Personality and Defensive Reactions: Fear, Trait Anxiety, and Threat Magnification

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ABSTRACT The revised Reinforcement Sensitivity Theory (rRST) of personality (Gray & McNaughton, 2000) maintains that trait individual differences in the operation of defensive systems relate to facets of human personality, most notably anxiety and fear. We investigated this theory in 2 separate studies (total $N = 270$) using a threat scenario research strategy (Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001). Consistent with rRST, results showed that individuals with high fear questionnaire scores tended to select defensive responses entailing orientation away from threat (e.g., run away) and that fear-prone individuals also tended to perceive threats as magnified. The extent of this threat magnification mediated the positive association observed between fear and orientation away from threat. Overall, results suggest that interindividual variance in defensive reactions is associated with a variety of existing personality constructs but that further research is required to determine the precise relationship between personality and defensive reactions.

The revised Reinforcement Sensitivity Theory (rRST) of personality (Corr, 2008; Gray & McNaughton, 2000; McNaughton & Corr, 2004) provides a parsimonious theoretical framework for explaining aspects of personality in terms of trait individual differences in defensive reactions. This framework is based upon the two dimensions

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of "defensive direction" and "defensive distance." Defensive direction is a categorical dimension that distinguishes between anxiety, which is elicited by threats requiring approach and therefore creating goal conflict, and fear, which is elicited by threats that need not be approached. For example, this theoretical principle predicts that a threat (e.g., a large ferocious dog) would elicit fear accompanied by simple avoidance unless it required approach (e.g., if the dog was attacking a small child), in which case anxiety would be elicited and would be accompanied by a behavioral response of risk assessment. Thus, rRST predicts that a highly trait anxious person is more sensitive than average to threats requiring approach (i.e., that cause goal conflict between approach and avoidance tendencies) and that a highly trait fearful person is more sensitive than average to threats that need not be approached (i.e., requiring simple avoidance or escape).

Defensive distance is a continuous dimension and "applies equally to fear and anxiety" (McNaughton & Corr, 2004, p. 286), implying that the dimensions of defensive direction and defensive distance are theoretically independent. According to this view, threats that are perceived as close to the individual in space or time, or both, activate low neural levels (e.g., periaqueductal gray) and elicit coarse-grained responses, especially flight, defensive attack, or freezing. As threats become perceptually more distant, irrespective of their actual distance, they putatively activate progressively higher neural levels (e.g., prefrontal cortex) and elicit progressively more subtle and cognitively complex responses, such as rumination or risk assessment.

Studies of rRST have shown that trait anxiety and fear are psychometrically separable (e.g., Cooper, Perkins, & Corr, 2007; Heym, Ferguson, & Lawrence, 2008; Perkins, Kemp & Corr, 2007) and, in particular, that fear questionnaire scores may reflect a specific sensitivity to threats that can be simply avoided (Perkins & Corr, 2006). These findings provide support for the existence of a categorical dimension of defensive direction but have not demonstrated that perceived defensive distance exists as an independent dimension. Indeed, there is reason to think that they are not independent. Gray and McNaughton (2000, p. 6) stated that "the two dimensions are not, however, in practice independent, since (given a fixed appetitive motivation conflicting with the danger) the closer the animal is to the point of danger, the more likely it is that escape will take precedence over anxious approach." The extent of this interdependence has yet to be explored in human personality research: The purpose of our research was to investigate this.

Perceptions of Threat and Trait Individual Differences in Personality

Gray and McNaughton's (2000) proposal that, in practice, close threats usually elicit fear-based escape has implications for individual differences because it suggests that individuals who tend to perceive threat as especially close should (a) be more prone than average to fleeing from threat and (b) tend to experience fear more often than an average person. If this analysis is correct, then fear questionnaire scores may provide a proxy measure of perceived defensive distance, quite apart from any capacity they have to measure specific sensitivity to threats that need not be approached (i.e., trait fear). This is an important issue because there does not yet exist a well-established measure of defensive distance (i.e., perceived threat intensity).

One way to test the above idea is to compare fear questionnaire scores with human defensive reactions. Previous research has shown that human defensive responses may be assessed using a written threat scenario questionnaire (Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001). This procedure presents 12 scenarios, each containing different levels of threat intensity and ambiguity, to which participants choose a response from a list of 10 possible options. Perkins and Corr (2006) reported that fear questionnaire scores, but not trait anxiety questionnaire scores, were positively correlated with a tendency to select scenario responses that entail orientation away from threat (such as "run away"), a result that conforms to the predictions of rRST. If it is true, as Gray and McNaughton (2000) postulated, that close threats tend to elicit escape, then this finding provides support for the hypothesis that fear-prone individuals perceive threats as especially close. In addition, Perkins and Corr showed that, in regression models, a measure of trait anxiety was associated with an orientation toward threat, again in conformity with rRST.

