

Research Report

Affirmation of Personal Values Buffers Neuroendocrine and Psychological Stress Responses

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ABSTRACT—*Stress is implicated in the development and progression of a broad array of mental and physical health disorders. Theory and research on the self suggest that self-affirming activities may buffer these adverse effects. This study experimentally investigated whether affirmations of personal values attenuate physiological and psychological stress responses. Eighty-five participants completed either a value-affirmation task or a control task prior to participating in a laboratory stress challenge. Participants who affirmed their values had significantly lower cortisol responses to stress, compared with control participants. Dispositional self-resources (e.g., trait self-esteem and optimism) moderated the relation between value affirmation and psychological stress responses, such that participants who had high self-resources and had affirmed personal values reported the least stress. These findings suggest that reflecting on personal values can keep neuroendocrine and psychological responses to stress at low levels. Implications for research on the self, stress processes, health, and interventions are discussed.*

Stress is implicated in the development and progression of a broad array of pathological conditions. These include psychological disorders, such as depression and anxiety (Alonso et al., 2004; La Via et al., 1996), as well as medical disorders, including coronary heart disease, hypertension, and diabetes (McEwen & Seeman, 1999). Although not all the mechanisms connecting stress to these outcomes are known, chronic threats

can affect the functioning of the body's stress systems, namely, the sympathetic-adrenomedullary (SAM) axis and the hypothalamic-pituitary-adrenocortical (HPA) axis, in ways prognostic for or related to these disorders (McEwen, 1998).

In response to threat, the SAM system coordinates the release of catecholamines, triggering increases in heart rate and blood pressure, among other changes, and the HPA axis coordinates the release of glucocorticoids, including cortisol. Although activation of these stress systems facilitates short-term fight-or-flight responses to threats, prolonged or recurrent activation can compromise the resilience of these systems, laying the groundwork for chronic mental and physical health disorders (McEwen, 1998). Accordingly, identifying resources that mute the psychological and biological impact of stress is an important research priority with implications for mental and physical health.

Theories of the self, including self-affirmation theory (Steele, 1988) and cognitive adaptation theory (Taylor, 1983), have posited that affirmation or enhancement of the self can buffer an individual against the adverse effects of stress. Several lines of research support this prediction. On the biological side, Taylor, Lerner, Sherman, Sage, and McDowell (2003a) found that relative to their peers, individuals who chronically enhanced their personal qualities had lower basal cortisol levels and lower cardiovascular responses to a laboratory challenge (see also Seery, Blascovich, Weisbuch, & Vick, 2004). On the psychological side, affirmations of personal values can attenuate perceptions of threat (Keough, 1998; Sherman & Cohen, 2002; Steele, 1988), reduce rumination after failure (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999), and reduce defensive responses to threatening information (Sherman, Nelson, & Steele, 2000).

The primary goal of the present investigation was to test whether an intervention involving reflection on personal values

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(Steele, 1988) could buffer physiological and psychological stress responses during a laboratory stress challenge. A secondary goal was to examine whether dispositional self-resources moderate the effect of value affirmation on stress responses. Although previous research has found that dispositional self-resources can protect against stress (e.g., Taylor et al., 2003a), no experimental studies have examined whether a manipulation designed to recruit self-relevant resources has these beneficial effects.

METHOD

Eighty-five undergraduates (35 males, 50 females) participated in the study for course credit or \$30. Participants ranged in age from 17 to 33 ($M = 19.57$). They identified themselves as Asian (56%), Caucasian (21%), Latino (6%), or "other" (17%). During recruitment, participants were screened and excluded from the study if they had preexisting health conditions (e.g., hypertension, diagnosed mental health problems) or engaged in health behaviors that could affect cortisol levels (e.g., use of oral contraceptives). On the day of the study, participants were asked to refrain from activities that affect cortisol levels (e.g., smoking, drinking caffeine). All procedures were approved by the University of California, Los Angeles, institutional review board.

