Trait self-focused attention, task difficulty, and effort-related cardiovascular reactivity.

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Abstract:

Using motivational intensity theory as a framework, the present experiment examined how individual differences in self-focused attention interact with task difficulty to predict effort, assessed via cardiovascular reactivity. Participants (n = 50) worked on a cognitive task fixed at an easy, medium, or hard level of difficulty, and individual differences in private self-consciousness and self-reflection were measured. Regression models indicated that trait self-focus interacted with task difficulty to predict cardiovascular reactivity, particularly systolic blood pressure (SBP) reactivity. Participants low and high in trait self-focus showed similar SBP reactivity in the easy and medium conditions, but they diverged in the hard condition: High trait focus was associated with higher SBP reactivity, indicating greater effort, whereas low trait self-focus was associated with low SBP reactivity, indicating disengagement. The findings thus support the motivational intensity approach to effort and its interpretation of self-focus's role in effort mobilization.

Keywords: effort | cardiovascular reactivity | self-focused attention | private self-consciousness | motivational intensity | psychology | psychophysiology

Article:

1. Introduction

Self-focused attention is a major construct in the psychology of self-regulation and motivation (Carver, 2003). A large literature shows that directing attention to the self causes people to compare themselves to relevant standards. When people feel able to meet a standard, high self-focus increases their motivation to do so, as seen in a variety of affective, cognitive, and behavioral outcomes (for reviews, see Carver and Scheier, 1998 and Duval and Silvia, 2001). In the present research, we build upon recent applications of motivational intensity theory (Brehm et al., 1983 and Wright, 1996) to self-focused attention. This theory makes new predictions about how self-focus affects the intensity of effort, measured with physiological outcomes. In particular, we examine how individual differences in trait self-focused attention and task difficulty jointly determine effort-related cardiovascular reactivity in an active coping situation.

2. Self-focus and motivational intensity

Many studies of self-focused attention have proposed that self-focus increases effort and motivation (for reviews see Carver and Scheier, 1998 and Duval and Silvia, 2001), but the outcome measures have either been verbal self-reports, behavioral measures of persistence (how long people worked on a task), or achievement (how well people performed a task). Although worthwhile, such outcomes are at best indirect measures of the intensity of effort. An alternative approach, suggested by Wright's (1996) model of effort and cardiovascular activity, is to assess effort via cardiovascular reactivity in an active coping context.

Predictions about how self-focus affects effort-related cardiovascular reactivity can be developed by applying Brehm's motivational intensity theory (Brehm et al., 1983 and Brehm and Self, 1989), which proposes that the level of effort expended is a function of two variables: the importance of the goal at stake and the difficulty of the behaviors needed to achieve the goal. Importance affects potential motivation, the degree of effort people are willing to expend: People are willing put forth more effort for important goals than for trivial ones. The actual degree of effort, however, is determined by difficulty. Effort is low for easy tasks, increases as the task becomes harder, and then eventually declines, either because the goal is unattainable (and hence additional effort is fruitless) or isn't important enough to merit the additional effort.

Motivational intensity theory has suggested some exceptions to this pattern. For example, unfixed tasks—sometimes known as “do your best” tasks or piece-rate tasks—lack a fixed level of difficulty because people can work as quickly or slowly as they like (Wright et al., 2002). Similarly, some tasks have an unclear level of difficulty (Richter and Gendolla, 2006 and Richter and Gendolla, 2007). For tasks with unfixed or unclear difficulty, effort is a function of importance.