The chief aims of this paper were, therefore, as follows: Study 1 attempted to replicate the findings of Perkins and Corr (2006), and Study 2 attempted to extend this line of research by testing the hypothesis that fear-prone individuals perceive threats as especially close. Additionally, measures of personality other than fear or anxiety may plausibly relate to defensiveness. For example, the psychoticism scale (Eysenck & Eysenck, 1991) has item content relating to aggression and tough-mindedness and so seems likely to

measure individual differences in defensive distance as well as orientation toward approaching and engaging sources of threat. Indeed, Perkins and Corr showed that psychoticism related significantly to these defensive measures. The BIS scale from the Carver and White (1994) BIS/BAS scales (designed to measure sensitivity in the Behavioral Inhibition System and Behavioral Activation System, respectively) was developed in the context of the original model of RST. It has item content relating to generalized negative affective states and cognitions concerned with punishment sensitivity, but without explicitly separating fear and anxiety. It is important for the rRST to demonstrate that measures of anxiety and fear have predictive validity above and beyond the BIS scale or psychoticism scale: This was a secondary aim of our research.

STUDY 1

Few studies have sought to test the rRST. Study 1 attempted to replicate and extend Perkins and Corr (2006) in an independent sample. This included an evaluation of fear, behavioral inhibition, and psychoticism as predictors of defensive distance and intensity.

Method

Participants

One hundred seventy-three participants (80 men and 93 women), between 18 and 45 years of age (men: $M = 23.78$, $SD = 6.28$; women: $M = 24.01$, $SD = 6.66$) were recruited through advertisements placed at Swansea University. One hundred twenty-three of the participants were students and the remainder were nonstudent volunteers. The study was conducted in accordance with standard ethical requirements and it was approved by the appropriate ethics committee. All participants gave informed consent prior to commencing the study.

Questionnaires

Threat scenarios. The same threat scenario questionnaire (Blanchard et al., 2001) used by Perkins and Corr (2006) was employed. This questionnaire presents participants with 12 threatening scenarios covering a variety of situations: (1) attacked in an open space, (2) attacked in an elevator, (3) attacked in a car, (4) tailgated, (5) angry stranger, (6) shoved by an acquaintance, (7) knifeman in a park, (8) an arm grabbed in the

dark, (9) a suspicious noise at night, (10) a threatening phone call, (11) a possible bomb, and (12) a noise outside a window. Participants are required to select one response for each scenario from a list of 10 response options: (1) hide; (2) freeze, become immobilized; (3) run away, try to escape, remove self (flight); (4) threaten to scream or call for help; (5) yell, scream, or call for help; (6) threaten to attack; (7) attack or struggle; (8) check out, approach, or investigate (risk assessment); (9) look for something to use as weapon; (10) beg, plead for mercy, or negotiate. To permit comparisons between studies, the threat scenario questionnaire responses were scored for defensive direction and defensive intensity according to the same key (Figure 1) used by Perkins and Corr. High defensive intensity values were assigned to especially explosive defensive behaviors, such as attack or yell or scream that in rodents are displayed at very short distances to threat, and medium defensive intensity values were assigned by Perkins and Corr to behaviors, such as freeze or run, that are displayed by rodents at intermediate distances to threat. Physically mild or human-specific verbal responses were assigned low defensive intensity values.

Personality measures. To measure fear proneness, the Fear Survey Schedule (FSS; Wolpe & Lang, 1977) was administered. This questionnaire