Prior to the study, participants completed informed-consent forms, a health screening instrument, and measures assessing self-resources on the study's Web site. The latter measures included the Rosenberg Self-Esteem Scale (RSES), a 10-item assessment of global feelings of self-worth ($\alpha = .68$; Rosenberg, 1965); the How I See Myself Questionnaire (HSM), a 40-item questionnaire assessing the tendency to self-enhance ($\alpha = .91$; Taylor & Gollwitzer, 1995); and the Life Orientation Test (LOT), a 10-item questionnaire assessing dispositional optimism ($\alpha = .84$; Scheier, Carver, & Bridges, 1994). Web-site assessments were completed at least 24 hr before the study to reduce carryover effects (Steele, Spencer, & Lynch, 1993).

To control for the circadian rhythm of cortisol, we scheduled experimental sessions between 2:30 and 7:30 p.m. Upon arrival at the laboratory, participants completed the first part of the Values Questionnaire (Allport, Vernon, & Lindzey, 1960). In this part, five personal values (religion, social issues, politics, theory, and aesthetics) were defined, and participants rated and rank-ordered these values according to their personal importance.

Participants were then fitted with a blood pressure cuff, and heart rate and blood pressure were assessed every 2 min by an automatic sphygmomanometer (Dinamap Model 8146, Critikon Corporation, Tampa, FL). Following a 10-min acclimation period, participants provided a baseline saliva sample for the assessment of cortisol levels.

Participants listened to audiotaped instructions explaining the tasks. We employed the Trier Social Stress Task, a widely used challenge (Kirschbaum, Pirke, & Hellhammer, 1993) that involves a speech task and mental arithmetic. Participants were

instructed to prepare a speech on "why I would be a good candidate for an administrative assistant position at [the University of California, Los Angeles]," a competitive and desirable student position.

Participants were randomly assigned either to the value-affirmation condition or to a control condition. In both conditions, they completed the second part of the Values Questionnaire, which asked them to consider their thoughts and feelings about one of the values they had rated. For each item, participants indicated their relative preference for two choices by assigning each from 0 to 3 points, for a total of 3 points; more points reflected greater endorsement of the value. For example, for the political value, participants answered questions such as "Assuming that you have sufficient ability, would you prefer to be: (a) a banker (b) a politician?" Value-affirmation participants answered questions relating to their top-ranked value, whereas control participants answered questions relating to their fifth-ranked value.

Participants then mentally prepared their speech and completed a four-item prespeech measure in which they used 7-point scales to rate how stressful they expected the two tasks to be and their ability to cope with each task ($\alpha = .73$; Blascovich & Tomaka, 1996). The experimenter then left, and two speech evaluators (i.e., confederates who were trained to act in a stern, nonaccepting manner) entered the laboratory to direct the stress tasks. Participants delivered their 5-min speech and then counted aloud backward from 2,083 by 13s for 5 min under harassing conditions. Specifically, they were asked to "go faster" at 1-min intervals.

Participants then rested during a 10-min recovery period, and 20 min after stress onset, they provided a saliva sample. They also completed a three-item poststress measure, using 7-point scales to rate how stressful, threatening, and difficult the tasks were ($\alpha = .75$). Two more saliva samples were collected at 30 min and 45 min after stress onset. Participants were then debriefed and dismissed.

Cortisol samples were immediately frozen and shipped on dry ice in a single batch to a laboratory in Dresden, Germany, for analysis. Salivary cortisol levels were measured using a time-resolved immunoassay with fluorometric end-point detection (Dressendorfer, Kirschbaum, Rohde, Stahl, & Strasburger, 1992). All samples were assayed in a single batch.

RESULTS

Manipulation Check

As a manipulation check, points assigned to choices reflecting the rated value were summed. Participants in the value-affirmation condition assigned significantly more points ($M = 17.29$) to the value they rated than did control participants ($M = 10.26$), $t(77) = 6.79$, $p < .0001$. However, 5 participants failed the manipulation check, assigning as many points as

participants in the alternative condition, and were excluded from further data analysis.

Effects of Stress Tasks on Physiological Stress Response

Independent-samples *t* tests showed no condition differences in baseline levels of cortisol, heart rate, systolic blood pressure (SBP), or diastolic blood pressure (DBP). To normalize the data, we log-transformed cortisol measures prior to statistical analysis.

