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Explication of Interspousal Criticality Bias

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Abstract

Although bias towards perceiving spousal criticism is related to dysphoria and marital discord (Smith & Peterson, 2008), the bias *construct* has received insufficient elaboration. We explicated the criticality bias construct by exploring its correlates and incremental validity relative to perceived criticism, marital attributions, and negative affect. 118 couples completed self-report measures and undertook a videotaped discussion task. Signal detection analyses of both spouses' and outside observers' ratings of discussions produced bias indices. Criticality bias evidenced a pattern of convergent and discriminant validity mirroring perceived criticism's (Renshaw, 2008). Bias also provided incremental validity beyond perceived criticism, marital attributions, and negative affect to the prediction of behavior. Bias may be a dysfunctional way to view marital events and a stress generation process.

Keywords

criticality bias; criticism; depression; marital adjustment; stress generation

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Criticism from close relatives predicts poor treatment response and higher rates of relapse across a wide variety of psychiatric disorders and physical illnesses, including depression (Wearden, Tarrier, Barrowclough, Zastowny, & Rahill, 2000). Criticism is also linked to marital distress (Hooley & Teasdale, 1989; Lynch, Robins, Morse, 2001). Furthermore, relations between criticism and both depression and marital distress hold across several types of criticism, namely, perceived criticism as self-reported by spouses and expressed criticism, as coded by outside observers (Hooley & Teasdale, 1989). Those who are depressed or maritally discordant also over-perceive spousal criticism by a process that we refer to as "criticality bias" (Smith & Peterson, 2008).

Given the associations among depression, marital discord, and various types of criticism, and the potentially broad range of applications of this research given criticism's status as a generalized stressor across physical and emotional disorders (Hooley & Gotlib, 2000; Wearden et al., 2000), it is important to clearly explicate the nature of central criticism constructs, such as perceived criticism, expressed criticism, and criticality bias. The *perceived* criticism construct has already been explicated to a substantial degree by studies that demonstrate a compelling pattern of convergent and discriminant validity associations (Chambless & Blake,

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2008; Riso, Klein, Anderson, Ouimette, & Lizardi, 1996; for a review see Renshaw, 2008). *Expressed* criticism has also been well-explicated as a component of the Expressed Emotion construct (Chambless, Bryan, Aiken, Steketee, & Hooley, 1999). Insofar as criticality *bias* is concerned, presently available evidence comes from a single sample. Like actual criticism, criticism bias in this sample covaries with perceived criticism, dysphoria, and marital discord (Smith & Peterson, 2008). Criticality bias in this sample also evidences incremental validity beyond perceived criticism in the prediction of depression diagnosis (Smith & Peterson, 2009), thus highlighting its potential importance for theories of depression and Expressed Emotion. In sum, while the construct validities of perceived and expressed criticism are fairly well established, there are far fewer explications of the construct validity of criticality *bias*, making the relevance of its important associations with perceived criticism, depression, and marital discord less clear.

The purpose of this study is two-fold. First, like construct validation studies of perceived criticism (Riso et al., 1996), we will examine the construct validity of criticality bias by locating it within a network of associations among symptoms, individual differences, marital attributions, and behaviors. We predict that criticality bias will fit within this network of convergent and discriminant relationships in a manner similar to that observed for perceived criticism (Renshaw, 2008). Specifically, we expect criticality bias to be associated with relational and symptom constructs, demonstrating convergent validity with respect to negative affect, relationship attributions, and behavior during marital interactions while demonstrating discriminant validity with respect to positive affect and individual differences.

More important than convergent and discriminant validity however, is the second purpose of this study, which is to examine the incremental validity of criticality bias beyond other criticism constructs, general relationship cognitions, and negative affect in accounting for marital communication. Owing to the complexity of its assessment and its expense relative to self-reports of global perceived criticism, marital attributions, and negative affect, it is especially important to establish bias' incremental validity. A conservative approach to introducing new constructs also prevents theoretical accounts from becoming more complex than necessary. Finally, we will examine the incremental validity of bias with respect to behavior because it is only through behavior that cognitive phenomena, such as criticality bias, can have interpersonal impact. To the extent that criticality bias can predict unique variance in behavior, it will be useful for researchers and practitioners to consider as a possible mechanism of stress generation and marital discord.

Criticality Bias and Symptomatology

Criticality bias should be explicated not only relative to general diagnostic categories such as Major Depressive Disorder but also relative to general symptoms of psychopathology. Because perceived criticism is related not only to depression relapse (Hooley & Teasdale, 1989) but also to anxiety symptoms following treatment (Renshaw, Chambless, & Steketee, 2003) and relapse in substance abuse (Fals-Stewart, O'Farrell, & Hooley, 2001), criticality bias is likely not a symptom specific to depression. That is, criticality bias may be a more fundamental psychological process related to general psychological distress, possibly even cutting across multiple diagnoses (Hooley & Gotlib, 2000). For instance, criticality bias may be related to various otherwise distinct disorders through its relation to the higher-order construct of negative affect. Negative affect is hypothesized to be associated not only with a general negative outlook on life but also with a specific oversensitivity to criticism (Clark & Watson, 1991; Watson & Clark, 1984). Therefore, we expect bias to be related to negative affect. And because low positive affect is an especially distinctive feature of depression (Clark & Watson, 1991), we will examine positive affect as well, though theoretical descriptions of low positive affect do not support specific predictions about its relationship with criticality bias.

