

Self-Affirmation and Self-Control: Affirming Core Values Counteracts Ego Depletion

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Research has established that acts of self-control deplete a resource required for subsequent self-control tasks. The present investigation revealed that a psychological intervention—self-affirmation—facilitates self-control when the resource has been depleted. Experiments 1 and 2 found beneficial effects of self-affirmation on self-control in a depleted state. Experiments 3 and 4 suggested that self-affirmation improves self-control by promoting higher levels (vs. lower levels) of mental construal. Self-affirmation therefore holds promise as a mental strategy that reduces the likelihood of self-control failure.

Keywords: *construal level, ego depletion, self-affirmation, self-control, self-regulation*

The capacity for self-control contributes to a multitude of desirable life outcomes. For example, people who succeed at self-control have satisfying interpersonal relationships and high levels of academic achievement (Duckworth & Seligman, 2005; Kelly & Conley, 1987; Tangney, Baumeister, & Boone, 2004). Conversely, failures of self-control are associated with interpersonal conflict, intellectual underachievement, irrepressible appetites or addictions, and many other adverse outcomes (see Baumeister & Vohs, 2004).

Research has established that some failures of self-control stem from the depletion of an internal energy (i.e., ego depletion). More precisely, the likelihood of self-control failure increases after a person has exercised self-control, as though initial efforts at self-control deplete an inner resource required for further volitional efforts. Even a seemingly minor act of self-control, such as maintaining a stoic facial expression during a mildly upsetting film, may undermine subsequent acts of self-control (Muraven, Tice, & Baumeister, 1998). Moreover, emotion regulation, delay of gratification, the capacity to resist temptation, and other forms of self-control all appear to rely on the same limited resource (Muraven & Baumeister, 2000).

Research regarding the rapid depletion of the resource for self-control seems to portend gloom and doom for those who attempt self-control. Yet, evidence has begun to suggest that a weakened resource for self-control can be restored. A biologically based intervention to restore the self-control resource was tested in one

investigation. Gailliot and colleagues (2007) found that acts of self-control consume one of the body's main sources of energy—glucose—and that reduced levels of glucose are related to reduced performance on tests of self-control. Crucially, restoring glucose to the bloodstream (by having participants drink lemonade made with sugar) also appeared to restore the capacity for self-control.

In the present work, we sought a strategy to counteract a depleted self-control resource without the costs or calories associated with glucose consumption. Specifically, we tested the hypothesis that a purely psychological intervention—self-affirmation—counteracts the behavioral effects of a depleted resource for self-control. *Self-affirmation* refers to behavioral or cognitive events that bolster the “perceived integrity of the self, its overall adaptive and moral adequacy” (Steele, 1988, p. 291). Self-affirming events include receiving positive feedback from others and reflecting upon positive aspects of oneself (for a review, see D. K. Sherman & Cohen, 2006). One of the most powerful forms of self-affirmation, and also the focus of the present investigation, is the small but significant act of expressing one's core values.

It is well documented that self-affirmation releases people from defensive response patterns triggered by threats to self-regard. As we describe in the next section, self-affirmation makes threatened selves act as though they have not been threatened. We propose that the benefits of self-affirmation also extend to people with depleted resources, releasing them from proneness to self-control failure. Self-affirmation may make depleted selves act as though they have not been depleted.

Self-Control and Self-Affirmation

Self-control entails overriding or altering a predominant response tendency. Self-control is commonly studied in the context of basic motivational urges to seek pleasure or avoid pain—potent urges that are notoriously difficult to control. Research suggests that a relative incapacity to control one's urges contributes to overeating (Vohs & Heatherton, 2000), problem drinking behavior (Muraven, Collins, & Neinhuis, 2002), strong sexual thoughts and behaviors (Gailliot & Baumeister, 2007), and reduced persistence at difficult tasks (Schmeichel & Zell, 2007).

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Self-affirmation sustains a person's sense of their own adaptive and moral adequacy (Steele, 1988; cf. Wicklund & Gollwitzer, 1982). Self-affirmation is commonly studied in the context of people's responses to an ego threat (i.e., events or communications that have unfavorable implications for the self; Baumeister, Heatherton, & Tice, 1993). Ego threats tend to elicit reflexive, self-enhancing tendencies that are thought to stem from the motivation to view oneself and one's associates positively (Aronson, 1969; Baumeister, 1998; Steele, 1988). These defensive responses include self-justifying attitude change, self-serving attributions for success and failure, outgroup derogation, and zealous conviction about one's beliefs, (e.g., Campbell & Sedikides, 1999; Fein & Spencer, 1997; McGregor & Marigold, 2003; Steele & Liu, 1983). Despite the pervasive tendency to defend the self via self-enhancement, there appears to be an antidote. Self-affirmation softens the knee-jerk tendency to react to ego threats with self-enhancement; at the same time, it allows people to maintain positive views of self.