Preliminary analyses confirmed that the stress tasks produced acute physiological stress responses. A paired-samples *t* test comparing baseline cortisol levels with cortisol levels 20 min after stress onset showed a significant increase, $t(71) = 3.39$, $p = .001$. Paired-samples *t* tests comparing baseline heart rate, SBP, and DBP with average values during the stress tasks showed significant increases in heart rate, $t(73) = 12.53$, $p < .001$; SBP, $t(72) = 17.58$, $p < .001$; and DBP, $t(72) = 17.20$, $p < .001$.

Analytic Strategy

We tested the primary hypothesis that value affirmation reduces stress responses by conducting repeated measures analyses of covariance (ANCOVAs) with baseline values for the physiological measures entered as covariates and affirmation condition entered as a between-subjects factor. We tested the secondary hypothesis that this relation is moderated by self-resources by computing a self-resources variable from the measures of self-esteem (RSES), self-enhancement (HSM), and optimism (LOT). Principal-axis factor analyses using promax rotation revealed a one-factor solution that accounted for 64.28% of the variance (factor loadings: RSES = .91; HSM = .72; LOT = .77). This *self-resources* variable was then tested as a moderating variable for the effects of value affirmation on stress. Specifically, a median split was applied to the self-resources variable, creating a dichotomous self-resources variable (low, high) for the repeated measures ANCOVAs on physiological stress response. In testing the moderating effects of self-resources on psychological stress responses, we entered the self-resources variable as a continuous predictor variable in a series of multiple regression equations. In these regression equations, all predictor variables were centered prior to being entered.

Effects of Value Affirmation on Neuroendocrine Stress Responses

Repeated measures ANCOVAs tested for condition differences in cortisol responses to stress. As predicted, participants in the value-affirmation condition had significantly lower cortisol responses to the stress task than did control participants, controlling for basal cortisol, $F(1, 64) = 4.80$, $p = .03$, $\eta^2 = .07$ (see Fig. 1). Pair-wise comparisons controlling for basal cortisol showed that value-affirmation participants had significantly lower cortisol responses 20 min after stress onset ($M_{\text{difference}} =$

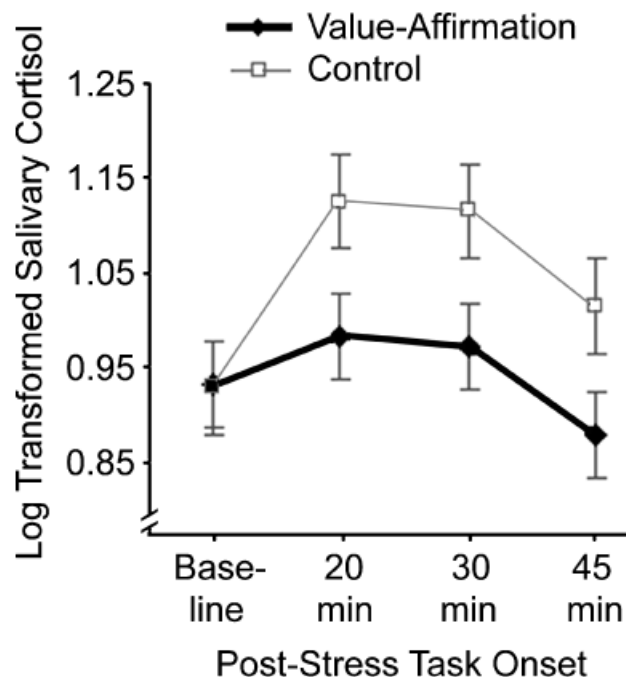


Fig. 1. Salivary cortisol response to stress in the value-affirmation and control groups. Vertical lines depict standard errors of the means.

0.14, $p = .041$), 30 min after stress onset ($M_{\text{difference}} = 0.14$, $p = .047$), and 45 min after stress onset ($M_{\text{difference}} = 0.14$, $p = .024$). Additionally, paired *t* tests that tested for changes from baseline to 20 min after stress onset revealed that control participants had significant increases in cortisol, $t(32) = 4.49$, $p < .0001$, whereas value-affirmation participants did not, $t(38) = 0.85$, $p = .40$; thus, the stress tasks elicited significant cortisol responses in the control group only. Repeated measures ANCOVAs showed that self-resources did not moderate this pattern. Specifically, the Self-Resources (low vs. high, based on a median split) \times Condition interaction was not significant, $F(1, 53) = 1.42$, $p = .24$, $\eta^2 = .03$.