Gendolla et al. (2008) proposed that self-focused attention affects effort by affecting potential motivation, the level of justified effort. Because self-focused people are evaluating their actions relative to their standards, success should be more significant when self-focus is high. Thus far, three experiments on effort-related cardiovascular reactivity have supported the predictions made by motivational intensity theory. When self-focused attention was increased by filming participants with a video camera, systolic blood pressure (SBP) reactivity was higher for an unfixed task (Gendolla et al., 2008, Study 1). Because effort for unfixed tasks is due to importance (Wright et al., 2002), this finding suggests that self-focus made success more important. For fixed tasks, manipulating self-focus didn't affect SBP reactivity for easy or impossible tasks, which is predicted because effort isn't required or justified for such tasks. But it did increase SBP reactivity for moderately difficult tasks. People in low self-focus conditions disengaged at lower levels of task difficulty than people in high self-focus conditions (Gendolla et al., 2008, Study 2; Silvia et al., 2010), which further suggests that self-focus affects effort by making success more important.

3. The present research

The present research sought to extend the evidence for motivational intensity theory's predictions regarding self-focused attention and cardiovascular reactivity. In particular, we examined the influence of individual differences in self-focused attention instead of manipulated self-focus. Examining individual differences is valuable for several reasons. First, replicating the effects with individual differences would conceptually replicate the experimental work and thus offer strong support for Gendolla et al.'s (2008) motivational intensity interpretation. Finding similar effects with individual differences would cast strong doubt on alternative explanations for the effects of manipulated self-awareness (e.g., evaluation apprehension, distraction, self-presentation). Second, trait self-focus has been a major part of the self-focus literature since its origins (Buss, 1980, Fenigstein, 2009 and Smári et al., 2008). Many of the demonstrations of self-focus's effects on cognition, motivation, and emotion used individual differences in self-focus (e.g., Scheier and Carver, 1977 and Scheier and Carver, 1983). As a result, a motivational intensity interpretation of self-focus should be able to explain the effects of both state and trait self-focus.

In the present experiment, adult participants completed a cognitive task with a fixed-difficulty level of either easy, medium, or hard. Individual differences in self-focused attention were measured with two self-report scales. We then tested whether levels of trait self-focus interacted with task difficulty to affect effort, quantified as systolic reactivity. Although psychophysiological work on motivational intensity commonly assesses reactivity for systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR), it views SBP reactivity as the parameter most closely linked to effort. Of the three, SBP best reflects the impact of the sympathetic nervous system (Richter et al., 2008 and Richter and Gendolla, 2009a), and research shows it is the most consistent marker of effort (e.g., Bongard, 1995, Gerin et al., 1995, Light, 1981, Sherwood et al., 1990 and Smith et al., 2000). DBP reactivity often parallels the effects of SBP reactivity (e.g., Al'Absi et al., 1997, Gendolla and Richter, 2005 and Silvia et al., 2010) but it is less consistent. Both SBP and DBP are influenced by beta-adrenergic sympathetic discharge, but the effects of DBP can be obscured by changes in total peripheral resistance (Levick, 2003). HR is influenced by both sympathetic and parasympathetic arousal, so HR reactivity is the least consistent of the three parameters, although some research finds HR effects (e.g., Eubanks et al., 2002).

4. Method

4.1. Participants and design

A total of 56 people (45 women, 11 men) enrolled in General Psychology at the University of North Carolina at Greensboro participated as part of a research participation option. Six cases were excluded (primarily due to issues with the software, computer, or cardiovascular equipment, but also because of intense exercise before the session and participant non-compliance), leaving a final sample of 50 people (41 women, 9 men). Based on self-reported race and ethnicity, approximately 40% of the sample was African American and 48% of the sample was European American. Age ranged from 18 to 28 (M = 18.7, SE = .23). Task difficulty was manipulated with three levels (easy, medium, and hard), and each person was randomly assigned to one of these between-person conditions.

4.2. Cardiovascular assessment

SBP (mmHg), DBP (mmHg), and HR (bpm) were measured with an automated Dinamap 1846sx cardiovascular monitor using the oscillometric method. The experimenter placed a cuff (Critikon) over the brachial artery of the participant's non-dominant arm. There were four baseline assessments (one every 2 min) and five task assessments (one every minute).