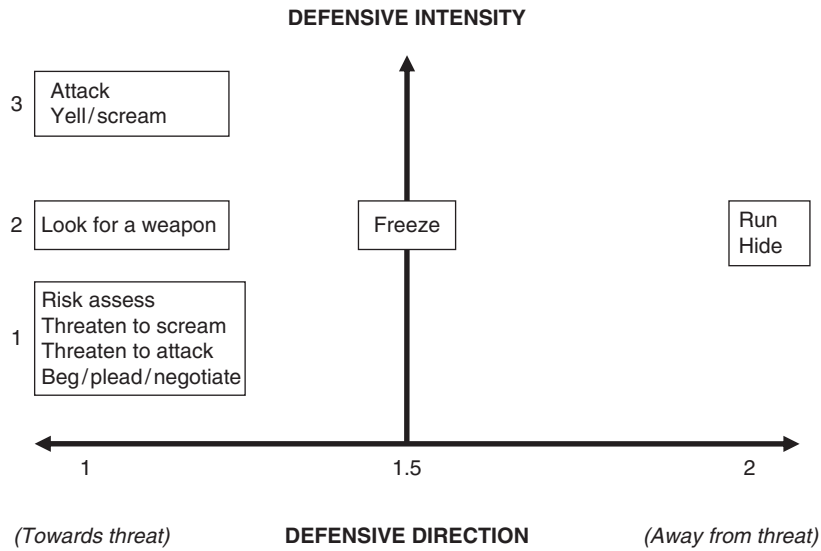

Figure 1
Threat scenario response choices coded for defensive intensity and defensive direction.

has well-established psychometric properties and requires participants to indicate how much they feel disturbed by descriptions of 108 aversive objects or situations (e.g., needles, blood, speaking in public), using a scale of 0 (*no fear*) to 4 (*very much fear*). Although originally formulated to measure phobic change during therapy, this questionnaire has been shown to have validity as a measure of fear-related personality variance in nonclinical settings that is not accounted for by conventional neuroticism-type scales (e.g., for a summary of validation data, see Perkins et al., 2007). None of the items in the FSS comprises a clear duplication of the content of the threat scenario questionnaire; however seven items describe objects, situations, or people that appear in the threat scenarios: FSS item 11 (automobiles), FSS item 23 (strangers), FSS item 31 (journeys by car), FSS item 41 (weapons), FSS item 52 (being in an elevator), FSS item 54 (angry people), and FSS item 82 (sight of knives or sharp objects).

The Eysenck Personality Questionnaire–Revised (EPQ-R; Eysenck & Eysenck, 1991) was also used. The psychoticism scale consists of 25 items measuring impulsivity and tough-mindedness. The other scales included on the EPQ are Extraversion and Neuroticism, as well as a Lie (social desirability) scale. Items are completed using a binary (yes/no) response scale. General approach and avoidance tendencies were measured by the BIS/BAS scales (Carver & White, 1994), which contains 24 items that assess sensitivity to aversive and appetitive stimuli as conceptualized in the original version of RST (e.g., Gray, 1982). In the BIS/BAS scales, individual differences in responses to aversive stimuli (i.e., punishment sensitivity) are measured by the BIS scale, whereas individual differences in responses to appetitive stimuli are measured by three separate scales, namely BAS-Drive, BAS-Fun Seeking and BAS-Reward Responsiveness. Although they measure related traits, these BAS scale scores often have differential relations with other personality measures and social behaviors and so were considered separately in these studies.

Trait anxiety was measured by the Y2 (trait) scale from the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This scale is a reliable and valid questionnaire measure of trait anxiety and consists of 20 items that require the participant to respond to a number of statements about how they generally feel. Participants indicate their response on a scale of 1 (*almost never*) to 4 (*almost always*).

Procedure

Participants were given a booklet containing the personality questionnaires and the threat scenarios in a classroom environment in small groups of 5–20 individuals. All participants completed the three personality

questionnaires first, followed by the threat scenario measure. At the end of the session, participants were debriefed and thanked for their time.

Statistical Analyses

Pearson's product-moment correlations were used to assess associations between personality constructs and defensive reactions. Following the analysis of Perkins and Corr (2006), multiple regression models tested whether fear and trait anxiety questionnaire scores predicted scores on defensive distance and defensive intensity while controlling for the effect of scores on the BIS and psychoticism scales.

Results and Discussion

Table 1 presents descriptive statistics for personality questionnaire scores and measures of defensive responding, both for the whole sample and for men and women separately. Using *t* tests, we found that women had significantly higher scores on fear, BIS (both at $p < .01$), and neuroticism ($p < .05$), and they were also significantly ($p < .01$) more likely to orient away from threat and to respond intensely to threats. This pattern of significant gender differences broadly matches those reported by Perkins and Corr (2006). For example, the mean FSS scores reported by Perkins and Corr were 91.45 ($SD = 52.57$) for men and 127.56 ($SD = 60.26$) for women: In the present study they were similar, at 93.40 ($SD = 48.77$) and 124.60 ($SD = 50.66$), respectively.

