



Rejection sensitivity and disruption of attention by social threat cues

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ABSTRACT

Two studies tested the hypothesis that Rejection Sensitivity (RS) increases vulnerability to disruption of attention by social threat cues, as would be consistent with prior evidence that it motivates individuals to prioritize detecting and managing potential rejection at a cost to other personal and interpersonal goals. In Study 1, RS predicted disruption of ongoing goal-directed attention by social threat but not negative words in an Emotional Stroop task. In Study 2, RS predicted attentional avoidance of threatening but not pleasant faces in a Visual Probe task. Threat-avoidant attention was also associated with features of borderline personality disorder. This research extends understanding of processes by which RS contributes to a self-perpetuating cycle of interpersonal problems and distress.

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1. Introduction

Social relationships serve many essential human needs. Some people find the task of establishing and maintaining those relationships overwhelming, and cope in self-defeating ways that ultimately compromise both their relationships and other life goals. Heightened concern about the possibility of rejection is implicated in several maladaptive relational patterns, such as too readily becoming hostile, socially withdrawn, or over-accommodating of others (for review, see Romero-Canyas, Downey, Berenson, Ayduk, & Kang, *in press*). Extreme sensitivity to rejection and characteristic patterns of reacting to the possibility of rejection in daily life are also part of the defining criteria for several psychiatric diagnoses, including avoidant personality disorder/social phobia and borderline personality disorder (American Psychiatric Association, 2000).

In recognition of the central role of sensitivity to rejection in seriously maladaptive interpersonal patterns and in the resulting distress, much scholarship from the early psychoanalysts to the present has grappled with understanding how individuals with this vulnerability deal with the threat of rejection. In recent years, evidence that effective deployment of attentional resources underlies adaptive coping with challenging circumstances has motivated efforts to establish whether various psychological conditions and vulnerabilities are associated with general and specific forms of ineffective attention deployment in the face of threat (Mathews

& MacLeod, 2005). Accordingly, the question addressed in this research is how individuals who are highly sensitive to rejection deploy their attention when they encounter rejection cues. The first goal is to test the basic prediction that rejection-relevant stimuli should divert attentional resources and thereby disrupt simultaneous processes in people who are highly sensitive to rejection. The second goal is to examine how people high in RS deploy their attention once social threat is detected and whether biases in attention deployment are associated with particular constellations of maladaptive behaviors characteristic of rejection-sensitive people. The two constellations on which we focus are captured in features of borderline and avoidant personality disorders.

1.1. Conceptualizing rejection sensitivity as a defensive motivational system

The phenomenon of rejection sensitivity has a long descriptive history in clinical psychology and psychiatry, as noted above, and is associated with many personality dispositions including low self-esteem, neuroticism, social anxiety and insecure attachment style. Building upon attachment, object relations, and cognitive social-learning theories of development, Downey and colleagues have developed a model of rejection sensitivity (RS) that defines the phenomenon in social-cognitive terms – as the disposition to anxiously expect, readily perceive, and intensely react to rejection. The RS model proposes that prior exposure to the pain of rejection (Downey, Khouri, & Feldman, 1997), perhaps in conjunction with a biological vulnerability, leads individuals to become sensitized to the possibility of future rejection by significant others and moti-

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vated to protect themselves from it. Despite its intended function, RS typically has maladaptive consequences, in that the self-protective behaviors it promotes both impede the formation of significant relationships and ultimately undermine the relationships that people enter, eliciting further feelings of rejection (e.g., Downey, Freitas, Michaelis, & Khouri, 1998).

There is considerable evidence to support the notion that RS contributes to this self-perpetuating cycle of interpersonal problems and distress by leading individuals to process information in ways that prioritize detecting and quickly responding to threats of rejection – that is, through activation of the defensive motivational system. When viewing images conveying rejection, RS predicts heightened startle responses (Downey, Mougios, Ayduk, London, & Shoda, 2004), indicating greater activation of physiological systems to prepare for defending against threat (Lang, Bradley, & Cuthbert, 1990). RS also predicts being conditioned to react to angry faces with a physiological threat response that is more resistant to extinction than conditioned responses to other stimuli (Olsson, Carmona, Remy, Downey, & Ochsner, 2007). In addition to heightened readiness for physiological threat responses, those high in RS also have preexisting expectations for rejection that are readily triggered and used to make sense of social interaction cues in the current situation (Downey & Feldman, 1996; Downey et al., 1998). For example, people high in RS interpret short videoclips of others' naturalistic emotional responses as expressing more interpersonal negativity, but not more positivity (Romero-Canyas, Downey, Franco, & Bolger, 2008). Although the processes that serve early detection and management of potential rejection threats in rejection-sensitive individuals are likely to include defensively motivated attention deployment, no previous research has directly examined this question.

1.2. Rejection sensitivity and attentional interference in response to social threat

If, as both theory and research on the RS model suggests, the ability to quickly detect rejection threat is of particularly high priority for rejection-sensitive individuals, cues signaling potential for rejection should interfere with the successful completion of ongoing tasks by diverting attention from them. We test this prediction in Study 1 using a standard interference task, the Emotional Stroop (see Williams, Mathews, & MacLeod, 1996, for review). In this task, participants are asked to process one dimension of a stimulus (i.e., to name the ink color a word is printed in) while ignoring an irrelevant aspect of the same stimulus (the emotional content of the word). Words with emotionally significant content typically lead to slower color naming than other words, indicating that the task-irrelevant emotional dimension is interfering with attention to the task-relevant dimension (McKenna & Sharma, 2004; Phaf & Kan, 2007). That is, threat stimuli “ensnare attentional resources” to cause interference with goal-directed activity (Williams, Watts, MacLeod, & Mathews, 1988; Williams et al., 1996).