4.3. Procedure

Each person participated individually. After providing informed consent, participants were told the study was about how the body responded during cognitive tasks. The experiment began with a baseline period, during which four cardiovascular assessments were taken at 2 min intervals while participants completed a questionnaire.

4.3.1. Assessment of trait self-focused attention

The questionnaire completed during the baseline period contained the measures of trait self-focus among demographic items and filler scales intended to disguise the study's purpose. Trait self-focus was measured with the revised private self-consciousness scale (Scheier & Carver, 1985) and the self-reflection scale (Grant et al., 2002). The revised private self-consciousness scale is a 9-item version of the original 10-item private self-consciousness scale (Fenigstein et al., 1975). In addition to simplifying the wording, the revised scale improved the internal consistency and unifactorial structure of the original scale (see Smári et al., 2008, for a review). The 12-item self-reflection scale, like the private self-consciousness scale, was designed to assess trait self-focus, and it appears to do so with higher internal consistency and stronger unidimensionality (Grant et al., 2002 and Roberts and Stark, 2008). As one would expect, the two scales have correlated strongly in past research (Grant et al., 2002 and Silvia and Phillips, 2011). Both scales were completed using a 7-point response format (1 = strongly disagree, 7 = strongly agree).

4.3.2. The d2 task

After the baseline period, the experimenter introduced the participant to the cognitive task. People completed a computer-based version of the d2 test of attention (Brickenkamp & Zillmer, 1998), which has been used in several studies of motivational intensity (Gendolla and Richter, 2005, Gendolla et al., 2008 and Silvia et al., 2010). For this task, a d or a p is presented on the computer screen. The d or p has up to 2 apostrophes above and below it, and participants must decide if it is a d2 (a d with 2 apostrophes above it, 2 apostrophes below it, or with one above and one below it). Participants were told to press a green button if the letter was a d with exactly 2 apostrophes and a blue button for all other items (ds with 1, 3, or 4 apostrophes, and all ps). People used their dominant hand to respond. Responses were collected with a Cedrus RB-834 response pad, and the task was controlled by SuperLab Pro 2.0.4.

4.3.3. Manipulation of task difficulty

Fixed levels of task difficulty were manipulated by varying the response window for each task trial. In the easy condition, each trial lasted for 2500 ms. Making a response did not end the trial; the character appeared on the screen for the full 2500 ms. In the medium condition, each trial lasted for 1250 ms; in the hard condition, each trial lasted for 750 ms. In all conditions, the trial remained on the screen until the end of the response window. This prevents people from working at their own pace, which would turn the fixed-difficulty task into an unfixed task (Wright et al., 2002). The timing parameters were based on our past research with this task (Gendolla et al., 2008 and Silvia et al., 2010). The hard condition was intended to evoke a range of effort. Responding within 750 ms is challenging (but not impossible), so we anticipated that some participants would disengage (reflected in low SBP reactivity) and others would mobilize additional effort (reflected in high SBP reactivity) based on whether the goal was important enough to merit additional effort. The condition thus affords a test of the moderating role of trait self-focus in effort mobilization.

Participants completed a block of 22 practice trials to acquaint them with the task. After the practice trials, they completed a brief questionnaire that assessed self-reported impressions of the task's difficulty. People were asked “How easy or hard does the d2 task seem?” (1 = very easy, 7 = very hard). We assessed expectancies for task performance by asking three items: “How confident are you that you can get 90% correct?” (1 = not confident, 7 = very confident), “Are you optimistic about your ability to meet the standard of 90% correct?” (1 = no, not at all, 7 = very optimistic), and “Do you expect to meet this standard?” (1 = no, not at all, 7 = yes, definitely). We also asked about the importance of success (How important to you is it to meet the standard?, 1 = not at all important, 7 = very important). Finally, as in Nolte et al. (2008), we asked about perceptions of challenge and threat (“Does the D2 task seem challenging?” and “Does the D2 task seem threatening?”); both items had a 7-point format (1 = no, not at all, 7 = yes, definitely).