Table 2 presents correlations between personality and defensive variables. It shows that fear scores, but not trait anxiety scores, were significantly ($p < .01$) and positively correlated with the tendency to orient away from threat, a clear replication of the same finding by Perkins and Corr (2006). This finding supports the key rRST principle that fear and departure from threat are linked. In addition, this finding supports the utility of the FSS as a measure of individual differences in defensive tendencies. Psychoticism scores were significantly ($p < .01$) and negatively correlated with the tendency to orient away from threat. This finding is similar to that of Perkins and Corr and suggests that those high on psychoticism are more likely to confront and directly engage with potential sources of threat. A more detailed summary of the scale intercorrelations will be provided in Study 2, which replicated most of these associations.

Table 1
Descriptive Statistics (Means and Standard Deviations) for Psychometric Measures in Study 1

Variable	Overall	Men	Women	*t* Test and *p* Values Between Sexes
1. STAI	41.61 (11.79)	40.46 (11.92)	42.60 (11.64)	−1.19 (.235)
2. Psychoticism	7.24 (3.96)	7.69 (3.75)	6.85 (4.12)	1.39 (.166)
3. Extraversion	14.92 (5.60)	14.69 (5.60)	15.13 (5.62)	−.52 (.606)
4. Neuroticism	12.45 (5.58)	11.39 (5.50)	13.37 (5.51)	−2.36 (.020)
5. Lie	7.34 (3.78)	7.03 (4.01)	7.60 (3.57)	−.10 (.321)
6. BAS-D	10.64 (2.58)	10.50 (2.92)	10.75 (2.25)	−.64 (.522)
7. BAS-FS	12.08 (2.24)	12.15 (2.04)	12.01 (2.41)	.41 (.685)
8. BAS-RR	17.12 (2.29)	17.15 (1.93)	17.09 (2.57)	.18 (.855)
9. BIS	20.54 (4.16)	19.45 (4.28)	21.47 (3.74)	−3.32 (.001)
10. FSS	110.17 (52.04)	93.40 (48.77)	124.60 (50.66)	−4.11 (.000)
11. Defensive direction (high = responses oriented away from threat)	15.91 (1.63)	15.09 (1.49)	16.62 (1.39)	−6.97 (.000)
12. Defensive intensity (high = intense responses)	19.10 (3.55)	18.16 (3.21)	19.90 (3.65)	−3.30 (.001)

Note. $N = 173$ (80 men, 93 women). STAI = Spielberger Trait Anxiety Inventory, BAS-D = Behavioral Approach System–Drive, BAS-FS = Behavioral Approach System–Fun Seeking, BAS-RR = Behavioral Approach System–Reward Responsiveness, BIS = Behavioral Inhibition System, FSS = Fear Survey Schedule.

Table 3 presents the results of multiple regression models that examined whether the measures of fear and anxiety significantly predicted scores on defensive direction and defensive intensity while controlling for the effect of psychoticism and the BIS scale. With regard to the dimension of defensive direction, fear and BIS (positively) and psychoticism (negatively) were significant ($p < .05$) predictors. However, contrary to the findings of Perkins and Corr (2006), trait anxiety was not significantly associated with the tendency to orient toward threat. With regard to the dimension of defensive intensity, no significant associations with personality questionnaire scores were found.

Overall, support for Perkins and Corr (2006) was mixed: Fear, as measured by the FSS, significantly related to an orientation away

Table 2
Correlations Between Psychometric Measures of Personality and Defensive Responding in Study 1

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. STAI	(.92)											
2. Psychoticism	.125	(.71)										
3. Extraversion	−.385**	.058	(.88)									
4. Neuroticism	.776**	.043	−.312**	(.86)								
5. Lie	−.202**	−.278**	−.180*	−.221**	(.75)							
6. BAS-D	−.070	.213**	.269**	.001	−.212**	(.77)						
7. BAS-FS	−.181*	.259**	.455**	−.072	−.198**	.434**	(.67)					
8. BAS-RR	−.086	−.110	.233**	.108	−.149	.372**	.331**	(.71)				
9. BIS	.539**	−.322**	−.194*	.622**	−.082	−.036	−.094	.255**	(.84)			
10. FSS	.390**	−.195*	−.179*	.437**	−.002	.015	−.052	.230**	.549**	(.96)		
11. Defensive direction (high = away)	.132	−.291**	−.149	.199**	−.024	−.009	−.047	.107	.355**	.333**	(.48)	
12. Defensive intensity (high = intense)	−.014	−.097	.040	.022	.049	−.100	.003	−.190*	.017	.115	.202**	(.45)

Note. $N = 173$. Cronbach's alpha in parentheses on the diagonal. STAI = Spielberger Trait Anxiety Inventory, BAS-D = Behavioral Approach System–Drive, BAS-FS = Behavioral Approach System–Fun Seeking, BAS-RR = Behavioral Approach System–Reward Responsiveness, BIS = Behavioral Inhibition System, FSS = Fear Survey Schedule.
*$p < .05$, **$p < .01$.