Research using the Emotional Stroop task has shown interference effects of threat-related words in social anxiety (Grant & Beck, 2006; Spector, Pecknold, & Libman, 2003), generalized anxiety (Taghavi, Dalgleish, Moradi, Neshat-Doost, & Yule, 2003), post-traumatic stress disorder (Foa, Feske, & Murdock, 1991) and insecure attachment style (Edelstein & Gillath, 2008). Additionally, unpopular, rejected children have shown attentional disruption in response to rejection words (Martin & Cole, 2000), as have people low in self-esteem (Dandeneau & Baldwin, 2004), a construct consistently found to have a moderate inverse association with RS. In the present study we hypothesized that RS should be associated with longer color-naming latency when processing rejection cues, but not when processing negative information in general.

1.3. Rejection sensitivity and direction of attention deployment in response to social threat

While the Emotional Stroop task can reveal whether RS leads rejection threat to disrupt goal-directed attention, the task does not reveal the direction of attentional bias. The predicted interference effect could be due to increased attentional resources being allocated to the threat cues, and/or efforts to avoid processing them, which in turn disrupt task performance (de Ruiter & Brosschot, 1994). Study 2 aims to extend Study 1 by identifying the direction of attentional bias associated with RS, as either persistent vigilance toward or vigilance followed by avoidance of rejection cues, using another standard attentional paradigm, the Visual Probe task.

The Visual Probe (sometimes called Dot Probe or Attentional Probe) typically presents emotional and neutral stimulus pairs (e.g., a word or picture with emotional content, which is paired with a neutral word or picture) followed by a visual probe (e.g. small dot or arrow). The probe appears in the location which had been previously occupied by either the emotional stimulus (e.g. angry face), or by the neutral stimulus (e.g. neutral face). The direction of attention deployment is measured in terms of how quickly an individual responds to the visual probe. A persistent vigilant pattern of attention deployment, characterized by faster responses to probes that appear in the location of threat (relative to neutral) stimuli, has typically been found among people with a wide range of anxiety-related concerns, including trait anxiety and generalized anxiety disorder, social anxiety and clinical social phobia (see review by Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). However, some Visual Probe studies have found the opposite pattern, indicating deployment of attention away from the location where the threat stimulus was presented for example, in maltreated children with posttraumatic stress disorder (Pine et al., 2005) and in adults with insecure romantic attachment styles involving a combination of high anxiety and high avoidance (Dewitte, Koster, DeHouwer, & Buysse, 2007).

While no comprehensive model yet accounts for the differences in experimental and participant variables contributing to one pattern of attentional bias versus the other, a consideration of the motivations involved in threat processing may help clarify the form, function, and consequences of such attentional biases to the extent that they arise for self-protective reasons. That is, whereas persistent vigilance toward threat may serve to increase preparedness to avert danger through flight, attentional avoidance following initial threat detection may serve to reduce distress when it is impossible or undesirable to flee. Indeed, when separated from such overlapping constructs as trait anxiety and anxiety in broad social/performance domains, the distinctive element of RS is that it is a processing disposition developed and practiced in the context of investment in maintaining relationships with the perceived sources of threat. Based on this reasoning we predict that RS will be distinctively associated with a vigilant-avoidant pattern of attentional bias, characterized by an initial attentional bias towards threat to facilitate early detection of potential danger, followed by attentional avoidance strategies (Mogg & Bradley, 1998). We further expect that this type of bias will be associated more specifically with features of borderline personality disorder (characterized by dysregulated responses to managing the dilemma posed by desperately wanting to connect to others while intensely threatened by the prospect of rejection by them), than with features of avoidant personality disorder (characterized by avoidance of exposure to rejection or criticism). Indeed, a disorder closely related to avoidant personality disorder (social phobia) has been previously associated with persistent vigilance toward social threats in the Visual Probe task.

2. Study 1

In this study we used the Emotional Stroop task, which assesses the extent to which stimuli that vary in emotional content tax attentional resources. Specifically, we tested the hypothesis that RS would be associated with attentional interference by rejection-related cues, and not by negative cues more generally. We also predicted that this effect would hold when controlling for several relevant covariates. Prior research shows that negative affectivity is related to increased latencies to threat, relative to neutral, words on the Emotional Stroop task (e.g. Mogg, Bradley, Williams, & Mathews, 1993). Therefore, in the present study, we controlled for it using established measures of depression and neuroticism. Because low self-esteem and attachment style have been shown to heighten sensitivity to rejection cues (Edelstein & Gillath, 2008; Gyurak & Ayduk, 2007), we used global self-esteem, attachment anxiety and attachment avoidance as additional covariates to ensure that variance RS shares with these competing constructs does not account for any effects we observe.

3. Method

3.1. Participants

Undergraduate students ($N = 70$, 53% male) completed the study in exchange for course credit. All had 20/20 or corrected 20/20 vision and no one in the sample was color-blind. Average age of the participants was 20.6 years ($SD = 4.8$). Participants identified their primary racial/ethnic identification as follows: 47.1% Asian, 28.6% Caucasian, 1.4% African-American, and 1.4% Hispanic. 21.4% of the sample reported their primary racial or ethnic identification as multi-racial or “other”.