Criticality Bias and Individual Differences

In the same way that criticality bias may be associated with fundamental processes such as negative affect, criticality bias may also be related to other third variables that may underlie bias' relationship with depression and marital discord, such as individual differences traditionally linked to depression and relationship stress. While we do not expect criticality bias to be associated with individual differences, it is important to test this expectation empirically to establish criticality bias as distinct from potentially related constructs associated with depression and discord.

In this regard, sex differences are worth examining. Women are twice as likely as men to experience a depressive episode (Nolen-Hoeksema, 1987). Many studies have suggested that there are important sex differences in the perception of marital communication (Noller, 1980; Carels & Baucom, 1999; Fincham, Garnier, Gano, & Osborne, 1995). Likewise, the association between depressive symptoms and marital adjustment seems to be significantly greater for women than for men (Whisman, 2001). A common cognitive process may account for this pattern of sex differences, at least to the extent that these sex differences parallel sex differences in criticality bias. However, if criticality bias follows a pattern of discriminant validity similar to perceived criticism, it should not be associated with sex (Renshaw, 2008).

Another candidate individual difference theoretically associated with the development of depression in response to interpersonal stress is sociotropy (Beck, Epstein, & Harrison, 1983). Sociotropy reflects variation in the extent to which people need and are concerned about their personal relationships and the quality of their interactions with others (Beck et al., 1983). Characteristically sensitive to rejection (Bieling, Beck, & Brown, 2000), highly sociotropic people may be more sensitive to criticism from spouses. Criticality bias, or the tendency to report both actual and imagined criticism, may reflect these interpersonal sensitivities. It is important however, to distinguish criticality bias from this general tendency to be sensitive to the quality of relationships. Previous studies of perceived criticism have shown only small correlations between perceived criticism and personality traits such as sensitivity to criticism (Renshaw, 2008). Therefore, we do not believe that criticality bias will be associated with sociotropy.

Attachment style has been linked with marital discord and depression (Shaver, Schachner, & Mikulincer, 2005). There are also theoretical and empirical reasons to examine the association between attachment style and criticality bias. Theoretically, Bowlby (1981) proposed that negative internal working models of self and others, developed in response to prior relationships with caregivers, predispose people to erroneously interpret negative events as personal failings. Empirically, poor parental bonding experiences have been associated with maladaptive cognitive processes, such as excessive attention to negative information and dysfunctional automatic thinking (Ingram & Ritter, 2000; Ingram, Overbyey, & Fortier, 2000). Similarly, Barrett and Holmes (2001) found that adolescents with insecure romantic attachment and insecure parental attachment interpreted ambiguous social situations as more threatening than did their securely attached peers. Negative working models of relationships may be associated with criticality bias in the same manner. Due to this potential overlap between attachment and criticality bias, we must establish that criticality bias is not simply a reflection of avoidant or insecure attachment.

Finally, depression is associated with excessively seeking reassurance (Starr & Davila, 2008). Excessive reassurance seeking may arise from fears of rejection (Starr & Davila, 2008) or out of concerns about negative evaluation from others (Coyne, 1976). Such sensitivities to rejection or negative evaluation might lead to heightened attention to criticism and even perhaps to an over-perception bias. To make criticality bias useful in theoretical

accounts, it is imperative that criticality bias is not just a reflection of general interpersonal sensitivities of those who excessively seek reassurance.

Criticality Bias and Marital Cognitions

Although bias' convergent validity with respect to marital adjustment has been established (Smith & Peterson, 2008), bias' relations with other marital constructs, such as marital cognitions, have not been tested. Nevertheless, evidence from previous studies shows that bias may be related to general marital cognitions (e.g., negative attributions and expectations). For example, those who are not satisfied with their marriages tend to have characteristic cognitive tendencies, such as making destructive attributions about their spouse's negative behaviors (Fincham & Bradbury, 1993) and seeing their spouse as more negatively than is warranted (Murray, Holmes, Dolderman, & Griffin, 2000). Thus, we predict that criticality bias will be highly associated with other cognitive phenomena associated with marital discord, namely destructive relationship attributions.

Criticality Bias and Interpersonal Behaviors

Given that criticality bias is ultimately an internal cognitive process, it can only have interpersonal or relationship consequences if it has external behavioral correlates. Therefore, we seek to establish bias' convergent validity with respect to destructive marital behavior. Past research has documented relations between cognitions (e.g., attributions and expectations) and subsequent negative behavior in spousal interactions (Fletcher & Thomas, 2000; Miller & Bradbury, 1995; Sanford, 2006). In addition, husband bias in perceiving both criticism and rejection from female strangers has been shown in a previous study to be associated with self-reported verbal aggression towards their wives (Schweinle, Ickes, & Bernstein, 2002). Other forms of verbal aggression, such as criticism, demand, and negative tone in interactions, may also relate to criticality bias.

While there are many types of behavior related to marital discord and depression (e.g., lack of social support, demand, withdrawal), criticality bias may be especially closely tied to hostile, as opposed to non-hostile, dysfunctional behaviors towards one's spouse. This is because criticality bias involves perceiving hostility from one's spouse, which could easily prompt hostile behaviors in return. That is, while bias should have convergent validity in relation to criticism and demand, it should have discriminant validity in relation to non-hostile dysfunctional forms of communication such as depressive behavior (self-criticism) and withdrawal.

To reiterate, the purpose of this investigation is to examine the convergent and discriminant validity of criticality bias with respect to symptoms, individual differences, marital attributions, and behavior. We will also test the incremental contribution of bias, beyond traditional constructs linked with marital discord and depression, to the prediction of various hostile marital behaviors.