The task began after participants had completed the pre-task questionnaire. The task lasted for 5 min in each condition, and cardiovascular responses were measured 5 times at 1 min. intervals, starting with the task's onset. After the task, participants were debriefed, thanked, and given the opportunity to ask questions about the research.

5. Results

5.1. Data reduction and preliminary analyses

We averaged the four baseline assessments to form baseline scores for SBP (α = .94), DBP (α = .93), and HR (α = .97). Table 1 displays the baseline values. One-way ANOVAs with S-N-K follow-up tests found no significant between-group differences in SBP, DBP, or HR for the baseline scores. The five task assessments were averaged to form overall task scores for SBP (α = .97), DBP (α = .92), and HR (α = .97). Baseline-to-task change was then measured by computing difference (delta) scores. To test for possible carry-over or initial-value effects, we tested whether the baseline scores correlated significantly with the difference scores. We found significant correlations for SBP ($r = -.34$, $p = .016$) and DBP ($r = -.39$, $p = .005$) but not for HR ($r = -.10$, $p = .48$), so the analyses of SBP and DBP were conducted using baseline-adjusted scores (Llabre et al., 1991). Gender wasn't analyzed because too few men participated, but gender was distributed evenly between the conditions ($n = 3$ men in each condition).

Table 1. Cardiovascular baseline values.

	Easy	Medium	Hard
SBP			
M	112.58	107.75	106.41
SE	3.99	1.97	2.08
DBP			
M	66.69	63.43	65.03
SE	2.24	1.09	1.73
HR			
M	80.88	81.19	79.48
SE	3.35	1.74	2.61

Note. SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate. SBP and DBP are in mmHg; HR is in beats per minute. Cell *n*s are $n = 16$ in the Easy condition, $n = 18$ in the Medium condition, and $n = 16$ in the Hard condition.

The two measures of trait self-focus—the revised private self-consciousness scale ($\alpha = .64$) and the self-reflection scale ($\alpha = .88$)—were highly correlated ($r = .65$, $p < .001$), as expected. Each scale was thus standardized, and a trait self-focus composite was created by averaging the standardized scores.

5.2. Cardiovascular reactivity

We expected that trait self-focus, a continuous variable, would interact with task difficulty—as task difficulty increased, people low in trait self-focus would disengage more quickly. To test this, we estimated a regression model for SBP, DBP, and HR. The regression equation included the following effects: (1) two orthogonal contrast terms for task difficulty—a linear contrast (easy = − 1, medium = 0, hard = 1) and a quadratic contrast (easy = 1, medium = − 2, hard = 1)—that represent its main effects; (2) a main effect of trait self-focus, which was centered at zero; (3) the two interactions (trait self-focus by the linear contrast, and trait self-focus by the quadratic contrast); and (4) an intercept.

5.2.1. SBP reactivity

For SBP, the regression analysis found a marginal effect of the linear contrast (b = 1.81, SE = 1.10, p = .107) and a significant effect of the quadratic contrast (b = − 1.56, SE = .61, p = .014). Table 2 shows the descriptive statistics. There was no main effect of trait self-focus (b = 1.01, SE = 1.06, p = .345), but trait self-focus significantly interacted with both the linear contrast (b = 2.84, SE = 1.38, p = .045) and the quadratic contrast (b = 1.72, SE = .70, p = .018). Adding the interaction effects increased R^2 by 13.2%, a significant change, $F(2, 44) = 4.02$, p = .025, for a total model R^2 of 27.9%.

Table 2. Cardiovascular reactivity and task difficulty.

	Easy	Medium	Hard
SBP			
M	− 3.16	3.14	−.37
SE	1.34	1.67	1.69
DBP			
M	− 1.94	.81	1.04
SE	.90	1.07	1.22
HR			
M	− 2.30	1.17	−.07
SE	1.37	1.18	1.16

Note. SBP = systolic blood pressure; DBP = diastolic blood pressure; HR = heart rate. SBP and DBP are in mmHg; HR is in beats per minute. Values for SBP and DBP are baseline-corrected. All means and standard errors are descriptive statistics, not predicted values from the regression models. Cell *n*s are n = 16 in the Easy condition, n = 18 in the Medium condition, and n = 16 in the Hard condition.