3.2. Procedure

Participants completed the study individually. The session started with the Stroop tasks¹ which were described as measuring the speed and accuracy of color naming. The Emotional Stroop was administered in paper format in which a set of words varying in emotional content were printed on cards (e.g., Mathews & MacLeod, 1985). Although the Emotional Stroop appears to tap into somewhat different processes when administered using blocks of words on cards, rather than one randomized trial at a time via computer (Kindt, Bierman, & Brosschot, 1997), the nature of these differences has yet to be thoroughly understood. Evidence that attentional interference effects are more robust when the different categories of words on an Emotional Stroop (e.g. rejection, negative) are presented in separate blocks rather than individual randomized trials (Phaf & Kan, 2007), led us to choose a blocked design. Finally, modeling after Stroop measures used in executive control test batteries (e.g. D-KEFS; Delis, Kaplan, & Kramer, 2001) a task-switching component was included to make the task reasonably difficult and challenging for college students (Gilbert & Shallice, 2002; Wylie & Allport, 2000). Specifically, participants were instructed to say out loud the color of the ink that each word was printed in if the word was printed in color ink, but to read the word itself if it was printed in black ink. For each card, the experimenter used a stopwatch to begin timing when the first color was named and stopped timing after the last color was named. Using an answer key, the experimenter logged participants' errors.

¹ A color Stroop card was also used to measure inhibitory control. Specifically, the card contained color words (purple, yellow, red, green and orange) printed in inks of an incongruent color, and participants were asked to name the ink color. These findings are reported elsewhere (Ayduk & Gyurak, 2008).

After completing the Emotional Stroop task, participants responded to a set of questionnaires, including the Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996), and the Ten-Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003), Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), abbreviated version of Experiences in Close Relationships to measure anxious and avoidant attachment styles (ECR; Brennan, Clark, & Shaver, 1998) and the Global Self-esteem Scale (Rosenberg, 1965) along with several other measures which were not the focus of this study.

3.3. Measures and Materials

3.3.1. Emotional Stroop task

Three Emotional Stroop cards were used to measure attention when exposed to particular emotional content: one contained five rejection words (ignored, unwanted, rejected, disliked, shunned), one contained five negative words unrelated to rejection (cancer, disaster, accident, pain, diarrhea), and one contained five neutral words (pavement, radiator, suitcase, curtain, calendar). The words on each card were selected through pilot work (described below) and were matched for syllable counts and word frequency using the American Heritage Word Frequency Book (Carroll, Davies, & Richman, 1971).

Each card contained 100 words. On each card, the five relevant words appeared 20 times – once on each of the 20 lines. The words were printed in five colored inks for the color-naming task (purple, yellow, red, green, orange), and in black ink for the words that participants were supposed to read in the task-switching component of the procedure. Each line contained one word printed in black. Words and colors were randomized such that no word (or color) appeared twice on the same line, and no consecutive words (or ink colors) were the same. Furthermore, no same word-color combination appeared on two consecutive lines. Cards were printed using a professional quality printer on letter sized card stock paper using 17 point “Courier New” font. The order of presentation for the three Stroop cards was randomized across participants and reading time was measured in seconds using a stopwatch.

3.3.2. Stimuli development for Emotional Stroop

A preliminary list of rejection, negative, and neutral words were initially selected from words previously used in similar research (Ayduk, Downey, Testa, Yen, & Shoda, 1999; Dandeneau & Baldwin, 2004; Mathews & MacLeod, 1985). This list was then validated through a pilot study in which a separate group of participants ($N = 12$) rated each word on valence (-3 : very negative, 0 : neutral, $+3$: very positive) and rejection-relevance (1 : not relevant, 7 : very relevant). Rejection words selected for inclusion were both relevant to rejection ($M = 6.48$, $SD = .64$) and negative in valence ($M = -2.03$, $SD = .72$). Negative words were also negative in valence ($M = -2.40$, $SD = .58$) but were not relevant to rejection ($M = 2.07$, $SD = 1.14$). Finally, neutral words were neutral in valence ($M = .15$, $SD = .52$) and unrelated to rejection ($M = 1.08$, $SD = .24$).

3.3.3. Rejection sensitivity

The RSQ assesses anxious expectations for rejection by significant others (Downey & Feldman, 1996). Participants read 18 hypothetical interpersonal interactions where rejection by a significant other is possible (e.g. “You ask your partner to move in with you”). They indicated the level of anxiety they felt about the outcome of each situation, as well as the perceived likelihood that the significant other in each situation will respond with rejection. Scores were calculated by first weighting (multiplying) the expected likelihood of rejection for each situation by the degree of anxiety, and then averaging these weighted scores across the 18 situations ($M = 8.82$, $SD = 2.75$, $\alpha = .86$.) Previous studies (e.g., Downey & Feld-

man, 1996) have demonstrated the convergent and discriminant and behavioral validity of the measure: RSQ scores show the expected association to theoretically related constructs, such as global self-esteem, attachment style, and neuroticism, but predict outcomes of interest when these constructs are controlled statistically.

3.3.4. Neuroticism

Each dimension of the Five Factor Model of Personality is measured on TIPI (Gosling et al., 2003), with adequate validity, by two trait adjectives rated for self-descriptiveness on 7-point scales. In this study, only the neuroticism subscale was used ($M = 3.5$, $SD = 1.32$, $\alpha = .65$, correlation with the RSQ: $r(68) = .19$, $p = .10$).

3.3.5. Depression

On the Beck Depression Inventory (BDI; Beck et al., 1961), participants report the extent they are experiencing 21 symptoms of depression (e.g., 0: I do not feel sad, 1: I feel sad, 2: I am sad all the time and I can't snap out of it, 3: I am so sad or unhappy that I can't stand it). Scores were summed across the items, $M = 6.87$, $SD = 7.13$, correlation with the RSQ: $r(68) = .25$, $p < .05$.

3.3.6. Global self-esteem

Participants rated how well each of 10 phrases (e.g. "I feel that I have a number of good qualities," Rosenberg, 1965) describes them (1: Does not describe me at all; 6: Describes me very well). Higher scores indicated higher self-esteem ($M = 4.62$, $SD = .94$, correlation with the RSQ: $r(68) = -.47$, $p < .001$).