Effects of Value Affirmation on Cardiovascular Stress Responses

Repeated measures ANCOVAs tested for condition differences in cardiovascular responses during the stress tasks and recovery. Participants in the two conditions experienced similar degrees of cardiac reactivity; there were no significant condition differences for heart rate, $F(1, 68) = 0.11$, $p = .74$, $\eta^2 = .002$; SBP, $F(1, 66) = 0.243$, $p = .62$, $\eta^2 = .03$; or DBP, $F(1, 66) = 1.89$, $p = .17$, $\eta^2 = .03$. Pair-wise comparisons showed no significant differences between conditions during the stress tasks (heart rate: $M_{\text{difference}} = 0.98$, $p = .70$; SBP: $M_{\text{difference}} = -0.59$, $p = .83$; DBP: $M_{\text{difference}} = 2.16$, $p = .21$) or during the 10-min recovery period (heart rate: $M_{\text{difference}} = 0.17$, $p = .89$; SBP: $M_{\text{difference}} = 2.60$, $p = .14$; DBP: $M_{\text{difference}} = 1.36$, $p = .22$). As

we found for cortisol, the Self-Resources \times Condition interactions were not significant, $F(1, 56) = 0.06, p = .81, \eta^2 = .001$, for heart rate; $F(1, 54) = 0.44, p = .51, \eta^2 = .01$, for SBP; and $F(1, 54) = 2.53, p = .12, \eta^2 = .05$, for DBP.

Effects of Value Affirmation on Psychological Stress Responses

To examine whether participants who affirmed personal values had lower perceptions of stress than control participants, we conducted one-way analyses of variance on the psychological stress measures. No significant differences between the value-affirmation and control groups were found for the pretask stress appraisals, $F(1, 63) = 0.18, p = .68, \eta^2 = .003$, or the posttask stress ratings, $F(1, 73) = 0.08, p = .72, \eta^2 = .001$.

A significant main effect for self-resources was found in regression analyses of the psychological stress measures. This result is consistent with those of past studies showing that self-resources can buffer against stress (Taylor et al., 2003a). Specifically, participants with more self-resources had lower pretask stress appraisals, $\beta = -.63, t(55) = -4.25, p < .001$, and lower stress perceptions after the stress tasks, $\beta = -.48, t(63) = -2.96, p = .004$.

Moreover, self-resources moderated the effect of value affirmation. Specifically, a significant Self-Resources \times Condition interaction was found for the pretask stress appraisals, $\beta = .34, t(55) = 2.26, p = .03, R^2 = .26$. Simple slopes tests (see Fig. 2, top panel) showed that increases in self-resources were associated with lower stress appraisals in the value-affirmation condition, $\beta = -.67, t(28) = -4.685, p < .001, R^2 = .45$, but not in the control condition, $\beta = -.06, t(26) = -0.28, p = .78, R^2 = .003$. Similarly, the Self-Resources \times Condition interaction was significant for posttask stress perceptions, $\beta = .38, t(63) = 2.34, p = .02, R^2 = .13$. Simple slopes tests (see Fig. 2, bottom panel) showed that higher self-resources were associated with lower stress perceptions in the value-affirmation condition, $\beta = -.48, t(34) = -3.17, p = .003, R^2 = .23$, but not in the control condition, $\beta = .10, t(28) = 0.52, p = .61, R^2 = .01$. Thus, self-resources moderated the impact of value affirmation on psychological stress responses.

DISCUSSION

The present study provides the first evidence that an experimental intervention involving the affirmation of personal values can buffer neuroendocrine and psychological stress responses. Specifically, value-affirmation participants had significantly lower cortisol responses to the stress tasks, compared with control participants. Furthermore, changes from baseline to peak stress revealed that only control participants had significant stress-related increases in cortisol, suggesting that value affirmation mitigated HPA-axis activation. Value-affirmation and control participants had equivalently elevated heart rate