Table 3
The Regression of Defensive Direction and Defensive Intensity on Personality Questionnaires in Study 1

	Defensive Direction				Defensive Intensity			
Variable	R^2	*B*	*SE B*	β	R^2	*B*	*SE B*	β
Step 1	.16**				.01			
BIS		.12	.03	.29**		−.01	.07	−.02
Psychoticism		−.08	.03	−.20**		−.09	.07	−.10
Step 2	.19**				.02			
BIS		.08	.04	.21*		−.07	.10	−.09
Psychoticism		−.08	.03	−.18*		−.09	.08	−.10
Fear		.01	.003	.20*		.01	.01	.15
Anxiety		−.01	.01	−.03		−.004	.03	−.01

Note. Defensive direction: $\Delta R^2 = .03$ ($p > .05$), defensive intensity: $\Delta R^2 = .01$ ($p > .05$), $N = 173$ (80 men/93 women). BIS = Behavioral Inhibition System.
*$p < .05$, **$p < .01$.

from threat, even when we controlled for other relevant personality variables, namely psychoticism and BIS. But there was no support for the association of trait anxiety with an orientation toward threat. Additionally, there were no significant relationships found between the key personality variables and defensive intensity.

STUDY 2

Although the results of Study 1 provided only partial support for Perkins and Corr (2006), there was replication of the finding that fear questionnaire scores are associated with a tendency to orient away from threat. Although this finding conforms to the predictions of rRST, it does not address the different possible interpretations of this finding. The first interpretation is that defensive direction and defensive distance dimensions are, in reality, separate, and the second interpretation is that, when threats are perceived to be especially intense, the two dimensions collapse (in other words, at high levels of perceived threat intensity, fear preponderates).

Study 2 sought to explore these two different interpretations by examining how situational factors related to the defensive scenarios might mediate relationships between the questionnaire measure of

fear and reactions to the defensive scenarios. In addition to measuring participants' responses to 12 threatening scenarios, their perceptions of the five key situational factors that have been shown to affect rodent defensive behavior were assessed. These situational factors include (a) the magnitude or intensity of threat, (b) the escapability of threat, (c) the distance between subject and the source of threat, (d) the ambiguity of threat, and (e) the opportunity for concealment (Blanchard et al., 2001). If Gray and McNaughton's (2000) qualification of rRST is correct, that the two dimensions of defensive distance and direction collapse at high levels of perceived threat intensity, then a significant positive correlation should be observed between fear questionnaire scores and perceived *intensity* of threat as well as a significant negative correlation between fear questionnaire scores and perceived *distance* to threat. In addition, if it is true that fear-prone individuals perceive threat as especially close or intense and this is the reason they favor simple avoidance responses, then the positive correlation between fear questionnaire scores and the tendency to orient away from threat should be mediated by such perceptions of threat intensity. More specifically, the capacity of fear questionnaire scores to predict defensive reactions should disappear when perceptions of threat distance or threat magnitude are entered in a multiple regression analysis.

Method

Participants

One hundred six participants were recruited through advertisements at Goldsmiths, University of London. The study was approved by the appropriate ethics committee, and all participants gave informed consent prior to its commencement. Seventy-five participants were psychology students participating for course credit, and the remaining were 31 nonstudent volunteers. Data screening resulted in 9 participants being excluded because of partial data and incorrect completion of questionnaires, resulting in a final sample of 97 participants (22 men and 75 women), between 18 and 45 years of age (men: $M = 24.77$, $SD = 7.85$; women: $M = 21.89$, $SD = 5.58$).

Measures and Procedure

The questionnaires and procedures were identical to Study 1, with the exception that a modified version of the threat scenario questionnaire was

used (this measured perceptions of threat as well as defensive reactions). Prior to choosing a behavioral response to each scenario, participants were required first to rate their perceptions of each threat scenario, via a 7-point scale, on the following dimensions: (a) magnitude or intensity of threat, (b) escapability, (c) distance between subject and the source of threat, (d) ambiguity of threat, and (e) opportunity for concealment. Scoring for the measures of defensive direction and intensity was the same as described in Study 1.

Statistical Analyses

Pearson's product-moment correlations were used to assess associations between defensive variables and personality measures. To test the putative role of perceptions of situational demand characteristics, as mediators of the relationship between personality traits and defensive behaviors, mediated regression was used (Baron & Kenny, 1986). Mediation is determined if the following criteria are met: First, the predictor must predict the mediator and the criterion. Second, the mediator must predict the criterion. Finally, when the mediator and the predictor simultaneously predict the criterion, the β coefficient for the predictor (but not the mediator) must be significantly reduced. Significant mediation is also tested formally by the Sobel test (Sobel, 1982).

