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# Masked first name priming increases effort-related cardiovascular reactivity ☆

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ABSTRACT

Recent research on motivational intensity has shown that explicit manipulations of self-focused attention (e.g., mirrors and video cameras) increase effort-related cardiovascular responses during active coping. An experiment examined whether masked first name priming, an implicit manipulation of self-focused attention, had similar effects. Participants ($n = 52$ young adults) performed a self-paced cognitive task, in which they were told to get as many trials correct as possible within 5 min. During the task, the participant's first name was primed for 0%, 33%, 67%, or 100% of the trials. First name priming, regardless of its frequency, significantly increased cardiovascular reactivity, particularly systolic blood pressure (SBP) reactivity. Furthermore, the priming manipulation interacted with individual differences in trait self-focus: trait self-focus predicted higher SBP reactivity in the 0% condition, but first name priming eliminated the effects of individual differences. Implications for self-awareness research and for the emerging interest in priming effects on effort are considered.



## 1. Introduction

When people focus attention on the self, they evaluate the self against standards, norms, and goals. Self-focus enables people to monitor their performance and to evaluate whether they have fallen short of a goal, so it is a central mechanism in self-regulation and goal striving (Carver, 2003; Duval and Silvia, 2001). Most of the research on how self-focus affects motivational processes has measured motivation using self-reports, behavioral measures of persistence (how long people spend working on a task), or how well people perform (for reviews, see Carver and Scheier, 1998; Silvia and Duval, 2001a).Recent work, however, has examined how self-focus affects physiological outcomes, particularly cardiovascular reactivity, during the goal striving process (Gendolla et al., 2008; Silvia et al., 2010, 2011).

Research on self-focus and effort-related cardiovascular reactivity has used Brehm's motivational intensity theory as a framework (Brehm and Self, 1989; Brehm et al., 1983). Wright (1996) integrated this theory with Obrist's (1981) active coping approach to develop a model of the cardiovascular dynamics of effort regulation. According to motivational intensity theory, the intensity of motivation is a function of the importance of success and the difficulty of behaviors needed to achieve the goal. For fixed-difficulty tasks, cardiovascular reactivity is a function of task difficulty, provided that success is possible and the goal is worth the effort. Reactivity is low when tasks are easy, increases as tasks become more challenging, and then declines when achieving the goal is impossible or requires more effort than is justified by the goal's importance (for reviews, see Gendolla and Richter, 2010; Wright and Kirby, 2001). For unfixed-difficulty tasks — also known as self-paced, piece-rate, and "do your best" tasks — people can work at their own pace and thus set their own level of challenge, so cardiovascular reactivity is a function of potential motivation (Wright et al., 2002).

Self-focused attention, by inducing self-evaluation, makes achieving a goal more significant and self-relevant (Gendolla and Richter, 2010). As a result, self-focus should increase potential motivation, the amount of effort that is justified. Research thus far has supported the application of motivational intensity theory to self-focused attention. For unfixed-difficulty(self-paced) tasks, self-focused people showed higher cardiovascular reactivity, particularly systolic blood pressure (SBP) reactivity (Gendolla et al., 2008). For fixed-difficulty tasks, self-focused people didn't show greater SBP reactivity for easy or for impossible tasks, for which effort wasn't required or justified, but they did show greater SBP reactivity for tasks of intermediate difficulty (Gendolla et al., 2008, Study 2; Silvia et al., 2010). Furthermore, these interactive effects of self-focus and task difficulty on SBP reactivity have been replicated in research that assessed stable individual differences in trait self-focus instead of manipulating self-focus (Silvia et al., 2011).

To date, however, studies of self-focus and cardiovascular reactivity have used only explicit manipulations of self-focus. These manipulations pose people with obvious, salient reminders of the self, and they evoke strong feelings of self-consciousness. Common explicit

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manipulations involve having participants sit in front of a mirror during the experiment (Phillips and Silvia, 2005), videotaping the participants and showing their image on a monitor (Duval, 1976; Silvia and Duval, 2001b; Silvia and Phillips, 2004), or making participants feel distinctive (Silvia and Eichstaedt, 2004; Snow et al., 2004).

A smaller tradition of self-awareness research, however, has explored implicit manipulations of self-focused attention. These manipulations direct attention to self and activate self-knowledge unobtrusively. The most common implicit manipulation is masked name priming. In one study, people were presented their last names (surnames) for 30 ms, followed by a 30 ms mask (Macrae et al., 1998). Last name priming significantly affected the self-regulation of social stereotypes. In recent work, masked first name priming (presenting the name for 27 ms and a mask for 100 ms) made people more likely to behave according to salient situational standards (Silvia and Phillips, under review). Another experiment showed that priming self-relevant pronouns (presenting "I" for 17 ms, followed by a 1000 ms mask) influenced affective regulation (Koole and Coenen, 2007).