Method

Participants

We recruited married couples from South Bend, IN and surrounding areas in two phases. During the first phase we targeted primarily non-depressed community couples using newspaper advertisements for a "marital communication" study. Some analyses based on this sub-sample were previously reported in Smith and Peterson (2008). Because the current investigation was part of a larger study involving depression and criticism, in the second phase we targeted depressed couples through newspaper advertisements, referrals from physicians, and fliers placed in a local community mental health center. Couples recruited by the first

method were paid $50 for their participation. In order to achieve a comparable rate of participant referrals from the community mental health center, and because such participants took substantially more time to complete the study (owing primarily to the greater attention their symptoms required during the diagnostic interview), payment was increased to $100 in the second phase to appropriately compensate participants for their time.

To assess inclusion and exclusion criteria, we diagnosed participants using the Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Non-Patient Edition (SCID-I/NP, Feb 2001 revision: First, Gibbon, Spitzer, & Williams, 2001). Couples were excluded from analyses if either partner was acutely suicidal, had experienced psychotic symptoms, or if they met criteria for substance abuse or dependence within the past year, Posttraumatic Stress Disorder within the past two years, Obsessive-Compulsive Disorder within the last two years, or had current or past manic episodes. 57 couples from the original sample of 175 were excluded based on these criteria. All diagnostic interviews were videotaped. A second diagnostician reviewed 80 SCID interviews (approximately 23% of the interviews). Chance-corrected inter-diagnostician agreement for the overall "depressed" versus "non-depressed" versus "excluded" classification was $\kappa = .82$.

After inclusion and exclusion criteria were assessed, in the final sample, there were 39 couples recruited by the first method and 79 couples recruited by the second method. There were no significant demographic differences between these two groups. Likewise, there were no significant differences between these groups in criticality bias. The primary difference between these groups was that, as expected, couples recruited from the community mental health center were likely to have more psychological and relational distress. For example, couples from the community mental health center had higher levels of negative affect, $t(113) = -5.91$, $p < .001$, and more destructive relationship attributions, $t(114) = -2.37$, $p < .05$, than those recruited from the community.

The majority of participants identified their race/ethnicity as White (78.0%). 9.3% identified as African-American, 3.4% identified as Hispanic, 0.8% identified as Asian, and 3.4 % identified as another race/ethnicity (e.g., "mixed"). Six participants did not indicate a race/ethnicity. Couples had been married for an average of 14.00 (*SD* = 14.28) years. Spouses averaged 42.44 years of age (*SD* = 14.15). Couples averaged 2.09 children (*SD* = 1.65; range = 0 – 7). Annual family incomes ranged from $0 to $150,000, with a median of $40,000 (*M* = 47,468; *SD* = 28,537).

Procedure

Couples participated in a 3 hour laboratory visit during which they completed questionnaires, gave a Five Minute Speech Sample (Magaña et al., 1986), engaged in a 10-minute videotaped marital interaction task (e.g., Pasch & Bradbury, 1998), and rated their videotaped marital interactions for intended and perceived criticism.

The marital interaction task was a variation of the Social Support Interaction Task (Pasch & Bradbury, 1998). Topic selection began with the experimenter informing couples which spouse would be the "target" of the subsequent discussion. For non-depressed couples, the target spouse was randomly determined via a coin toss. For depressed couples, the depressed spouse was designated as the target. For expository purposes, we will refer to the non-target spouse as the "source." Participants were not aware of this designation.

Following identification of the target, the topic of the discussion was chosen. In contrast to the original Social Support Interaction Task (Pasch & Bradbury, 1998), where the topic of the discussion is something that the target identifies that he or she would like to change in himself or herself, the topic of our discussions was a mutually agreed upon change in the target. After

topic selection, couples were videotaped engaging in a 10-minute discussion of the chosen topic. Two identically time-stamped videotapes were made of this interaction so each spouse could independently view and rate the same interaction segments.

Following the interaction, spouses were taken to separate rooms where they watched their videotape, listening to the audio track using headphones so that the experimenters could not overhear the couple's discussion. During playback, experimenters paused each spouse's video following identical 30-second segments using the embedded timestamps as cues. While the videos were paused, target participants completed a questionnaire assessing their perceived criticism whereas source participants completed a questionnaire assessing their intended criticism. At a later date, outside observers also rated couples' videotaped interactions for criticism and valence of both spouses as well as counter-criticism and self-criticism from the target spouse. Thus, criticism was assessed from three different perspectives; as it was *perceived* by the target, as it was *intended* by the source, and as it was *observed* by the raters. After watching the entire 10-minute interaction, observers also made global ratings of demand and withdraw behaviors separately for husbands and wives.

Observational Measures

Participants' ratings of criticism—Participants completed measures of criticism when an experimenter paused the videotape following each 30-second segment. Target spouses responded to the question, "How critical was *your partner being of you*?", indicating their levels of perceived criticism. Source spouses responded to the question, "How critical were you *intending to be of your partner*?", indicating their levels of intended criticism. Ratings were made on Likert-type scales that were labeled: 0 = "not at all critical", 1 = "slightly critical", 2 = "moderately critical", and 3 = "very critical." In making their judgments, participants were instructed to consider both the duration and intensity of the criticism over the entire 30-second segment.

Judges' ratings of criticism and valence—Observer ratings provide an independent standard against which to evaluate the cognitive and perceptual processes of the target spouse. Independent observer ratings also help expose discrepancies between source intentions and their actual behavior – discrepancies that cannot be attributed to the target bias under investigation. Three outside judges independently rated couples' videotaped interactions at each of the same 30-second segments rated by the couples themselves. Ratings were made of criticism from the source participant. Judges also made several other ratings of the *target* spouse, including ratings of criticism, counter-criticism, self-criticism, and valence (viz., whether the 30-second segment was "1" positive, "2" neutral, or "3" negative).

