for any reason; they are not uniquely dependent on the existence of a usurping rival. Jealousy, however, does require the presence of a rival. Consequently, we would anticipate that emotional experiences associated with threats to established relationships may be experienced as more aversive because of both greater jealousy resulting from threatened self-esteem and from the comorbidity of other loss-relevant emotions (e.g., fear, sadness). Indeed, work by Drigotas, Rusbult, Wieselquist, and Whitton (1999) has suggested that strongly valued partners exert a high degree of influence on the shaping of an individual's self-concept through helping to define the nature of one's ideal self. Consequently, any implied threats to the status of this ideal self may be quite painful and induce not only jealousy, but also feelings of dysphoria and depression (cf. Higgins, 1987). Of course, to the degree that relationships are characterized by strong mutual levels

of commitment and investment, the modal level of well-being and the use of associated strategies (e.g., forgiveness) can be expected to limit the occurrences, but not the intensity, of jealousy (cf. Finkel, Rusbult, Kumashiro, & Hannon, 2002; Wieselquist, Rusbult, Foster, & Agnew, 1999). Consequently, we expect that an examination of threats to established relationships, though much more difficult to orchestrate, would result in a magnification of the findings presented here and, thereby, increase their generalizability.

Finally, development of additional measures of jealousy intensity stands as an important goal for future research. In the present case, we relied on the use of self-report measures of emotion. Although self-reports of emotion have clearly been demonstrated to be a valid assessment tool (Barrett, 2004), they are, at times, subject to self-presentational concerns. In the present case, such concerns may have led participants to underreport the intensities of jealousy they experienced because of the somewhat stigmatizing nature of this emotion. The development of alternative measures may be complicated by the probable fact that jealousy, like many more complex social emotions, is not associated with a specific, static facial expression (cf. Keltner & Buswell, 1997). Nonetheless, it may be possible to gauge its intensity through the coding of dynamic changes in expression and other nonverbal channels that, when taken together, comprise the blended phenomenological experience of jealousy (e.g., blends or sequences of anger and anxiety). Indeed, the development and use of a multi-indicator assessment of jealousy that combines self-report and non-verbal measures with hormonal markers of emotional stress may provide a window into jealousy intensity that is less constrained by the methodological limitations associated with any of these strategies used in isolation.

Coda

As noted in the preceding paragraphs, much work does remain to be done. At present, however, we feel that we have obtained a glimpse into the heart of the green-eyed monster. It is a heart built on two fundamental and interlinked motives. The first is the desire to feel good about the self; the second is the necessity to be engaged in beneficial relationships for which the first serves as a proxy. To sate these motives is to protect much that is important to social living at all stages of life. To threaten them is to signal possible problems of high consequence to well-being and, therefore, to whet the retributive appetite of Shakespeare's monster.

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Appendix

Stimuli for Implicit Self-Esteem Task

Pleasant Words

glory, gold, health, joy, kindness, lucky, peace, sunrise, truth, warmth

Unpleasant Words

agony, corpse, death, filth, killer, poison, slum, stink, torture, vomit

Self-Information Probes

first name, last name, birthday, birth year, hometown, home state, zip code, home country, ethnicity, student ID number

Other-Relevant Items

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