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Goal adjustment ability predicts magnitude of emotional and physiological responses to an unsolvable anagram task

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ABSTRACT

Individuals differ in their ability to disengage from unattainable goals (goal disengagement, GD) and reengage in other activities (goal reengagement, GR). Existing studies examining GD and GR abilities are limited by cross-sectional design and reliance on self-reported measures. The present study employed an experimental paradigm using an anagram solving task to examine whether self-reported and behaviorally observed GD and/or GR abilities relate to emotional, heart-rate (HR) and blood pressure (BP) reactivity. Results show no significant association between self-reported GD and time to disengage from unsolvable anagrams. However, self-reported GR predicted persistence behavior during unsolvable anagrams. Higher self-reported GR ability and longer behavioral persistence on unsolvable trials related to more positive affect before and during the task. Self-reported GD was associated with higher baseline HR and a tendency towards lower HR reactivity in response to unsolvable anagrams. While findings did not provide criterion-related validity to the GD measure, they do show self-reported GD and GR abilities may be relevant in the emotional and physiological consequences experienced during challenging goal pursuits.

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1. Introduction

In situations where goals are challenging, but ultimately attainable, perseverance may pay off (e.g., Duckworth, Peterson, Matthews, & Kelly, 2007). However, in situations where goals are not achievable despite extended effort, early goal disengagement and reconsideration may be more adaptive and minimize the experience of protracted frustration and other negative emotions (Klinger, 1975; Wrosch & Scheier, 2003). It has been suggested that there are stable individual differences in ability to modify goals based on perceived attainability, referred to as *goal adjustment ability*, that contribute to emotion regulation (Wrosch, Scheier, Carver, & Schulz, 2003). Two independent sets of skills are purported to contribute to goal adjustment ability: goal disengagement and goal re-engagement (Wrosch & Scheier, 2003; Wrosch, Scheier, Miller, Schulz, & Carver, 2003; Wrosch et al., 2003). Goal disengagement is the ability to evaluate the demands of a given goal and, cognitively and behaviorally 'let-go' when goals are perceived as unattainable. Goal reengagement is the ability to shift attention toward generating and re-engaging in more achievable goals.

Goal adjustment ability is typically assessed using a 10-item self-report measure called the "Goal Disengagement and Goal Reengagement Scale" (Wrosch, Scheier, Miller et al., 2003), with goal disengagement subscale items assessing how easily respondents reduce effort and abandon their commitment to a goal (e.g., "it's easy for me to reduce my effort toward the goal") and goal reengagement items measuring how easily individuals are able to identify and pursue new goals (e.g., "I start working on other new goals"). Evidence supports the internal consistency of the subscales (Cronbach's alpha of .84 for goal disengagement and .86 for goal reengagement; Wrosch, Scheier, Carver et al., 2003; Wrosch, Scheier, Miller et al., 2003) and shows that they are largely independent (e.g., correlation between subscale scores = .21; Dunne, Wrosch, & Miller, 2011). However, to date, validation of the scales has only been examined by relating respondent's scores on this scale to other self-report measures (Wrosch, Scheier, Carver et al., 2003; Wrosch, Scheier, Miller et al., 2003). To our knowledge, the scale has never been validated against objective indices of goal adjustment behavior. Accordingly, a primary goal of the current study was to examine whether scores on the goal disengagement subscale reflect the tendency to disengage from an unsolvable anagram challenge in the laboratory. It was hypothesized that higher disengagement scores would relate to less time spent trying to solve unsolvable anagrams (hypothesis 1).

Recent evidence suggests that goal disengagement and goal reengagement abilities relate differentially to emotional adjustment. Generally, inability to disengage from unachievable goals is positively related to symptoms of depression (e.g., Dunne et al., 2011); whereas, ability to reengage in new goals is associated with positive affect (e.g., feelings of hopefulness and self-reported purpose in life; Wrosch, Amir, & Miller, 2011). It is suggested that ability to disengage from unachievable goals minimizes the experience of failure and accompanying negative emotional consequences. In contrast, engaging in new goals may reduce

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rumination about failure to succeed and permit emotional recovery, leading to higher feelings of self-mastery and other positive emotional states (Wrosch & Scheier, 2003; Wrosch, Scheier, Carver et al., 2003; Wrosch, Scheier, Miller et al., 2003). To date, however, there is little empirical evidence connecting goal adjustment tendencies to emotional state in the face of unattainable goals. Thus, a second goal of the current study was to examine whether scores on the goal adjustment scale are associated with emotional response to an unsolvable anagram task. It was hypothesized that goal reengagement subscale scores, but not goal disengagement scores, would associate with positive affective responses to the task (hypothesis 2).