The literature is replete with evidence that self-affirmation curbs the reflexive response to enhance the self after threat (see D. K. Sherman & Cohen, 2006; Tesser, 2000). For example, warnings of potential health problems often lead to dismissive or defensive reactions, presumably in an effort to minimize anxiety and sustain a positive view of self (e.g., Ditto & Boardman, 1995; Liberman & Chaiken, 1992). Rather than dismiss such warnings, however, people who have recently affirmed a core personal value acknowledge the potential risks and, moreover, report strong intentions to change their behavior (Harris, Mayle, Mabbott, & Napper, 2007; Harris & Napper, 2005; Reed & Aspinwall, 1998; Sherman, Nelson, & Steele, 2000).

Another example comes from research showing that people cling to cherished beliefs when they encounter arguments that challenge those beliefs. One experiment found that participants who originally favored capital punishment became more convinced of the correctness of their position after hearing arguments against the use of capital punishment (Lord, Ross, & Lepper, 1979). Contrast that response with the responses of participants who have recently affirmed a core value. Several experiments have found that these participants respond to counterarguments by thoughtfully considering the opposing perspective and consequently become less convinced of the correctness of their initial position (Cohen, Aronson, & Steele, 2000; Correll, Spencer, & Zanna, 2004).

Terror management theory proposes that humans construct positive views of self because such views reduce the anxiety associated with awareness of death (e.g., Greenberg et al., 2003). One way to maintain a positive view of self, despite awareness of the inevitability of death, is to embrace cultural practices and values that are likely to persist long after one's own life. For example, research indicates that reminders of death cause people to bolster the validity of their own cultural worldview while dismissing or derogating the worldviews of others (Greenberg et al., 1990). People who have recently affirmed one of their core values, however, neither promote their own worldview nor derogate another's worldview when death is made salient (Schmeichel & Martens, 2005).

These findings lend support to the idea that self-affirmation enables good self-control. In each case, the small but potent act of expressing a cherished value enabled participants to forgo the

reflexive tendency to defend the self from psychological threat—a tendency that emerged readily among participants who had not expressed their values. Hence, the act of self-affirmation allowed people to respond in a manner that countered the automatic response tendency. This is the essence of self-control.

We took a cue from the self-affirmation literature and reasoned that, insofar as self-affirmation promotes nondefensive responses to ego threats, its effects may generalize to other circumstances that call for the modification of a predominant response tendency. Specifically, our reading of the literature led us to consider whether self-affirmation is a universal self-control booster. Returning to the notion of basic motivational urges, we tested the hypothesis that the benefits of self-affirmation apply to volitional domains such as impulse override and behavior control.

Previous research on self-affirmation suggested a caveat to the hypothesis that self-affirmation is an all-purpose aid to self-control. Self-affirmation reliably alters responses in the context of a threat to the self, such as having a cherished belief challenged or being reminded of life's inevitable end. In the absence of a threat, however, affirming the self appears to have little impact on behavior. For example, under neutral or nonthreatening conditions, self-affirmation does not increase openness to alternative viewpoints or reduce prejudice toward outgroup members (e.g., Shira & Martin, 2005; cf. Crocker, Niiya, Mischkowski, 2008). Such results suggest that people typically possess an affirmed sense of self and that experimental manipulations to increase self-affirmation do not reduce defensiveness relative to baseline (non-defensive) states. Rather, self-affirmation reduces defensiveness mainly under conditions of threat, when defensive responses are more likely to emerge.

Evidence indicating that self-affirmation has a beneficial effect under adverse (threatening) conditions, but has no effect under neutral (nonthreatening) conditions, led us to question the scope of self-affirmation's impact on self-control. Does self-affirmation mainly prevent an impairment of self-control under adverse conditions or does affirmation improve self-control even under neutral conditions?