3.3.7. Attachment

Using 7-point scales, participants rated their agreement with the 10 items with the highest factor loadings from each of the Experiences of Close Relationships attachment scales (ECR; Brennan et al., 1998). After appropriate reverse-scoring, the items for attachment anxiety (e.g., "I worry about being abandoned") and attachment avoidance (e.g., "I prefer not to show a partner how I feel deep down") were averaged to create separate indexes (anxiety, $\alpha = .84$, $M = 3.65$, $SD = 1.14$, correlation with the RSQ: $r(68) = .43$, $p < .001$; avoidance, $\alpha = .87$, $M = 2.88$, $SD = 1.02$, correlation with the RSQ: $r(68) = .30$, $p < .05$).

3.4. Results and discussion

3.4.1. Preliminary analyses

Vocal response times (in seconds) for the Emotional Stroop cards (rejection, negative, neutral) were highly correlated (with r coefficients ranging from .67 to .78, $ps < .05$). There were no significant differences in latencies by card type (Rejection: $M = 82.49$, $SD = 13.51$; Negative $M = 85.88$, $SD = 13.50$; Neutral: $M = 83.28$, $SD = 13.94$). The mean number of errors was very low and did not differ significantly by RS or across cards (Rejection: $M = 1.01$, $SD = 1.08$; Negative: $M = 1.29$, $SD = 1.43$; Neutral: $M = .90$, $SD = 1.07$). The analyses reported below focus only on response time.² Inter-correlation between reading time on each of the Stroop cards and the personality measures are reported in Table 1.

3.4.2. Relationship between RS and disruption of attention by rejection cues

Our main hypothesis was that RS would be associated with disruption of attention by rejection cues, and not with disruption of attention by negative cues in general. To test this hypothesis, we

² The mean vocal response latency of one participant was more than three standard deviations above the group mean for the negative and neutral word cards. These data were recoded to the next lowest value on each distribution to reduce skewness. After these corrections, skew on all Stroop performance distributions were less than 1.13.

Table 1

Correlations between personality measures and Emotional Stroop card reading times by stimulus type.

| Personality measure | Rejection card | Negative card | Neutral card |
|-----------------------|------------------|---------------|--------------|
| Global self-esteem | .13 | .00 | .19 |
| Attachment anxiety | .02 | .08 | -.02 |
| Attachment avoidance | .15 | .18 | .05 |
| Neuroticism | -.03 | .16 | .04 |
| Depression | .05 | .15 | .01 |
| Rejection sensitivity | .20 ^a | .10 | .07 |

^a $p < .1$.

ran a repeated measures General Linear Model (GLM) on color-naming times with *stimulus type* (2: rejection and negative cards) as a within-subjects predictor so that we could compare the association between personality variables and attentional responses during exposure to negative cues with versus without specific rejection-relevant content. RS was our primary between-subjects predictor of interest, but we simultaneously included *neuroticism*, *depression*, *self-esteem*, *attachment anxiety* and *attachment avoidance* as between-subjects predictors in order to control for the effects of these related constructs. Finally, *response time on the neutral card*, an index of baseline interference by affectively neutral words, was included as a between-subjects predictor to control for individual differences in processing speed, as in prior Emotional Stroop tasks (Williams et al., 1996). All predictor variables were standardized, so the reported b coefficients correspond to the change in response time (in seconds) associated with a 1 SD increase in the predictor.

Consistent with our hypothesis, the stimulus type by RS interaction was significant ($F(1, 63) = 5.68$, $p < .05$). When univariate analyses were conducted for each stimulus type, (including the same covariates as in the multivariate analysis), RS was found to be significantly associated with a slower response time indicating attentional interference when reading the rejection card ($b = 2.78$, $t(63) = 2.11$, $p < .05$), and a non-significantly faster response time indicating no such attentional interference, when reading the negative card ($b = -.18$, $t < 1$).

Returning to our multivariate analysis, there was also a marginally significant interaction between stimulus type by neuroticism ($F(1, 63) = 3.82$, $p = .06$). Separate analyses for each stimulus type revealed that neuroticism was related to somewhat faster performance for the rejection card ($b = -1.40$, $t(63) = -1.08$) and slower performance for the negative words card ($b = .79$, $t < 1$), however, neither of these simple relationships was statistically significant. None of the other predictors (as main effects or in interactions with stimulus type) were significantly related to response times.

To summarize, in Study 1, RS was associated with greater attentional interference by rejection-related words after controlling for relevant individual differences. Importantly, RS did not predict attentional interference by negative words unrelated to rejection. Hence, the effect of RS on attention was specific to processing social threat.

4. Study 2

Building on the finding that, among those high in RS, social threat cues interfere with attention to ongoing goal-directed activities, we used the Visual Probe task to examine how those high in RS direct their attention in response to such cues. In addition, having established that social threat cues influence attention in ways that are not shared by other negative cues, we were interested in whether acceptance cues might also influence attention.

Vigilance toward threat should serve a self-protective function for anxious individuals by increasing preparedness for flight or

flight, yet attentional avoidance of a detected threat may better serve the motivation to maintain a close emotional bond to the threat source that distinguishes the RS construct from anxiety about non-social situations or about being evaluated by strangers/acquaintances in public or performance settings. Hence, our primary prediction was that the effect of RS on attention deployment when processing social threat cues would be characterized by attentional avoidance that follows initially vigilant detection of threat, and be distinct from the effects of trait anxiety and social anxiety linked with persistent vigilance toward social threat in previous studies. Because assessing relatively early and late stages of attentional processing by varying the duration of exposure to the same stimuli makes it possible for the Visual Probe task to capture such a change in the direction of attention deployment over the course of time, we designed our experimental task to assess attention after two stimulus durations (500 ms and 1250 ms), as in previous research (Mogg, Philippot, & Bradley, 2004). Finally, we examined the specific association of attentional biases during threat processing with two patterns of maladaptive behavior marked by high RS, as manifested at non-clinical levels in this college sample: the volatile, emotionally conflicted patterns of maladaptive behavior characteristic of borderline personality disorder, and the inhibited social behavior characteristic of avoidant personality disorder. Whereas we expected the former to be associated with the vigilant-avoidance pattern, we expected the latter to be associated with the persistent vigilance given its overlap with social phobia.