Training of the judges was based on definitions of criticism given in major observational coding systems (e.g., Magaña et al, 1986; Vaughn & Leff, 1976b; Weiss & Summers, 1983). Specifically, judges were trained to rate comments as critical if they expressed dislike, disapproval, or resentment of the spouse's personality or behavior. Criticism ratings of both the target and source spouse were made following each 30-second segment using a "0" to "3" scale, where "0" = "no criticism"; "1" = "low intensity and short duration criticism"; "2" = "high intensity or long duration criticism"; and "3" = "high intensity *and* long duration criticism, or global criticism of character." Counter-criticism was indicated when the source spouse made a critical comment and the target spouse responded within the next 30-second segment with a criticism of their own. Self-criticism was rated on the same scale as criticism but was rated only as it pertained to target's criticism of themselves. Prior to coding study tapes, sample tapes were coded in groups, with judges discussing their ratings out-loud in order to expose and resolve misunderstandings and to clarify definitions. Judges then rated study tapes independently of the other judges.

In all, seven judges provided ratings of participants' videotaped interactions. Videotapes were first grouped into sets of 25 consecutive participants. Each set of 25 videos was then randomly assigned three of the seven available judges. The reliability of these judges for each of the 30 second segments was estimated using an intraclass correlation coefficient, *ICC*(*3, k*), in order to correspond to the clip-by-clip level at which subsequent signal detection analyses were undertaken (Shrout & Fleiss, 1979). The reliability of the observed criticism ratings across the 20 segments was.84 for source spouses and.83 for target spouses. The reliability of ratings was. 69 for valence,.55 for self-criticism, and.43 for counter-criticism. The low reliability of the latter two variables was most likely due to the low item variances, as most target spouses did not have *any* instances of self-criticism or counter-criticism. Across all 20 clip segments, for all study participants, 92.34% and 97.55% of the time all three raters agreed in giving ratings of zero for self-criticism and counter-criticism, respectively, thus indicating a high degree of rater agreement despite the apparently low level of reliability.

Judges' ratings of demand/withdraw behavior—In addition to the ratings of criticism and valence at every 30-second interval during the videotaped interactions, at the end of each interaction, judges made global demand and withdraw ratings based on the couple's behavior during the entire 10-minute interaction. Ratings were based on definitions given in the Couples Interaction Rating System (Heavey, Gill, & Christensen, 1996). The withdraw subscale in this system consists of three behavioral variables: "avoidance," "withdraws," and "discussion" (reverse-keyed). The demand subscale consists of two behavioral variables: "blame" and "pressure for change." Each partner's behavior is rated on 9-point scales ranging from 1 to 9, with higher scores reflecting greater frequency and/or intensity of the behavior.

Before beginning the actual coding process, raters were provided with the shortened form of the Couples Interaction Rating System, that includes brief descriptions of demand and withdraw behaviors. Raters then participated in a training session during which they watched a random subset of videos together in order to help agree on the nature of the different behaviors. The same 7 raters that made criticism and valence ratings also made the demand and withdraw ratings so that each video was rated by the same three raters. Separate husband and wife demand and withdraw composites were created by aggregating each construct's constituent behaviors.

ICCs were computed across the three raters for the composite demand and withdraw scores. For husbands, the *ICCs* for demand and withdraw were.80 and.84, respectively. For wives, *ICCs* were.87 and.68 for demand and withdraw, respectively.

Self-Report Measures

Positive and negative affect—The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) assesses the degree that participants experience emotions on average. The PANAS consists of 10 negative affect adjectives (e.g., upset, nervous) and 10 positive affect adjectives (e.g., interested, excited) that are rated on a "1" (*very slightly or not at all*) to "5" (*extremely*) scale. Both subscales have excellent psychometric properties, with internal consistencies ranging from.86 to.90 for the Positive Affect and from.84 to.87 for Negative Affect (Watson et al., 1988). In this sample, reliabilities were.89 and.91 for the Positive and Negative Affect subscales, respectively. Likewise, the subscales evidence discriminant validity, correlating in the −.12 to −.23 range with each other (Watson et al., 1988). Convergent validity is evidenced by the correlation between Positive Affect and measures of reduced behavioral activation and arousal (e.g., the BDI) as well as Negative Affect's positive correlation with measures of neuroticism, inhibition, anxiety, and tension (Watson et al., 1988; Watson & Clark, 1984).

Sociotropy—The Sociotropy scale of the Personal Style Inventory-II (Robins et al., 1994) assesses sensitivity to interpersonal events and needs for approval and love. This scale comprises 24 items on three subscales: excessive concern over what others think, dependency, and pleasing others. The Sociotropy scale evidences a theoretically-meaningful pattern of convergent and discriminant associations with respect to other measures of sociotropy and with respect to depression, depressive experiences, gender, social desirability, and efficacy (Robins et al., 1994; Robins et al., 1997). Internal consistency is in the.90 range (Robins et al., 1997) and in the present study was.91.