It's currently unknown how implicit manipulations of self-focus would affect cardiovascular reactivity during active coping. Given that implicit and explicit self-focus manipulations replicate each other and evoke the same self-evaluative and self-regulatory mechanisms, one would expect implicit self-focus to have the same influence on effort-related cardiovascular reactivity. Testing the effects of name priming on effort is valuable for several reasons. First, it extends the large literature on self-focused attention and motivation into new directions, given that most of that literature was developed prior to psychology's interest in implicit processes. Second, studying name priming extends an emerging interest in implicit processes in effort regulation, such as how masked primes influence the perceived difficulty of goal attainment or an orientation to act (Gendolla and Silvestrini, 2010, 2011).

Finally, it's unclear how manipulated self-focus and trait self-focus jointly influence effort-related cardiovascular reactivity. Past work has shown effects for state self-focus (Gendolla et al., 2008; Silvia et al., 2010) and for trait self-focus (Silvia et al., 2011). Self-focus research, however, often finds interactions between manipulated and measured self-focus (e.g., Buss and Scheier, 1976; Carver and Scheier, 1978; Kleinke et al., 1998). In a recent review, Fenigstein (2009) remarked that the nature of these interactions remains obscure — some studies find that state manipulations diminish the effects of individual differences (e.g., Carver and Scheier, 1978), whereas other studies find that state self-focus amplifies the effects of individual differences (e.g., Brockner, 1979) — so it is important for research to untangle how states and traits interact.

## 2. The present research

In the present experiment, we examined the effects of implicit self-focus, manipulated via masked first name priming, on cardiovascular reactivity during active coping. People completed a self-paced cognitive task, and we manipulated four levels of prime frequency during the task: 0% (a no-priming control condition), 33% of the trials, 67% of the trials, and 100% of the trials. We explored several levels of priming frequency because higher prime frequencies can sometimes lead to habituation to the prime (e.g., Silvestrini and Gendolla, in press). In addition, we measured individual differences in trait self-focus and examined its effects on cardiovascular reactivity, particularly if it interacted with name priming.

To assess effort, we measured reactivity (change from baseline to task) for systolic blood pressure (SBP), diastolic blood pressure (DBP), and heart rate (HR). Of these parameters, SBP reactivity is the parameter most closely linked to effort (Wright, 1996). A large literature indicates that it is a reliable and consistent indicator of effort during active coping (e.g., Bongard, 1995; Gerin et al., 1995; Light, 1981; Richter et al., 2008; Richter and Gendolla, 2009; Sherwood et al., 1990; Smith et al., 2000). DBP reactivity often tracks SBP reactivity, and several studies of motivational intensity have found effects for DBP (e.g., Al'Absi et al., 1997; Gendolla and Richter, 2005; Silvia et al., 2010, 2011), but it is much less consistent. HR is the least consistent of the three, although some experiments have found effects for HR reactivity (e.g., Eubanks et al., 2002).

Based on past work on motivational intensity and self-focus, we predicted that masked name priming would increase cardiovascular reactivity, particularly SBP reactivity, during the self-paced cognitive task. Because self-focus makes achieving goals and standards more significant, masked name priming should increase the amount of effort people are willing to expend. Effort during self-paced tasks is a function of the goal's importance (Wright et al., 2002), so name priming should increase effort for such tasks. We expected trait self-focus to increase effort, given past work (Silvia et al., 2011), but we didn't have specific predictions concerning how trait self-focus would interact with name priming.

## 3. Method

### 3.1. Participants and design

A total of 56 people (40 women and 16 men) enrolled in General Psychology at the University of North Carolina at Greensboro participated as part of a research participation option. Four cases were excluded (three due to equipment issues, one because the participant thought she may have seen her first name), leaving a final sample of 52 people (37 women and 15 men). Based on self-reported race and ethnicity, the sample was approximately 48% European American, 31% African American, 11% Asian American, and 6% Hispanic or Latino. Age ranged from 18 to 30 ($M = 18.7$, $SD = 1.90$). The project was approved by our university's Institutional Review Board (IRB), and all participants signed an informed consent form approved by the IRB.

Name priming was manipulated with four levels — no name priming, 33% priming, 67% priming, and 100% priming — and each person was randomly assigned to one of these between-subject conditions.

### 3.2. Cardiovascular assessment

We measured SBP (mm Hg), DBP (mm Hg), and HR (bpm) with an automated Dinamap cardiovascular monitor (1846sx or 8100; Critikon, USA) using the oscillometric method. The experimenter placed a cuff over the brachial artery of the participant's non-dominant arm. There were four baseline assessments (one every two minutes) and five task assessments (one every minute).

### 3.3. Procedure

Everyone participated individually. After participants provided informed consent, the experimenter explained that the study was about how the body responded during cognitive tasks. The experiment started with a baseline period, during which participants sat quietly and completed a questionnaire. Four cardiovascular assessments were taken every two minutes during the baseline period.

#### 3.3.1. Assessment of trait self-focus

The baseline questionnaire contained measures of individual differences in trait self-focus among many filler scales. As in our past work (Silvia et al., 2011), we used two scales: the 9-item private self-consciousness scale from the revised self-consciousness scales (Scheier and Carver, 1985) and the 12-item self-reflection scale (Grant et al., 2002). These scales assess the same construct and correlate highly (Silvia and Phillips, 2011).