5. Method

5.1. Participants

Eighty-seven participants (79.3% female) were recruited to complete the study in exchange for monetary compensation, using flyers posted on an urban university campus. 62.1% were currently enrolled in classes. Average age of the participants was 22.74 years ($SD = 5.57$). Participants reported their racial or ethnic identification as follows: 44.8% Caucasian, 32.2% Asian, 12.6% African-American, 4.6% Hispanic, 1.1% Native American, 4.6% multiple or other racial/ethnic identifications.

5.2. Procedure

Participants completed the study individually, in a soundproof, windowless room. The session started by asking participants to read an eyechart, to ensure adequate visual acuity, followed by the Visual Probe task. After the administration of the task, participants completed a set of questionnaires which included measures of rejection sensitivity, trait anxiety, social anxiety measured as fear of negative evaluation, and features of borderline and avoidant personality disorders.

5.3. Measures and materials

5.3.1. Visual probe task

Participants completed a pictorial version of the Visual Probe task identical to that used in previous work (Mogg et al., 2004). The task, which was programmed with MEL software, involved 10 practice trials and two buffer trials immediately before the 160 experimental trials. Each trial started with a central fixation cross for 500 ms followed by presentation for 500 ms or 1250 ms of a pair of photographic stimuli on a standard computer monitor positioned 100 cm from the participants. Each photograph was approximately 45×75 mm, and they were presented side-by-side on the screen, with a distance of 115 mm between their centers.

Following the offset of the paired stimuli, an arrow (pointing either up or down) appeared in the location of one of the photographs. Participants pressed one of two buttons on a response box to identify the direction of the arrow as quickly as possible, and reaction times were measured. The screen was blank for an inter-trial interval that varied between 500 and 1250 ms before the fixation cross for the next trial appeared. Lights in the room were dim, and the experimenter was seated behind the participants.

Identical to Mogg et al. (2004), the photographic stimuli showed the faces of 32 people with threatening expressions and 32 with pleasant ones. Each emotional face was paired with a photograph of the same person with a neutral expression. In addition, 16 neutral face pairs were also used in filler trials. The number of trials was equal for each condition of stimulus duration (500 or 1250 ms), emotional face location (left or right), arrow location (left or right), and arrow direction (up or down). The trials were presented in a new, fully random order for each participant.

5.3.2. Rejection sensitivity

Because 40% of the participants were not currently enrolled in college, this study used a version of the RSQ (Downey & Feldman, 1996) adapted for general samples of adults (available at <http://www.columbia.edu/cu/psychology/socialrelations/downloads/ARSQ.pdf>). It was created by revising situations on the RSQ to have more generally applicable wording, removing those that were specific to college life, and generating additional items about potential rejection situations in adults' lives. The 9-situation Adult RSQ (A-RSQ; Downey, Berenson, & Kang, 2006) correlated .87 with the original college-based 18-situation RSQ among students. As with the original measure, scores are computed by multiplying the ratings of rejection concern/anxiety by ratings of rejection expectancy in each situation, and averaging the resulting scores. In this study the mean was 8.99 ($SD = 3.60$), $\alpha = .74$.

5.3.3. Validity of the A-RSQ

The A-RSQ was completed by 685 adults in an internet survey. Scores ($M = 8.6$, $SD = 3.6$, range = 1.0–24.2, $\alpha = .70$) did not systematically vary with gender or age (range 18–78, $M = 25.6$ years), but were inversely associated with years of education ($r = -.15$; $p < .001$). Controlling for education, the A-RSQ showed expected correlations (all $p < .001$) with related constructs measured in a subsample of survey respondents ($n = 245$), including: neuroticism (John, Donahue, & Kentle, 1991, $r = .32$); social avoidance/distress (Watson & Friend, 1969, $r = .34$); self-esteem (Rosenberg, 1965, $r = -.46$); attachment anxiety and attachment avoidance (Fraley, Waller, & Brennan, 2000; $r = .48$ and $r = .33$, respectively); and interpersonal sensitivity and depression (Derogatis, Lipman, & Covi, 1973, $r = .45$ and $r = .37$, respectively). As evidence for its discriminant validity, the A-RSQ remained associated with attachment anxiety ($r = .21$, $p < .001$) and interpersonal sensitivity ($r = .18$, $p < .01$) when controlling for the rest of these constructs.

Further support for the validity of the A-RSQ derives from its ability to reflect the individual differences in RS associated with serious forms of psychopathology in which rejection concerns are prominent. In an ongoing study of adults who met diagnostic criteria for borderline and/or avoidant personality disorders ($n = 80$), the mean A-RSQ scores for those diagnosed with either one of the disorders fell above the 90th percentile for our unselected internet sample, whereas the mean A-RSQ scores for those diagnosed with both disorders fell above the 99th percentile (Downey, Berenson, & Rafaelli, 2009). Hence, the A-RSQ captures meaningful differences in RS across diverse groups of adults.

5.3.4. Trait anxiety

Participants completed the trait anxiety scale from the State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970).

This widely-used 20-item measure asks participants to rate the frequency of their feelings (e.g. “I feel nervous and restless”) on a 4-point scale. The measure has high reliability ($\alpha = .90$) and established validity, and was correlated with the A-RSQ ($r(85) = .55$, $p < .001$).