Results and Discussion

Table 4 presents descriptive statistics for all personality scales and self-reports of defensive reactions, both for the whole sample and for the two genders separately. Independent sample *t* tests showed there were no significant differences between the men and women. This result was unexpected because women in the past have shown significantly greater susceptibility to negative emotions and threat (e.g., Farmer et al., 2003; Perkins & Corr, 2006).

Table 5 presents correlations between personality and defensive variables. As expected, fear (but not trait anxiety) questionnaire scores were positively and significantly correlated with the tendency to orient away from threat. This result replicates the findings reported by Perkins and Corr (2006) and those found in Study 1. Fear questionnaire scores were also positively correlated with the intensity of defensive reactions and perceived intensity of threat and negatively correlated with perceived distance to threat, escapability of threat, and availability of concealment. The direction of these correlations is broadly consistent with the prediction that fear-prone

Table 4
Descriptive Statistics (Means and Standard Deviations) for Psychometric Measures in Study 2

Variable	Overall	Men	Women
1. STAI	41.13 (10.21)	41.64 (9.97)	40.99 (10.33)
2. Psychoticism	7.61 (3.85)	8.27 (4.14)	7.41 (3.74)
3. Extraversion	14.65 (4.95)	14.05 (4.93)	14.81 (4.98)
4. Neuroticism	13.67 (5.84)	13.32 (4.79)	13.76 (6.13)
5. Lie	7.53 (3.77)	7.23 (4.39)	7.60 (3.59)
6. BAS-D	10.69 (2.54)	10.86 (2.66)	10.64 (2.52)
7. BAS-FS	11.27 (2.32)	11.41 (2.40)	11.23 (2.31)
8. BAS-RR	16.81 (1.90)	17.32 (2.01)	16.63 (1.84)
9. BIS	21.21 (3.97)	19.82 (3.72)	21.62 (3.97)
10. FSS	111.58 (59.73)	104.73 (53.79)	113.59 (61.56)
11. Defensive direction (high = responses oriented away from threat)	16.77 (1.80)	16.27 (1.33)	16.92 (1.90)
12. Defensive intensity (high = intense responses)	20.98 (2.50)	21.09 (2.47)	20.95 (2.52)
13. Perceived intensity of threat	56.10 (7.43)	54.14 (5.93)	56.68 (7.75)
14. Perceived escapability of threat	51.23 (8.04)	52.77 (4.87)	50.77 (8.73)
15. Perceived distance to threat	36.88 (9.21)	36.64 (8.69)	36.95 (9.41)
16. Perceived ambiguity of threat	46.94 (8.71)	49.82 (8.62)	46.09 (8.61)
17. Perceived availability of concealment	42.60 (9.05)	41.68 (8.95)	42.87 (9.12)

Note. $N = 97$ (22 men, 75 women), STAI = Spielberger Trait Anxiety Inventory, BAS-D = Behavioral Approach System–Drive, BAS-FS = Behavioral Approach System–Fun Seeking, BAS-RR = Behavioral Approach System–Reward Responsiveness, BIS = Behavioral Inhibition System, FSS = Fear Survey Schedule.

individuals perceive threats as especially close and intense or, more generally, have a magnified perception of threat.

Other questionnaire measures of personality that seem likely to reflect individual differences in defensiveness were also meaningfully correlated with defensive variables. In particular, BIS scores were positively correlated with defensive direction, providing support for the notion that a tendency to orient away from threat indicates high sensitivity to punishment. This finding is similar to that found by Perkins and Corr (2006). Psychoticism scores were negatively correlated with perceived intensity of threat. Trait anxiety questionnaire

Table 5

Correlations Between Psychometric Measures of Personality and Defensive Reactions in Study 2

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. STAI	– (.92)																
2. Psychoticism	– .085	– (.68)															
3. Extraversion	– .339**	.064	– (.78)														
4. Neuroticism	.637**	– .158	– .416**	– (.88)													
5. Lie	– .132	– .257*	– .062	– .138	– (.74)												
6. BAS-D	– .143	.293**	.256*	– .081	– .049	– (.73)											
7. BAS-FS	– .153	.348**	.463**	– .234*	– .149	.448**	– (.64)										
8. BAS-RR	– .096	– .038	.185	.003	– .081	.324**	.270**	– (.51)									
9. BIS	.413**	– .371**	– .201*	.530**	– .104	– .200	– .219*	.106	– (.80)								
10. FSS	.539**	– .205*	– .269**	.467**	.180	.006	– .058	.143	.412**	– (.97)							
11. Defensive direction (high = away)	.113	– .102	– .261**	.247*	– .053	– .154	– .181	.080	.211*	.262**	– (.42)						
12. Defensive intensity (high = intense)	.119	– .023	– .063	.122	– .074	.011	– .014	.207	.095	.209*	.389**	– (.33)					