Excessive reassurance seeking—The excessive reassurance seeking subscale (ERS) of the Depressive Interpersonal Relationships Inventory (Joiner, Alfano, & Metalsky, 1992) is a four-item scale assessing excessive pursuit of reassurance and excessive concern with how much others truly care. The ERS has an internal consistency approaching.90 (Joiner et al., 1992) and in our sample was.88. The ERS is correlated with observer ratings of reassurance seeking during discussions between college roommates (Joiner & Metalsky, 2001). It also distinguishes between depressed and non-depressed college students and predicts the development of depressive symptoms over time (Joiner & Metalsky, 2001). Discriminant validity is suggested by moderate correlations between the ERS and other personality factors such as dependence (Joiner & Metalsky, 2001).

Attachment—We measured attachment using a 13-item questionnaire developed by Simpson, Rholes, and Nelligan (1992), which was based on Hazan and Shaver's (1987) adult attachment measure. Participants respond to items based on their general feelings towards their romantic partners, using a Likert scale ranging from "1" (*strongly disagree*) to "7" (*strongly agree*). Each item was originally developed to identify secure, avoidant, or anxious-ambivalent attachment to romantic partners. Although the scale was originally constructed to measure these three basic attachment styles, factor analyses have shown that it consists primarily of two factors: anxious vs. nonanxious and secure vs. avoidant (Simpson et al., 1992). The avoidant/secure index has discriminant validity in that it is not highly correlated with love or closeness scales (Simpson et al., 1992). Cronbach's alphas for both indices are in the .6–.8 range (Simpson et al., 1992). In the current sample, Chronbach's alphas were.76 and.53 for the avoidant/secure attachment index and the anxious attachment index, respectively.

Spousal attributions—Causal and responsibility attributions for hypothetical negative spousal behaviors were measured with the Relationship Attribution Measure (RAM; Fincham & Bradbury, 1992). Respondents answer six questions pertaining to the cause of their spouse's behavior in 4 hypothetical situations using seven point scales ranging from "1" (*disagree strongly*) to "6" (*agree strongly*). Subscales of the RAM assess causality (locus, stability, and globality of the behavior) and responsibility (intentional, selfish, blameworthy) attributions. We summed all items of the RAM to create a total general attributions score, which effectively comprises the Causal and Responsibility subscales. Total RAM scores have good reliability and validity (Fincham & Bradbury, 1992). Internal consistency ranges from.89 to.94 (Fincham & Bradbury, 1992) and in the present sample was.94.

Spousal criticism—A modified version of the Perceived Criticism Measure developed by Hooley and Teasdale (1989) assessed global criticism. The scale consists of two questions: (a) "How critical is your spouse of you?", and (b) "How critical are you of your spouse?" The original scale ranges from "1" (*not at all critical*) to "10" (*very critical indeed*), but for purposes of the current study the scale was changed to a "0" (*not at all critical*) to "5" (*extremely critical*) scale to correspond with a longer measure, the General Criticism Inventory (Smith, Couture, & Myers, 2001), which measures criticism from multiple sources on a 0 to 5 scale. For the purposes of this study, we analyzed only scores on the perceived criticism item.

The Perceived Criticism Measure has good temporal stability and concurrent validity with the Camberwell Family Interview (Van Humbeeck, Van Audenhove, De Hert, Pieters, & Storms, 2002). Likewise, its discriminant validity is established by its lack of correlation with measures of depression and personality (Riso et al.,1996).

Results

To estimate bias in target spouse responses, we subjected the discussion data to signal detection analysis. Two separate analyses were conducted to compare (a) perceived and intended criticism (P-I) and (b) perceived and observed criticism (P-O). In each case, for P-I and P-O comparisons, I and O served as "signals" to be detected or not. If couples had missing data for more than five out of the 20 segments, or if they had either no criticism or criticism on every segment, they were excluded from the signal detection analyses because false alarm or hit rates could not be calculated or would be based on an insufficient number of observations. 30 couples were excluded from P-I analyses. Out of these 30, 4 couples were excluded because they had no intended criticism, 7 were excluded because they had intended criticism on every segment, and 15 were excluded because they had missing data for more than five of the segments. 37 couples were excluded from P-O analyses. Out of these 37, 19 were excluded because they had no observed criticism and 18 were excluded because they had missing data for more than five segments. No couples had observed criticism on every segment. With the excluded couples removed, the final analyses included 88 and 81 participants with P-I and P-O scores, respectively. Couples who were excluded did not differ systematically from those who were retained on any study variables.

Bias, c, was calculated from the hit and false alarm rates in the following manner: $c = .5 [z(H) + z(F)])$, where z is the standard normal deviate, H is the hit rate, and F is the false alarm rate (Macmillan & Creelman, 2005)[1]. Although there are several bias indices to choose from, c was chosen because it is a traditional signal detection index, it continues to be recommended by contemporary experts in the field of signal detection analysis (Macmillan & Creelman, 2005; Pastore, Crawley, Berens, & Skelly, 2003), and it is relatively familiar to substantive researchers.

Owing to the many statistical analyses of bias, we needed a strategy to control for family-wise error rate. We considered the self-reported convergent validity indicators (negative affect and attributions) as one family and therefore set the alpha level for those correlations at.05/2 =. 025. For discriminant validity analyses, it is more conservative *not* to adjust the alpha level. For observer-coded marital interaction behaviors, we had four hypothesized convergent validity indices. For those indices (criticism, counter-criticism, demand, and valence), alpha was set at.05/4 =.0125. Again, for discriminant validity indices (self-criticism and withdraw), we did not control for family-wise alpha level. For our tests of incremental validity, we treated the four regression models predicting discussion behaviors as one family. Subsequently, we set alpha at.05/4 =.0125 for the tests of the overall R^2 for each of the regression analyses. Following Fisher's protected t procedure (Cohen & Cohen, 1984), we only examined the significance of individual predictors if the overall R^2 was first found significant. This allowed us to set alpha at.05 for the subsequent tests of individual predictors.