5.3.5. Fear of negative evaluation

To test whether the effect of RS on attention deployment is specific to RS or based on its overlap with social anxiety more generally, we examined the association between the direction of attention deployment and the Fear of Negative Evaluation Scale (Watson & Friend, 1969), a 30-item true–false inventory. The statements all concern judgments others may make about the self whether in a social/intimate interaction or a performance setting (“I am frequently afraid of other people noticing my shortcomings”). The correlation with the A-RSQ was $r(85) = .52$, $p < .001$.

5.3.6. Borderline and avoidant personality disorder features

Participants completed a self-report measure developed to screen for the possible presence of borderline and avoidant personality disorders (from the International Personality Disorders Examination Screening Questionnaire, IPDES-Q; Loranger, 1999). The DSM-IV criteria for the disorders are represented with true–false items derived from questions with proven reliability and validity when used in an interview format. The resulting screens have been used effectively for identifying likely cases of personality disorder in non-clinical samples (Lenzenweger, Loranger, Korfine, & Neff, 1997). The number of borderline and avoidant personality disorder features, respectively, correlated with the A-RSQ ($r(87) = .42$, $.43$), trait anxiety ($r(87) = .66$, $.58$) and FNE ($r(87) = .43$, $.79$), all $ps < .001$. As anticipated based on the substantial co-morbidity that exists between the two disorders, self-reports of their features were also correlated with each other ($r(87) = .47$, $p < .001$).

5.4. Results and discussion

5.4.1. Preliminary analyses

The reaction time data used for analyses of attention deployment were first prepared according to standard recommendations. After excluding the reaction times for incorrect responses and those less than 200 ms or more than 1200 ms from the data set, the mean and *SD* of each participant’s reaction times (in milliseconds) were computed, and trials more than 2 *SD*s above the individual’s mean were excluded. RS was not correlated with either the rate of incorrect responses ($r(85) = .01$) nor of reaction times outside the allowable range ($r(85) = -.01$), nor of the mean response time for scores within this range when averaging across conditions ($r(85) = .01$). Across the entire sample, the mean (*SD*) number of trials excluded was 7.55 (2.85), or less than 5% of the total trials. Estimated alpha coefficients for the reliability of response times in each of the experimental conditions were between .88 and .94.

Table 2 shows descriptive statistics for response times in each experimental condition for the entire sample. For all five types of face pairs, responses were significantly faster at 1250 ms exposures to the stimuli than at 500 ms exposures (all $ps < .001$). No significant differences in response times emerged as a function of emotional face type or probe location.

Bias scores were then computed for the two types of emotional faces (threatening, pleasant) and stimulus durations (500 ms, 1250 ms). To compute the bias scores, the time for identifying probes in the location of the emotional face was subtracted from the time for identifying probes in the location of the neutral face. Hence, positive scores indicate attention toward the emotional face, and negative scores indicate attention away from the emotional face. The zero-order correlations between these bias

scores and the personality variables included in our analyses are shown in Table 3.

Bias scores were analyzed in a series of repeated measures General Linear Models (GLM) with emotional face type (threatening, pleasant) and stimulus duration (500, 1250) as within-subjects predictors. All personality variables used as predictors (described below) were standardized, so that *b* coefficients reflect the change in response time associated with a 1 *SD* increase in the predictor. Trait anxiety (also standardized) was included as a covariate in all analyses.³

5.4.2. Direction of attention deployment predicted by RS

We first conducted our GLM with standardized measures of RS and trait anxiety as between-subject predictors. The face type by RS interaction was significant, $F(1, 84) = 4.88$, $p < .05$, indicating that the two types of emotional stimuli were processed differently as a function of RS, as predicted. Stimulus duration was not significantly related to bias scores either as a main effect or in interaction with the other variables, therefore follow-up analyses for each face type averaged across stimulus duration. RS was a significant predictor of attention away from the threatening faces, $b = -5.55$, $t(84) = -2.03$, $p < .05$. When the parallel analysis was conducted for processing of pleasant faces, RS showed no significant effect, $b = 2.13$, $t(84) < 1$, ns. The predicted values generated from these analyses are depicted in Fig. 1 for values of RS one *SD* above and below the mean. Our results indicate that RS was associated with a biased deployment of attention following exposure to threatening social stimuli that did not occur for pleasant social stimuli, and was characterized by allocation of attention away from threat.

5.4.3. Ruling out social anxiety as an explanation for the effect of RS on attentional bias

To examine the specificity of the relationship between attentional bias and RS, we first conducted the same repeated measures GLM analysis using standardized Fear of Negative Evaluation (FNE, Watson & Friend, 1969) as the predictor rather than RS (controlling for trait anxiety as before). There were no significant effects of FNE on attentional bias – neither as a main effect nor in interaction with face type, stimulus duration, or both. We also repeated this analysis with FNE included as a predictor along with RS (controlling for trait anxiety). Again, no significant main or interaction effects involving FNE showed any relationship between FNE and attentional bias. Indeed, the only significant effect to emerge was the same RS by face type interaction that had been present without FNE included in the model, $F(1, 83) = 4.25$, $p < .05$. Follow-up analysis of this interaction showed that when the shared effects of FNE and RS were controlled for statistically, the effects of RS on attentional biases changed little (threatening $b = -5.31$, $t(83) = -1.86$, $p = .07$, pleasant $b = 2.18$, $t(83) < 1$, ns.). Consistent with our contention that the RS construct is substantively unique from the social anxiety construct with which it shares variance, these results indicate that FNE cannot be considered an alternative explanation for the pattern of attention avoidance to threat associated with RS.