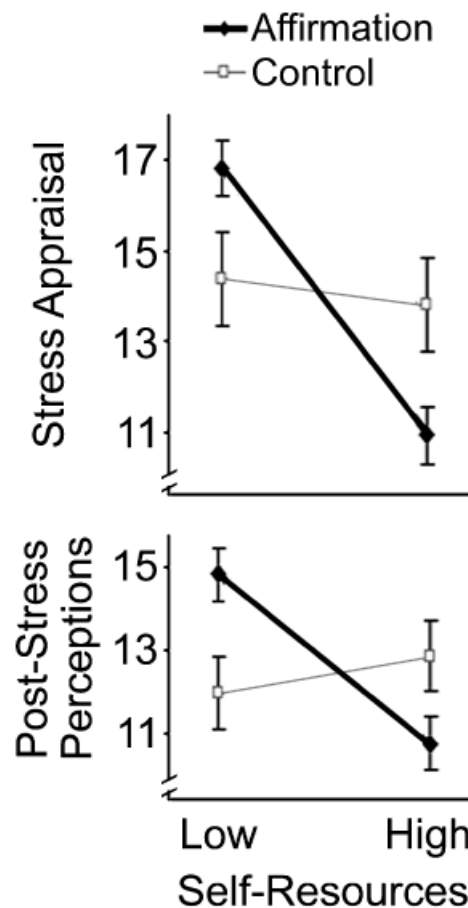


Fig. 2. Pretask stress appraisals (top) and poststress stress perceptions (bottom) as a function of the interaction of dispositional self-resources and condition (value-affirmation vs. control). Higher values reflect higher stress appraisals and perceptions; the graphed values for these variables were obtained from regression equations by using $+1 SD$ as the value for high self-resources and $-1 SD$ as the value for low self-resources.

responses to the stress tasks, suggesting that participants in the two conditions were equally engaged in the tasks (Blascovich & Seery, in press). Thus, it was not the case that value-affirmation participants were simply trivializing the tasks (Simon, Greenberg, & Brehm, 1995) or distracted during the tasks (McGregor, 2004). The pattern of cardiovascular arousal coupled with HPA-axis activation found in the control group is believed to be more health compromising than cardiovascular arousal only (the pattern found in the value-affirmation group; Blascovich & Mendes, 2000; Dienstbier, 1989).

The results are consistent with past research (Taylor et al., 2003a; Taylor, Lerner, Sherman, Sage, & McDowell, 2003b) in that positive dispositional self-resources (e.g., self-esteem) were associated with reduced stress appraisals before and after the stress tasks. Further, self-resources moderated the relation between value affirmation and psychological stress responses. Specifically, value-affirmation participants high in self-resources reported the least stress, whereas value-affirmation participants low in self-resources reported the most stress (see

Fig. 2). These findings suggest that affirmation of personally important values may be most effective in reducing stress in people with a positive dispositional self-concept (i.e., high self-resources), but may exacerbate stress in people with a negative dispositional self-concept (i.e., low self-resources; cf. Swann, Griffin, Predmore, & Gaines, 1987).

The results are consistent with theories of the self, specifically, self-affirmation theory (Steele, 1988) and cognitive adaptation theory (Taylor, 1983), which maintain that the self acts as a buffer against threatening events. The present findings suggest that strong self-resources, especially when coupled with an affirmation of personal values, protect against psychological reactions to stressful events. Value affirmation alone was sufficient to buffer participants' neuroendocrine responses to stress, and this effect did not depend on dispositional self-resources. This pattern suggests that physiological stress responses may be especially sensitive to the immediate threatening context, which would be consistent with evolutionary arguments underlying the fight-or-flight response, whereas psychological responses to stress may depend more on whether a strong dispositional sense of self can be recruited.

From a clinical standpoint, the results imply potential benefits of stress-reduction interventions that capitalize on the protective capacities of the self, by introducing value-affirmation tasks prior to stressful events or in chronically stressful environments (McEwen, 1998). Clinical treatment practices might also provide patients with opportunities to reflect on other valued aspects of the self.

An important question concerns whether the results have implications for health. Recruiting self-resources, such as through value affirmations, for managing stressful events could have cumulative beneficial effects on multiple biological systems (cf. McEwen, 1998). Research with patient populations shows, for example, that men who are HIV seropositive (Reed, Kemeny, Taylor, & Visscher, 1999) and people with heart disease (Helgeson & Fritz, 1999) have less aggressive courses of illness if they have strong self-resources. The present study provides the first experimental evidence for an underlying mechanism that may help to explain these benefits.

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