For zero-order correlations, power for detecting a medium sized effect, with a two-tailed alpha level of.05, and 88 participants (e.g., for $c_{P\text{-}I}$ analyses) was.82. For parallel $c_{P\text{-}O}$ analyses (with

[1]Ordinarily with a graded response measure (e.g., 0–3) one would use additive ROC procedures (Macmillan & Creelman, 2005, p. 126–130), but in our data very few couples used all four response options (usually neglecting the rating of "3"). In order to preserve the sample size, we collapsed responses into the more familiar binary form, comparing zero to non-zero (viz., "1", "2", and "3") ratings. This recoding represents the simple presence versus absence of criticism during each 30-second segment.

80 participants), power was.78. Power for analyses involving the four behavioral variables, assuming a medium effect size, with a two-tailed alpha level of.01, was.61 for $c_{P\text{-}I}$ and.56 for $c_{P\text{-}O}$ (Cohen & Cohen, 1983). For regression analyses we used Fischer's protected *t*-tests to test the significance of individual predictors each at an alpha level of.05. Our maximum power was for analyses of $c_{P\text{-}I}$, attributions, perceived criticism, and negative affect in predicting target criticism. Power to test each of these individual predictors, assuming a medium effect size, was greater than.90. Our minimum power for the regressions was when we used $c_{P\text{-}O,}$ attributions, perceived criticism, and negative affect to predict target demand. Power to test each of these individual predictors assuming a medium effect size was approximately.90.

Characteristics of the Sample

55.1% of target participants were female. A chi-square test indicated that there was not a significant difference between the number of males and females chosen to be the target spouse, χ^2 (1) = 1.69, n.s. The means and standard deviations of the other main study variables are presented in Table 1 for the self-report measures and in Table 2 for the outside observer codes of target interaction behavior. Inspection of the means in Table 1 reveals that spouses had levels of positive affect similar to those seen in a large-scale community sample (*M* = 31; Crawford & Henry, 2004) but had levels of negative affect slightly higher than those seen in the same sample (*M* = 16). Spouses were fairly securely attached (Simpson, Rholes, & Nelligan, 1992). They also had average levels of excessive reassurance seeking and sociotropy. They tended to have average levels of relationship attributions, with levels consistent with those seen in a community sample (*M* = 74.4; Uebelacker & Whisman, 2005). In comparison, levels of attributions in depressed samples are higher, *M* = 80.7 (Uebelacker & Whisman, 2005).

Turning to Table 2, in regards to outside-observer coded behavior during the marital interaction task, target spouses made less than one mild critical comment per segment during the discussion. That is, on average, they used criticism in one to two segments during the discussion. However, criticism scores ranged from 0 to.65, meaning that for those at the tail of the distribution, spouses made a mild critical comment on about two-thirds of the 30-second segments of the discussion. This equates to at least 13 critical comments towards one's spouse during a discussion focused on changes in oneself. In comparison to criticism, spouses had lower mean levels of counter-criticism and self-criticism, with each occurring only rarely. For the most part, spouses were neutral in their tone. Finally, on average, spouses were only "somewhat" demanding and withdrawing.

Before calculating bias scores, we examined the hit and false alarm rates. Average P-I and P-O hit rates were.52 (*SD* =.27) and.56 (*SD* =.26). Average P-I and P-O false alarm rates were. 34 (*SD* =.28) and.38 (*SD* =.29). Therefore, spouses perceived criticism about half the time it was present and perceived it about a third of the time when it was not present.

Turning to bias, when target reports of perceived criticism were gauged against partner reports of intended criticism ($c_{P\text{-}I}$), average bias scores were.21 (*SD* =.81), meaning spouses tended to under-report criticism rather than to over-report it. When bias was calculated based on outside observer ratings of criticism ($c_{P\text{-}o}$) average bias scores were.07 (*SD* =.83). This indicates that, on average, participants did not have a systematic bias towards over- or under-perceiving criticism in relation to observer ratings of criticism. However, both $c_{P\text{-}I}$ and $c_{P\text{-}o}$ scores ranged from the most extreme over-perception bias (−1.64) to the most extreme under-perception bias (+1.64) possible in this study.

Self-report Correlates of Bias

Table 1 shows the within-subject correlations between bias and other self-reported personal characteristics for target spouses. As predicted, bias evidences discriminant validity with

respect to positive affect and convergent validity with respect to negative affect when bias was judged with respect to outside observers. The magnitude of the negative affect correlation ($r = -.28$) is in the medium effect size range. This mirrors published findings involving the relation between depressive symptoms and both bias and perceived criticism in a subsample of community participants used in the current manuscript (Smith & Peterson, 2008). A clearer pattern of discriminant validity emerged with respect to individual difference variables. All associations were statistically non-significant and effect sizes were all small. In contrast, as predicted, bias had convergent validity with relationship attributions, as it was highly correlated with bias. That is, those with more negative relationship attributions also tended to have the greatest degree of over-perception bias, $r = -.30$ and $r = -.41$, for $c_{P\text{-}I}$ and $c_{P\text{-}O}$, respectively.