(Continued)

Table 5 (cont.)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
13. Perceived intensity of threat	.172	−.217*	.014	.203*	.241*	.011	−.072	.153	.236*	.389**	.364**	.426**	−(.69)				
14. Perceived escapability of threat	−.406**	.185	.125	−.346**	−.012	−.102	.078	−.141	−.183	−.337**	−.192	−.252*	−.506**	−(.70)			
15. Perceived distance to threat	−.143	.033	−.076	−.106	−.034	−.109	−.164	−.072	−.147	−.249*	−.105	−.273**	−.463**	.473**	−(.77)		
16. Perceived ambiguity of threat	.056	.064	.060	−.072	.052	−.218*	−.052	−.102	.089	−.001	−.041	−.153	−.086	.327**	.246*	−(.69)	
17. Perceived availability of concealment	−.170	−.006	.121	−.118	−.083	−.288*	−.136	−.018	.065	−.215*	.007	−.182	−.236*	.580**	.545**	.225*	−(.70)

Note. $N = 97$. Cronbach's alpha in parentheses on the diagonal. STAI = Spielberger Trait Anxiety Inventory, BAS-D = Behavioral Approach System–Drive, BAS-FS = Behavioral Approach System–Fun Seeking, BAS-RR = Behavioral Approach System–Reward Responsiveness, BIS = Behavioral Inhibition System, FSS = Fear Survey Schedule.

*$p < .05$, **$p < .01$.

scores correlated negatively with perceived escapability of threat, as did neuroticism scores. Neuroticism scores were also positively correlated with defensive direction and perceived intensity of threat, suggesting that highly neurotic individuals tend to orient away from threat and perceive threat as especially intense. This pattern of significant correlations supports the validity of the threat scenario research strategy; however, their lower magnitude, relative to those involving fear questionnaire scores and defensive variables, suggests that fear scores may measure defensive reactions more effectively than scores on other personality questionnaires.

Theoretically coherent correlations were also found between threat scenario variables: Defensive direction, defensive intensity, and perceived intensity of threat were all positively correlated ($p < .01$). This finding suggests, as might be expected in real situations, that threats perceived as intense generally elicit intense responses that are oriented away from threat and thus provides support for the construct validity of the threat scenario questionnaire. Perceived distance to threat correlated positively with perceived ambiguity of threat and negatively with perceived intensity of threat, a pattern of correlations that suggests that perceptions of threat distance, ambiguity, and intensity tend, in practice, to be closely intertwined in threatening situations.

Although defensive direction correlated positively with fear scores, it did not correlate significantly with perceptions of threat distance, and so a valid mediated regression could not be performed for these variables. Defensive direction did, however, correlate positively and significantly with perceived intensity of threat, so a mediated regression was performed to test whether or not perceptions of threat intensity mediate the observed positive relationship between fear and orientation away from threat.

In support of this prediction, it was found that fear was a significant predictor of orientation away from threat ($\beta = .262$, $p = .009$) and was a significant predictor of perceived threat intensity ($\beta = .389$, $p < .001$). Perceived threat intensity was, in turn, a significant predictor of defensive direction ($\beta = .364$, $p < .001$). When fear and perceived threat intensity were used simultaneously to predict defensive direction, fear was no longer a significant predictor ($\beta = .142$, $p = .171$), but perceived intensity was ($\beta = .309$, $p = .004$). These results satisfy the four criteria for mediation as specified by Baron and Kenny (1986). Mediation was also confirmed through a signifi-

cant result from the Sobel test of mediation ($z = 2.4$, $p = .016$), suggesting that fear-prone individuals tend to select threat scenario responses that entail orientation away from threat because they have a magnified perception of threat relative to less fear-prone individuals.