Fig. 1 displays the predicted values based on the regression equation. Trait self-focus was estimated at values of −1.5 (low) and 1.5 (high). As predicted, trait self-focus and task difficulty jointly influenced SBP reactivity. SBP increased as task difficulty increased, but when task difficulty was high, SBP reactivity declined when trait self-focus was low but increased when trait self-focus was high. This pattern conceptually replicates the experiments that manipulated self-focus (Gendolla et al., 2008 and Silvia et al., 2010). Another way to represent the interaction is to consider the within-condition correlations between trait self-focus and SBP reactivity. Trait self-focus was unrelated to SBP reactivity in the easy condition (r = −.022, p = .935), non-significantly negatively related in the medium condition (r = −.322, p = .192), but strongly and positively related in the hard condition (r = .560, p = .024).

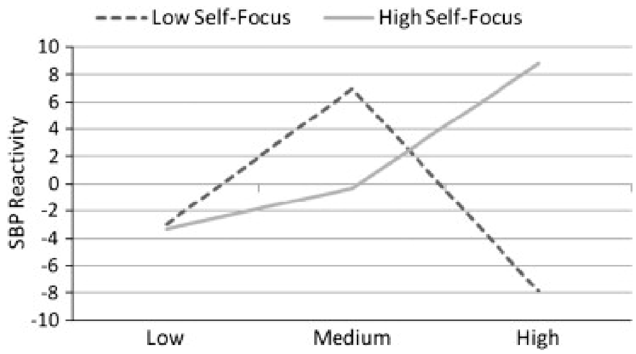

Fig. 1. Predicted values for trait self-focus, task difficulty, and SBP reactivity.

5.2.2. DBP reactivity

For DBP, the linear contrast was significant (*b* = 1.67, *SE* = .74, *p* = .029) but the quadratic contrast was not (*b* = −.45, *SE* = .41, *p* = .277): DBP increased as task difficulty increased. Table 2 displays the descriptive statistics. There was no main effect of trait self-focus (*b* = −.08, *SE* = .71, *p* = .909) and no interaction between trait self-focus and the linear contrast (*b* = .89, *SE* = .92, *p* = .335). Trait self-focus did, however, significantly interact with the quadratic contrast (*b* = 1.36, *SE* = .47, *p* = .006). Adding the interaction effects increased R^2 by 14.5%, a significant change, $F(2, 44) = 4.21$, $p = .021$, for a total model R^2 of 24.5%.

As with SBP, we estimated the interaction pattern for DBP using the regression equation; Fig. 2 displays the predicted values for low (− 1.5) and high (1.5) levels of trait self-focus. Like SBP, DBP reactivity overall increased as task difficulty increased, but it diverged when difficulty was high: Reactivity increased for people high in trait self-focus but declined for people low in trait self-focus.

Fig. 2. Predicted values for trait self-focus, task difficulty, and DBP reactivity.

5.2.3. HR reactivity

For HR, neither the linear contrast (*b* = 1.31, *SE* = .91, *p* = .159) nor the quadratic contrast (*b* = − .76,*SE* = .51, *p* = .140) was significant; Table 2 displays the descriptive statistics. Trait self-focus had no main effect (*b* = .765, *SE* = .88, *p* = .388) and no interactions with the linear contrast (*b* = .78, *SE* = 1.14, *p* = .500) or quadratic contrast (*b* = .78, *SE* = .58, *p* = .187). Total model R^2 was 12.3%.