It is widely accepted that prolonged negative emotional experiences are detrimental to health (Cohen, Janicki-Deverts, & Miller, 2007). By moderating negative emotional responses to life's challenges, goal adjustment ability may contribute to emotion-related physical health risk. For instance, existing studies show goal disengagement relates to higher subjective well-being, to lower systemic inflammation, and to health behaviors including better sleep efficiency, a more active lifestyle, and less substance use (Rasmussen, Wrosch, Scheier, & Carver, 2006; Wrosch & Sabiston, 2012; Wrosch, Scheier, Carver et al., 2003; Wrosch, Scheier, Miller et al., 2003; Wrosch, Miller, Scheier, & Brun de Pontet, 2007; Miller & Wrosch, 2007; Wrosch et al., 2011). Goal adjustment ability may also relate to magnitude of physiological response to psychological challenge. Individuals differ substantially and consistently in the magnitude of their cardiovascular (heart rate and blood pressure) responses to psychological challenge. These individual differences have been implicated in future health risk and have been conceptualized as measures of health vulnerability (Cohen & Manuck, 1995). For example, heightened blood pressure reactivity to stressful situations (e.g., laboratory challenge) may, over time, result in structural changes of the arteries that could place individuals at risk for cardiovascular disease (Krantz & Manuck, 1984). In support, studies have related heightened blood pressure reactivity to future hypertension and atherosclerosis risk (e.g., Carroll et al., 2012; Matthews, Zhu, Tucker, & Whooley, 2006; Treiber et al., 2003).

There is also evidence that individuals who have high ruminative tendencies (i.e., difficulty emotionally and cognitively disengaging from a stressor) maintain elevated levels in cardiovascular parameters following acute challenge when compared to their less ruminative counterparts (e.g., Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Glynn, Christenfeld, & Gerin, 2002). Thus, individual differences in goal adjustment ability may relate to magnitude of cardiovascular reactivity, providing another potential pathway to health risk. A final goal of the current study was to conduct an initial examination of this possibility by examining whether scores on the goal adjustment scale relate to the magnitude of heart rate and blood pressure responses to the anagram task. Here, it was hypothesized that higher goal disengagement and goal reengagement subscale scores would associate with lower baseline and task-related increases in heart rate (HR) and blood pressure (BP) (hypothesis 3).

2. Method

2.1. Participants

Participants were 90 young adults (59.3% female; 75.8% Caucasian; 93.4% non-smoker) with a mean age of 19.24 (SD = 1.34) years and no reported history of significant psychiatric illness or diseases known to affect the cardiovascular system. Participants were excluded from the study if they had a resting blood pressure above 150/90 mm Hg or were noncompliant with study restrictions (no caffeinated beverages for at least 4 h, no smoking or eating for at least 2 h, and no exercise or drinking alcohol for at least 24 h prior to their scheduled session). Post hoc power analysis taking the most common effect size observed in the present study (β of |.26|) yielded a power (1-β err prob) value of .81, confirming that the study was adequately powered. The study was approved by the university's Institutional Review Board.

2.2. Procedure

All laboratory sessions were held between 1 and 4 pm. Participants first completed a battery of questionnaires assessing demographic and health history, personality factors and self-reported goal disengagement/re-engagement ability. They were then fitted with three disposable electrodes on their chest (modified lead II confirmation; MindWare Technologies, LTD, Gahanna, OH) and an occluding cuff on their non-dominant arm for automated measurement of HR and systolic and diastolic BP (SBP, DBP). Participants remained seated for the duration of the study, which included a 20 minute baseline (habituation) and an anagram completion task (maximum 20 min). Participants' mood was measured during the task. At the end of the task, participants rated the difficulty of the task, and completed a 10 minute test to assess their anagram solving ability.

2.3. Description of anagram task

Participants were informed prior to arriving at the laboratory that they were going to be asked to complete a challenging anagram task. Participants completed a series of 16 five-letter anagrams under 20 min time pressure (adapted from Aspinwall & Richter, 1999). The task presentation was modified from the original format to allow for cardiovascular and affect measurement. Four sets (2 solvable and 2 unsolvable) of four anagrams were presented. The solvable anagrams are considered moderate in difficulty (50–60% of participants solved them correctly; Aspinwall & Richter, 1999). To encourage effort, the first anagram presented was always solvable. Participants were also informed that they were eligible to win a prize ($100 gift card) for correctly solving the anagrams. To minimize order effects, presentation of the remaining three anagram sets was counterbalanced. Participants were not permitted to return to prior sets after choosing to disengage from a set (i.e., they were required to 'abandon' a specific goal). After presentation of each anagram set, participants were given time to write down their responses. A timer was displayed on the screen for participants to see how long they spent on each set. Time participants spent on solvable and unsolvable anagram sets was recorded separately. Preliminary analyses showed average time to disengage from both unsolvable sets was strongly correlated with time to disengage from the first unsolvable set ($r = .86$, $p < .01$), confirming that, on average, participants continued to maintain effort following the first unsolvable set.

2.4. Instruments/measurements

2.4.1. Health history and demographic information

Participants completed a brief questionnaire assessing demographics and personal health history.

2.4.2. Goal adjustment ability

Self-reported goal disengagement and goal reengagement ability were determined using the 10-item Goal Disengagement and Goal Reengagement Scale (Wrosch, Scheier, Carver et al., 2003; Wrosch, Scheier, Miller et al., 2003). Consistent with prior findings, the subscales showed adequate reliability in the current sample (Cronbach's alpha = .82 for goal disengagement subscale and .87 for goal reengagement subscale). Also consistent with findings reported by Wrosch, Scheier, Carver et al. (2003) and Wrosch, Scheier, Miller et al. (2003), a confirmatory factor analysis showed that goal disengagement items loaded on one factor with correlations ranging from .72 to .86 and goal reengagement items loaded on a second factor with values ranging from .67 to .87. Time to disengage from unsolvable anagrams was used as a measure of behavioral disengagement.

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