GENERAL DISCUSSION

Certain key aspects of the revised Reinforcement Sensitivity Theory (rRST) of personality (Gray & McNaughton, 2000) were tested, specifically the claim that interindividual differences in defensiveness relate to key facets of personality. Results were broadly supportive and showed a range of plausible associations between defensive variables and personality constructs, such as Neuroticism. More specifically, the previously reported positive correlation between fear questionnaire scores and the tendency to orient away from threat (Perkins & Corr, 2006) was replicated in Studies 1 and 2. These data provide support for the rRST's assertion that fear is associated with departure (avoidance or escape) from threat (McNaughton & Corr, 2004). However, the finding by Perkins and Corr that trait anxiety questionnaire scores are positively associated with the tendency to orient *toward* threat was not supported.

Results supported the prediction (Gray & McNaughton, 2000) that anxiety and fear responses will not be equally likely at all distances from threat but that instead fear-based escape reactions will take precedence over anxious approach when threat is very close or intense (Gray & McNaughton, 2000). This is a novel finding. The hypothesis that individuals who perceive threats as especially close or intense are more prone to fleeing from threat (and thus will be more prone to fear) was supported by mediated regression analysis. This analysis showed that fear-prone individuals are prone to orientation away from threat because they perceive threats as especially intense.

In general, results suggest that individual differences in defensive tendencies are associated with aspects of personality but that future studies are required to translate, into human terms, the rodent findings that have strongly influenced the formulation of rRST. Chief among these is the finding that anxiolytic drugs increase perceived distance to threat in rodents (Blanchard, Griebel, Henrie, & Blan-

chard, 1997) and, given that "we can liken the low trait anxious individual to the drugged rat" (McNaughton & Corr, 2004, p. 291), a person low on trait anxiety, in strict rRST terms, can be conceptualized as someone who perceives threat as less intense or close than it really is (i.e., has a demagnified perception of threat). Because our findings link fear, but not trait anxiety questionnaire scores, to perceptions of threat magnification, they suggest (a) that rRST is incorrect in linking such perceptions to anxiety or (b) that conventional trait anxiety questionnaires are not well suited to measuring anxiety when it is strictly defined in rRST terms.

To test the relative merits of these two explanations, studies will be required that measure the effects of anxiolytic drugs on human defensive reactions so that candidate questionnaire measures of rRST trait anxiety may be validated using the same pharmacological rationale on which the theory is based. Existing evidence, nevertheless, favors the idea that conventional trait anxiety questionnaires are not well suited to measuring revised RST trait anxiety, as anxiolytic drugs are typically not used to treat depression, yet conventional trait anxiety questionnaire appear to index depression as well as anxiety (e.g., Bieling, Antony, & Swinson, 1998; Endler, Cox, Parker, & Bagby, 1992). This view is consistent with the finding that trait anxiety questionnaire scores correlated negatively with perceived escapability of threat because it is plausible that depressed individuals may have an especially pessimistic view of their chances of successful escape from a threat.

In summary, results indicate that human defensive reactions, as measured by Blanchards' threat scenario questionnaire, relate to personality variables in a way that is broadly consistent with the rRST of personality (Gray & McNaughton, 2000; McNaughton & Corr, 2004). Conclusions based on the results of these studies should, however, be viewed tentatively. First, all of the measures in the studies were self-report, but behavioral measures may offer a more sensitive index of defensive behavior because of their often nonreflective, automatic nature. It is possible that the processes required to generate self-reports superimposes variance (e.g., related to socially acquired expectations of response styles) over and above relatively low-level defensive reactions (e.g., immediate flight). Second, lack of a longitudinal or controlled experimental design precludes statements about causality.

A third limitation concerns the psychometric properties of the threat scenario measure used to derive the scores for defensive

direction and intensity. As can be seen in Figure 1, there are a greater number of potential response options available that correspond to both an orientation toward threat and a less intense form of defensive action. This may potentially reduce overall variability in defensive direction and intensity scores, leading to lower reliability estimates and attenuated correlations with personality questionnaires. Future studies should seek to examine the psychometric properties of the threat scenarios in more detail, although the general consistency of findings in the original study (Perkins & Corr, 2006), and the two studies reported here, indicate that the threat scenario questionnaire is reliable, at least regarding measurement of fear and departure from threat.

Further research is also required to determine whether or not the findings in these studies replicate with measures of real human defensive behavior; however, such studies must await the development of new behavioral tasks. Our finding that the Fear Survey Schedule measures, in part at least, perceptions of threat intensity suggests that this questionnaire might be used to make some tentative steps toward identifying the factors that affect human defensive reactions and, ultimately, emotionality, both in its normal and clinical expression. This goal is especially relevant to rRST because Gray and McNaughton (2000, p. 367) predicted that the heritable core of negative emotionality is "a perceptual bias ... towards the identification or magnification of threat of all kinds."

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