5.3. Task performance and subjective measures

How did trait self-focus and task difficulty affect task performance? Response time (RT) was quantified as the average RT for correct trials; errors were quantified as the proportion of incorrect trials (rather than the raw score, given the different number of trials in each condition). Table 3 displays the effects across levels of task difficulty. Not surprisingly, there were large effects of difficulty on both RT and errors. For RT, a regression model found only a significant linear effect of task difficulty (*b* = − 125.02, *SE* = 14.48, *p* < .001, β = −.797). For errors, there was a significant linear effect (*b* = .086, *SE* = .015, *p* < .001, β = .644) and quadratic effect (*b* = .018, *SE* = .008, *p* = .030, β = .242) of task difficulty; no other effects were significant. As Table 2 shows, response times became faster and the percentage of errors increased as the task became harder. To expand upon this analysis, we explored within-condition correlations between trait self-focus, RT, and errors. Trait self-focus did not significantly predict RT (correlations ranged from *r* = .00 to*r* = −.24) or errors (correlations ranged from *r* = −.06 to *r* = .26) in any of the conditions.

Table 3. Task difficulty effects on response time, errors, and subjective reports.

	Easy	Medium	Hard
Response time	768 (24)	632 (19)	516 (13)
Proportion errors	.039 (.013)	.071 (.014)	.22 (.029)
Rated task difficulty	2.31 (.29)	2.47 (.32)	3.87 (.42)
Rated performance expectancies	5.79 (.28)	5.64 (.26)	3.96 (.33)
Rated importance	5.38 (.36)	5.59 (.36)	5.07 (.36)
Rated challenge	2.69 (.35)	3.29 (.42)	4.80 (.37)
Rated threat	1.50 (.26)	2.00 (.33)	2.60 (.51)

Note. Standard errors are in parentheses. Response times are rounded to the nearest millisecond. All means and standard errors are descriptive statistics, not predicted values from the regression models. Due to missing questionnaire responses, cell *n*s for the rated variables are $n = 16$ in the Easy condition, $n = 17$ in the Medium condition, and $n = 15$ in the Hard condition.

Finally, we conducted regression analyses of the subjective measures; Table 3 displays the descriptive statistics. For perceptions of the task's difficulty, only the expected linear effect of task difficulty appeared ($b = .748$, $SE = .262$, $p = .007$); for performance expectancies, regression models found a linear ($b = -.933$, $SE = .217$, $p < .001$, $\beta = -.538$) and a quadratic ($b = -.248$, $SE = .120$, $p = .044$, $\beta = -.258$) effect of task difficulty. Not surprisingly, people found the task harder and had less optimistic performance expectancies as task difficulty increased. For self-reported challenge and threat, only a linear effect of task difficulty appeared (challenge: $b = 1.08$, $SE = .286$, $p < .001$, $\beta = .501$; threat: $b = .572$, $SE = .283$, $p = .050$, $\beta = .301$): People rated the task as more challenging and as more threatening as task difficulty increased. No significant main effects or interactions were found for self-reported importance.

6. General discussion

The present findings extend recent research on self-focus and motivational intensity and support Gendolla and Richter's (2010) analysis of the self's role in effort. Consistent with past work, trait self-focus appeared to shift the ceiling of potential motivation, the amount of effort seen as justified by the goal's importance. For the sample as a whole, SBP reactivity increased and then declined as task difficulty increased. This overall pattern, however, was moderated by trait self-focus. People high in trait self-focus continued to expend effort, indexed with higher SBP reactivity, for the difficult task, whereas people low in trait self-focus disengaged. This effect suggests that self-focused attention affects effort primarily by affecting how much effort people are willing to expend. The present findings thus conceptually replicate the experiments that manipulated self-focused attention, which also suggested that self-focus affected effort by affecting the importance of success (Gendolla et al., 2008 and Silvia et al., 2010).