5.4.4. Association of attentional bias with self-reports of maladaptive behavior

To examine the relationship between attentional bias and features of borderline and avoidant personality disorders, we included the two symptom variables (standardized) as simultaneous predictors of attentional bias in a GLM controlling for trait anxiety, with face type and stimulus duration as within-subjects repeated mea-

³ Although associated with the A-RSQ in our internet sample, education was not associated with it in the current study, hence we did not control for it.

Table 2

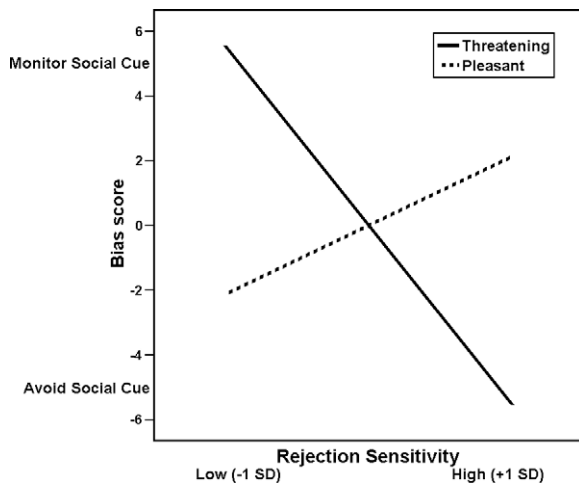
Means and standard deviations of response times (in ms) on the Visual Probe task by type of face pair, probe location, and stimulus duration.

| | Threatening–neutral pairs | | Pleasant–neutral pairs | | Neutral–neutral pairs |
|---------------------------|-------------------------------|-----------------------------|-------------------------------|-----------------------------|-----------------------------|
| | Emotional face probe location | Neutral face probe location | Emotional face probe location | Neutral face probe location | Neutral face probe location |
| 500 ms stimulus duration | 539.63 (72.94) | 540.61 (69.60) | 536.82 (72.94) | 543.46 (74.41) | 540.47 (73.30) |
| 1250 ms stimulus duration | 523.71 (64.86) | 524.26 (68.27) | 523.84 (71.30) | 523.73 (67.13) | 524.98 (67.62) |

Table 3

Correlations between measures of personality and attentional bias on the Visual Probe task by type of emotional face stimulus and stimulus duration.

| Personality measure | Bias toward threatening face | | Bias toward pleasant face | |
|--|------------------------------|---------------------------|---------------------------|---------------------------|
| | 500 ms stimulus duration | 1200 ms stimulus duration | 500 ms stimulus duration | 1200 ms stimulus duration |
| Trait anxiety | -.01 | .02 | .06 | -.16 |
| Fear of negative evaluation | -.09 | -.02 | -.05 | .00 |
| Borderline personality disorder features | -.07 | -.24* | .09 | -.12 |
| Avoidant personality disorder features | -.01 | -.03 | -.07 | .01 |
| Rejection sensitivity | -.15 | -.12 | .10 | -.03 |

* $p < .05$.**Fig. 1.** Predicted attentional bias to social cues by RS, controlling for trait anxiety.

ures. The only significant effect to emerge was the interaction of borderline features by face type, $F(1, 83) = 5.02, p < .05$.⁴ The follow-up analysis averaging across stimulus duration showed that borderline features significantly predicted attentional avoidance of threatening faces ($b = -8.20, t(83) = -2.69, p < .01$) and not pleasant ones ($b = .63, t < 1$).

⁴ Several marginally significant effects were also found. Specifically, there was a marginally significant three way interaction of trait anxiety by face type by stimulus duration $F(1, 83) = 3.51, p < .07$, explained by the expected association of trait anxiety with attentional vigilance to threatening faces at 1250 ms ($b = 9.35, t(83) = 2.18, p < .05$) but not at 500 ms ($b = 1.57, t(83) < 1, ns.$), or for pleasant faces (1250 ms: $b = -5.30, t(83) = -1.35, ns.$; 500 ms: $b = 2.04, t(83) < 1, ns.$). In addition, there was a marginally significant main effect of borderline features ($F(1, 83) = 3.57, p < .07$), that was qualified by the statistically significant interaction with face type described in the text, as well as by a marginally significant interaction with stimulus duration $F(1, 83) = 3.80, p < .06$. Follow-up analysis of the latter interaction showed that averaging across face type, attentional avoidance of emotional faces became stronger with time, i.e., it was statistically significant at 1250 ms, ($b = -7.36, t(83) = -2.96, p < .01$), but not at 500 ms, ($b = -.21, t(83) < 1, ns.$). Hence, the time course of the attention deployment associated with borderline personality disorder features is consistent with a vigilant-avoidance pattern of attentional bias, although obtaining direct evidence for initial vigilance toward social threat awaits further research using methods better suited to capturing the direction and speed of attentional orientation immediately after stimulus onset.

To summarize, attentional avoidance of threatening facial expressions was associated with RS and with endorsement of features of borderline personality disorder, but not with FNE or with endorsement of features of avoidant personality disorder. Moreover, the attentional bias was specific to social threat processing in that it did not occur in response to pleasant facial expressions. There were no significant effects of stimulus duration to conclusively demonstrate that attentional vigilance toward threat preceded the threat avoidance associated with RS and borderline features. Nevertheless, we assume that avoidance only occurred after the threat had been detected, and because the speed of initial threat detection is not readily captured by a supraliminal Visual Probe task, the observed attentional avoidance may well reflect a momentary slice of a vigilant-avoidant pattern of attentional bias.

6. General discussion

In two studies, highly rejection-sensitive individuals showed a unique vulnerability to disruption of goal-directed attention by social threat cues, which resulted in slower performance on a simultaneous task, and attentional avoidance of social threat stimuli. Previous research suggests that how people deploy attention when faced with cues they find threatening contributes to the development and maintenance of psychological difficulties such as anxiety and mood disorders (Mathews & MacLeod, 2005). Thus, evidence for patterns of attentional disruption associated with RS may help reveal the mechanisms by which RS has deleterious effects on adaptive functioning.