Behavioral Correlates of Bias

The correlations between bias and target spouses' behavior during the 10-minute spousal discussion are presented in Table 2. Criticality bias was significantly related to negative forms of communication. Bias was significantly correlated with target criticism and counter-criticism in response to their partner's criticism. This indicates that those who tended to over-perceive criticism from their spouse were also more likely to be critical of their spouse. They were also more likely to respond to spousal criticism with criticism of their own. What is more, those who had a bias towards perceiving criticism from their spouse were also more negative in their tone and tended to be demanding (e.g., pressuring for change, blaming) of their spouse. While bias was related to these negative and hostile behaviors, bias did not seem to be related to withdraw or verbal self-criticism. In sum, as predicted, bias evidenced convergent validity in its correlations with negative externalizing behaviors towards one's spouse. Effect sizes for correlations between bias and negative behaviors were in the medium to large range (r's range from $-.27$ to $-.54$). Bias had discriminant validity with respect to more internalizing behaviors and self-directed critical comments.

Incremental Contributions of Bias in Predicting Behavioral Correlates

Having established an association between bias and negative marital interaction behaviors, we tested the incremental validity of bias in predicting two types of negative communication, namely, target criticism and demand. These two dependent variables were judged to be the most theoretically relevant in relation to depression and marital functioning. Criticism has been an important focus in the Expressed Emotion and psychopathology literature (Hooley, 2007), whereas demand behaviors have long been implicated in poor marital adjustment (Eldridge & Christensen, 2002).

For each dependent variable, we tested the incremental validity of bias, relationship attributions, general criticism, and negative affect. We felt it was important to establish bias' contribution beyond these more well-established and more easily assessed constructs. For these analyses, bias was entered with relationship attributions, general criticism, and negative affect in the prediction of discussion behavior. In all, we performed 4 related regressions, crossing 2 dependent variables (target criticism or demand) × 2 independent variables ($c_{P\text{-}I}$ or $c_{P\text{-}O}$). Table 3 gives these results. To simplify the narrative presentation of these results, and because results were similar for both kinds of bias (viz., $c_{P\text{-}I}$ and $c_{P\text{-}O}$), in what follows, we will only describe findings pertaining to bias when it was judged against outside raters, $c_{P\text{-}O}$.

In the prediction of target criticism of their spouse, the set of four variables significantly predicted 27.5% of the variance in target criticism, $F(4, 74) = 7.01$, $p < .001$. Following Cohen and Cohen (1983), we then examined the individual predictors to determine whether any made unique contributions to the prediction of target criticism. As shown in Table 3, only criticality bias significantly predicted target criticism after controlling for the other variables. Criticality bias accounted for 14.52% of the unique variance in the prediction of target criticism. When

predicting target demand rather than criticism, the same pattern emerged. That is, the regression with all four predictors significantly explained 39.6% of the variance in demand, F (4, 65) = 10.63, p <.001. The only individual predictor to account for unique variance was bias, accounting for 15.13% of the unique variance in demand. In sum, bias accounts for a substantial proportion of variance in spousal discussion behaviors (both criticism and demand) even when other marital cognitions, general perceived criticism, and negative affect are accounted for. In fact, bias is the only significant predictor of criticism and demand. This suggests that bias is a specific cognition explaining negative statements, specifically criticism and demand, expressed towards spouses in marital discussions.

Discussion

Although interspousal criticality bias evidenced a pattern of convergent and discriminant validity similar to that of the more widely established perceived criticism construct (Renshaw, 2008), it also evidenced incremental validity in relation to behavior, a pattern of associations that suggests the two constructs are similar, albeit importantly different, relational constructs.

Previous studies suggest that both perceived criticism and criticality bias primarily reflect the self-reported quality of one's marital relationship (Riso et al., 1996; Smith & Peterson, 2008). The present study goes beyond general relationship quality to show that criticality bias evidences specific convergent validity associations with both cognitive and behavioral indicators of marital discord, namely marital attributions and observer rated criticism and demand expressed towards one's spouse in a laboratory-based marital interaction. Criticality bias also behaves like perceived criticism with respect to individual differences such as sociotropy and excessive reassurance seeking in that it does not appear to be associated with these constructs. It is also similar to perceived criticism with regards to broader symptoms such as positive and negative affect, in that it is only moderately, if at all associated with negative affect and not at all associated with positive affect. However, just as perceived criticism's relation to symptoms needs to be further investigated (Chambless & Blake, 2008), so too, criticality bias' relation to symptoms deserves further attention, inasmuch as positive and negative affect do not adequately capture the breadth of possible symptom correlates.

In sum, it appears that bias is not primarily an indicator of severity of symptoms nor is it a variation on maladaptive personality traits or individual differences associated with depression. Instead, bias appears to be an indicative of people's views of their spouse and their marriage. Perhaps this is not surprising given how our interspousal criticality bias measure requires identifying a spouse's negative (i.e., critical) behavior. Nevertheless, given the unique way criticality bias was measured, and given the relative novelty of the construct itself, it was important to establish its validity and to embed it in a nomological net that is centered on evaluations of one's spouse and marriage.

Findings from this study also suggest a possible mechanism through which interspousal criticality bias and marital discord may come to be related. Over-perception bias was highly related to negative behaviors in the marital interaction, including such behavior as criticizing one's spouse, responding to criticism with criticism, demanding, and speaking in a negative tone. However, over-perception bias evidenced discriminant validity with respect to other destructive styles of communication, such as withdrawal, and with respect to depressive communication behaviors, such as self-criticism. Therefore, it appears that criticality bias, a cognitive phenomenon, is manifested behaviorally in the form of hostile behaviors towards one's spouse. The more one perceives they are being criticized, the more likely they are to be critical or hostile in return. Over time, negative behaviors associated with an underlying criticality bias could lead to marital discord and lowered relationship satisfaction for both partners. It remains to be seen, however, how criticality bias develops. That is, bias may be a

consequence of relationship dissatisfaction or exposure to a highly critical spouse or parent. Future experimental studies that test causal links between bias and discord or negative behaviors would be especially helpful as would longitudinal research to investigate how and when bias develops in the first place.