As in past work, the clearest findings emerged for SBP. SBP reactivity showed both the overall quadratic effect as well as significant interactions with trait self-focus. DBP reactivity showed a similar pattern and a significant self-focus-by-quadratic interaction, but the effects were less consistent and the overall quadratic trend was not significant. The pattern for HR was broadly similar, but the main effects and interactions were all non-significant. The fact that the findings were strongest for SBP is consistent with Wright's (1996) integration of motivational intensity theory (Brehm et al., 1983) with Obrist's (1981) active coping approach, which notes that of the three parameters SBP most strongly reflects beta-adrenergic activity (Richter et al., 2008), and it is consistent with the large motivational intensity literature to date (see Gendolla and Richter, 2010 and Wright and Kirby, 2001).

No effects were found for task performance: trait self-focus and task difficulty jointly influenced SBP reactivity, but only task difficulty influenced error rates and response times. Research on motivational intensity commonly finds that changes in effort do not directly translate into changes in performance (e.g., Richter and Gendolla, 2009a and Silvia et al., 2010). This might initially seem non-intuitive, but it supports the theory's distinction between effort (intensity), persistence (duration), and performance (quality) as distinct aspects of motivated action. Performance is influenced by many factors other than effort, such as abilities relevant to the task (e.g., fluid intelligence, working memory span) and task strategies. For some kinds of tasks, or for people who lack necessary skills and knowledge, expending more effort won't translate into better performance. Motivational intensity research has found effort–performance dissociations often enough that future work should consider disentangling how test-level and person-level features influence the coupling of effort and performance.

The present study adds to the growing literature on self-focus and effort-related cardiovascular reactivity (Gendolla et al., 2008 and Silvia et al., 2010), and it plays a key role in reinterpreting past work. In general, past studies have shown main effects of either manipulated or trait self-focus on measures of performance or persistence, and several studies have shown interactions for two levels of difficulty (for reviews see Carver and Scheier, 1998, Duval and Silvia, 2001, Silvia and Duval, 2001 and Silvia and Duval, 2004). The present work, along with past work, indicates that the effects of self-focus on effort are non-linear, as predicted by motivational intensity theory. Furthermore, by replicating state effects with trait differences, the experiment casts doubt on possible alternative explanations for the state effects, and it illustrates how the model can be extended to the large literature on individual differences in self-focus (Fenigstein, 2009).

Two key questions, however, remain for studies of trait self-focus and cardiovascular reactivity. First, the present work used fixed-difficulty tasks, yet motivational intensity theory also makes predictions regarding unfixed tasks (people are told to “do their best” and can work at their own pace; Wright et al., 2002) and unclear difficulty tasks (performance standards and difficulty levels are unclear; Richter and Gendolla, 2006, Richter and Gendolla, 2007 and Richter and Gendolla, 2009b). Specifically, effort is a function of the importance of success for such tasks, so people high in trait self-focus should have higher SBP reactivity for tasks with unfixed and unclear task difficulty. Second, many self-awareness studies have crossed state and trait self-focus, which often interact (e.g., Buss and Scheier, 1976, Carver and Scheier, 1978, Kleinke et al., 1998 and Scheier, 1976). It seems likely, based on past research, that trait self-focus has its largest effects when state self-focus is low—increasing state self-focus tends to diminish the effects of individual differences (e.g., Carver and Scheier, 1978)—but testing the joint effects of state and trait self-focus awaits future research.

More generally, the present research illustrates the value of Brehm's motivational intensity theory for understanding how individual differences influence effort-related cardiovascular activity. Much of the work inspired by this theory has manipulated variables that influence difficulty appraisals and potential motivation, such as mood, fatigue, incentives, and task difficulty (e.g., Gendolla and Krüsken, 2002, Richter and Gendolla, 2009a, Richter and Gendolla, 2009b, Wright et al., 2007 and Wright et al., 2008). But the theory affords new predictions about how individual differences influence effort, including both demographic variables (e.g., gender; Frazier et al., 2008) as well as enduring aspects of personality, such as dysphoria (Brinkmann and Gendolla, 2007), achievement motivation (Capa et al., 2008), and extraversion (Kemper et al., 2008).

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