6.1. Functions and correlates of attentionally avoiding threatening social cues

The avoidance of social threat stimuli that was associated with high RS and high self-reported features of borderline personality disorder was similar to the pattern demonstrated in other studies, in abused children with PTSD (Pine et al., 2005), and in adults reporting insecure romantic attachment characterized by both anxiety and avoidance (DeWitte & DeHouwer, 2008; Dewitte et al., 2007). Our research therefore provides corroborating evidence that individuals who are likely to have extensively practiced attentional avoidance strategies to cope with perceived threat in the context of intensely conflicted, close relationships may charac-

teristically respond that way to threats detected in the social environment. Such avoidance may reflect efforts to regulate the experience of threat, by reducing emotional arousal and distress. Reducing distress may be important for maintaining a relationship with a close other who is also experienced as a threat source, as occurs, for example, in extremely insecure attachments and in relation to abusive parents. When one cannot flee from a threat source due to either strong approach goals or practical constraints, attentional avoidance may help allow a degree of proximity (analogous to the tendency of insecurely attached infants to avert their gaze from their caregivers).

Even when functional and necessary, using attentional avoidance to cope with the distress elicited by social threat may be problematic if it reflects a tendency to readily disconnect from the self and emotions in situations that are not actually dangerous. For example, by avoiding potential threats too quickly, one may neglect to take into account mitigating contextual information, or to use information about the emotions of the self and other to guide interpersonal behavior. Notably, characteristics associated with threat-avoidant attentional bias (such as the insecure attachment style called fearful or disorganized/disoriented, abuse-related post-traumatic stress disorder, and borderline personality disorder) include dissociative tendencies. Future research should investigate the possibility that attentional avoidance plays a role in dissociated and dysregulated responses to potential social threat both in controlled experiments and in daily life.

For future research to more directly address the defensive functions and liabilities of threat-avoidant and vigilant attentional biases to social threat cues, it will be important to utilize methods that can capture the emergence of these biases in a more fine-grained temporal sequence. The available data from studies using the Visual Probe task and related methods reflect only where attention is deployed at discrete snapshots in time, and therefore can not definitively rule out the possibility that participants shown to strategically avoid the threat stimulus had first vigilantly oriented their attention toward detecting it. If RS is associated with an initial vigilance toward threat cues, this may be more readily captured in eye-tracking research, e.g. reflected by the latency and direction of shifts in gaze immediately after stimulus onset (Garner, Mogg, & Bradley, 2006; Rinck & Becker, 2006).

6.2. Varieties of rejection concern and maladaptive behavior

The present studies further support the validity of the RS construct in that it showed unique effects on attention to social threat that were not explained by related constructs. Our conceptualization and operationalization of RS centers primarily on anxiously expecting close others to be unwilling to meet one's needs for care and support in a relationship, so that there is an emotional bond with the source of the threat. Thus, rejection cues primarily activate a dilemma in which one is motivated to prevent rejection but also to remain close to the threat source. By contrast, the rejection concerns manifested in social phobia/social anxiety and avoidant personality disorder typically involve doubts about one's ability to make a positive impression on others (Schlenker & Leary, 1982). Such concerns typically emerge as fear of rejection, criticism, or humiliation in performance situations or public settings, such when interacting with strangers, acquaintances, and those with the authority to evaluate one's professional skill (Watson & Friend, 1969). Despite the significant overlap between people's anxiety about relationships with people they know well and those that they do not know well, as reflected in the substantial correlation between RS and measures of social anxiety, these remain conceptually distinct concerns with non-redundant effects on interpersonal processing, as shown in Study 2 (see also Downey & Feldman, 1996). Likewise, although related to RS, the constructs

of self-esteem, attachment style, depression, and neuroticism did not account for the effects of RS on attentional disruption by social threat cues in Study 1. Further study of the attentional processes associated with these dispositions may help clarify their shared and unique contributions to maladaptive cognition, affect, and behavior.

Results linking threat-avoidant attention deployment with self-reported borderline features suggests a need for further research on this phenomenon in individuals diagnosed with this serious and costly psychiatric condition. In addition, although no attentional bias was associated with self-reported avoidant personality disorder features in this study, clinical samples with generalized social phobia (a disorder that has substantial overlap with avoidant personality disorder) have shown a persistent vigilance toward threat faces in previous Visual Probe studies (e.g., Mogg et al., 2004). It is possible that avoidant personality disorder features are particularly difficult to capture with simple self-report screening due to over-endorsement by individuals with subclinical levels of the diagnostic criteria, such as those with normative shyness or insecurity. The frequency of diagnosed disorders is unknown but likely to be low in the present non-clinical sample, and the self-report measure of borderline and avoidant personality disorder features we used had been designed as a screening tool rather than a diagnostic instrument. Further research is warranted to examine attentional disruption by social threat cues, and its association with specific symptoms, in clinical disorders characterized by high RS.

7. Conclusion

The study of attention to social cues is a window into how rejection sensitivity can undermine one's relationships and wellbeing. As illustrated by our data linking attentional avoidance of threat with self-reported features of borderline personality disorder, attentional disruption in the face of social threat has correlates of importance for people's interpersonal and personal adjustment in their everyday lives. Indeed, evidence that measures of executive functioning moderate the association between RS and maladaptive behavior (Ayduk et al., 2000, 2008) suggests that attention deployment may play a key role in the processes that lead to symptoms among highly rejection-sensitive people. Studies of attention deployment may help elucidate factors that make some people vulnerable to specific forms of maladaptive behavior and identify the stages of processing that may be most amenable to targeted intervention among individuals with these vulnerabilities.

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