Perhaps more importantly, in addition to its convergent validity with respect to negative marital behaviors, criticality bias had incremental validity in predicting criticism and demand in marital interactions. Because bias is a new construct that is relatively difficult to efficiently measure, and because bias converges with other more well-established relational constructs that can be economically assessed via self-report, it was important to establish bias' incremental validity with respect to these more economical measures. Results suggested that criticality bias has incremental validity, accounting for more variance in negative interaction behaviors than perceived criticism, relationship attributions, and negative affect. Bias might have incremental validity with respect to perceived criticism because perceived criticism confounds both actual criticism and one's cognitive biases towards perceiving criticism, whereas bias is a pure measure of one's cognitive tendency to perceive criticism. Bias may have incremental validity with respect to relationship attributions because it is associated with a more primary stage of processing (detection) than relationship attributions (ascribing motives to perceived behaviors). In other words, when criticizing or expressing hostility towards one's spouse, partners might simply act on the basis of perceiving attacks (e.g., criticism) rather than on the basis of their attributions about such attacks.

Some caution is in order when interpreting the results. Both bias and behavior were gleaned from the same marital interaction task whereas perceived criticism and relationship attributions came from self-report measures that focus on the marital relationship much more globally. Bias may have predicted more variance in behavior because of shared method variance and temporal correspondence. Also, 12.7 and 15.3% of couples were excluded from P-I and P-O analyses due to missing data on more than five segments. Although participants without bias scores did not differ on major study variables from those with bias scores, it is possible that these data were not missing at random with respect to other, albeit unmeasured, variables that are related to bias. Lastly, it should be noted that these results may not generalize to couples suffering from other psychological disorders, as couples were excluded if they had severe psychological disorders besides major depression such as, substance dependence, PTSD, and OCD. Considering that about one-third of couples in the present sample were excluded because of these disorders, future research might profitably be extended to these additional clinical populations.

Criticality bias' incremental validity in predicting interaction behavior and its robust associations with marital attributions make it a promising target for future research investigating Expressed Emotion and stress generation. To the extent that they are like "targets" and "sources", it is of interest to consider the implications of these findings for patients and family members within the traditional Expressed Emotion paradigm. Inasmuch as bias is associated with both perceived criticism and expressed criticism, it may be part of the dysfunction evident on both sides of the EE family dynamic. To the extent that interspousal criticality bias also extends to a more general criticality bias towards perceiving criticism from non-spouse others, criticality bias may be a general mechanism underlying stress generation (Hammen, 1991). Therefore, it would be worth studying criticality bias and interpersonal behavior in the context of non-marital relationships to see if criticality bias is an even broader cognitive mechanism predisposing people, especially depressed people, to generate relational stress.

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Table 1

Descriptive Statistics and Zero-order Correlations of Self-report Measures with Bias

	Means (Standard Deviations)	Correlations	
Self-report measures		$c_{P\text{-}I}$	$c_{P\text{-}O}$
Symptomatology			
Negative affect	22.88 (8.70)	−.16	−.28*
Positive affect	30.55 (7.68)	.11	.14
Individual differences			
Sex		.07	.17
Sociotropy	87.75 (18.71)	−.01	−.10
Reassurance seeking	11.12 (5.56)	−.15	−.13
Secure attachment	30.00 (8.03)	.00	−.09
Anxious attachment	87.75 (18.71)	−.15	−.19
Marital Functioning			
Marital attributions	72.84 (23.83)	−.30**	−.41***

Note.

* $p < .025$.

** $p < .01$.

*** $p < .001$.

Table 2

Descriptive Statistics and Zero-order Correlations of Behaviors with Bias

	Means (Standard Deviations)	Correlations	
Target Behavior		$c_{P\text{-}I}$	$c_{P\text{-}O}$
Criticism	.09 (.13)	−.36*	−.45*
Counter-criticism	.02 (.04)	−.27*	−.34*
Self-criticism	.05 (.06)	−.05	.07
Valence	1.98 (.32)	−.29*	−.47*
Demand	2.86 (2.09)	−.45*	−.54*
Withdraw	2.76 (1.14)	.08	−.02

Note.

* $p < .0125$.

Table 3

Regressions Predicting Target Interaction Behavior

	B	*SE B*	β	*t*		*B*	*SE B*	β	*t*
Criticism					Criticism				
−Bias$_{P\text{-}I}$	−.04	.01	−.35	−3.32***	−Bias$_{P\text{-}O}$	−.07	.02	−.42	−3.84***
−GPC	.01	.01	.11	.97	−GPC	.00	.01	.03	.26
−Attributions	.00	.00	.14	1.11	−Attributions	.00	.00	.21	1.56
−Negative affect	.00	.00	−.07	−.65	−Negative affect	.00	.00	−.12	−1.09
Demand					Demand				
−Bias$_{P\text{-}I}$	−.93	.27	−.37	−3.44***	−Bias$_{P\text{-}O}$	−1.13	.28	−.44	−4.04***
−GPC	.30	.16	.21	1.84	−GPC	.29	.19	.17	1.47
−Attributions	.01	.01	.12	1.01	−Attributions	.02	.01	.20	1.56
−Negative affect	.00	.03	.00	.02	−Negative affect	−.02	.03	−.07	−.63

Note. GPC refers to target self-reports of general perceived criticism.

*** p <.001.