We expected that self-affirmation would facilitate self-control under conditions of resource depletion but not under neutral, no-depletion conditions. In the absence of ego depletion or other conditions that disrupt self-control, individuals appear capable of exercising self-control effectively (Robinson, Schmeichel, & Inzlicht, 2008), and some evidence suggests that it is difficult to improve self-control above baseline levels of performance in the short term, without the benefit of practice or periods of rest. One series of studies, for example, found that monetary incentives did not improve performance at self-control tasks among nondepleted participants (Muraven & Slessareva, 2003; cf. Baker & Kirsch, 1991). Similarly, neither money nor the promise of a detailed performance evaluation improved performance on cognitive measures of self-control under neutral, nondepleted conditions (Hajcak, Moser, Yeung, & Simons, 2005). Evidence has further indicated that boosting positive mood (Tice, Baumeister, Shmueli, & Muraven, 2007) and adding glucose to the bloodstream (Gailliot et al., 2007) also fail to improve self-control among nondepleted participants. We therefore deemed it unlikely that self-affirmation would improve self-control under neutral conditions. Rather, we expected self-affirmation to improve self-control mainly under

conditions of resource depletion, when self-control failures are more likely to emerge.

In either case, our experiments were designed to permit a test of the optimistic hypothesis that self-affirmation boosts self-control among nondepleted participants and depleted participants alike. We favored the more conservative hypothesis that self-affirmation would influence self-control only under conditions of resource depletion. Specifically, we predicted that initial efforts at self-control would undermine subsequent volitional efforts, unless participants affirmed a core aspect of self in the interim between the two self-control tasks.

The Present Experiments

We tested our hypotheses in four experiments. In Experiments 1 and 2, we systematically manipulated both self-control and self-affirmation, thereby allowing us to assess the effects of self-affirmation under neutral (i.e., nondepleted) and adverse (i.e., depleted) conditions. In the next two experiments, we explored a possible mechanism for self-affirmation's effect on self-control. In Experiment 3, we tested the hypothesis that self-affirmation promotes a high level of mental construal—a broad mindset that has been shown to be conducive to good self-control (e.g., Fujita, Trope, Liberman, & Levin-Sagi, 2006; Vallacher & Wegner, 1987, 1989). In Experiment 4, we manipulated both self-control and the level of construal at which participants pondered a core value to test directly the role of high-level construal in self-affirmation's effect on self-control in a depleted state.

Experiment 1

At the start of Experiment 1, participants wrote a story under one of two sets of writing instructions. One group was required to exercise self-control by inhibiting the use of particular letters in the writing of the story, whereas the other group had no writing restrictions and thus exercised little self-control while writing (borrowed from Schmeichel, 2007). Only the self-control group was expected to show signs of ego depletion on the dependent measure of self-control (described below). Next, participants engaged in an exercise that is known to manipulate degree of self-affirmation: Participants ranked a list of values and either did or did not write about the importance of their top-ranked value (borrowed from Cohen et al., 2000). Last, all participants endured a test of pain tolerance. Pain elicits a prepotent desire to eliminate the experience of pain; hence, to tolerate pain requires self-control. We predicted that an initial act of self-control would reduce later pain tolerance, unless a self-affirmation exercise intervened.

Method

Participants. Sixty-three undergraduate students (32 men) participated in exchange for credit toward a course requirement. Data from 4 participants were excluded from analyses because the water temperature at the start of the cold pressor task was greater than three standard deviations warmer than the starting temperature for the remainder of the sample.

Ego depletion manipulation. The experiment began with a brief description of the major tasks to be performed, which were characterized as related to emotions and physical stamina. To

manipulate initial efforts at self-control, participants were randomly assigned to write a story in one of two ways (see Schmeichel, 2007). Participants in the *free-writing condition* were instructed simply to "Write a story about a recent trip you have taken. It may be a trip to the store, to Ohio, or to another country – wherever! Please write until the experimenter asks you to stop." Participants in the *regulated-writing condition* received an additional instruction: "Very important! Please do not use the letters *a* or *n* anywhere in your story." Hence, one group was required to regulate their writing by avoiding the use of two common letters, whereas the other group wrote without restrictions. Participants wrote for 5 min.

Self-affirmation manipulation. After the writing task, participants were presented with a list of 11 values and personal characteristics and asked to rank them in order of personal importance. The list included creativity, physical attractiveness, athletics, aesthetics, and relations with friends and family (Cohen et al., 2000). As is customary in self-affirmation research, all participants ranked the values.

Next, participants completed a short writing assignment that composed the self-affirmation manipulation (Cohen et al., 2000; Fein & Spencer, 1997; D. A. K. Sherman et al., 2000). Participants in the *self-affirmation condition* wrote a brief essay explaining why their top-ranked value was important to them and describing a time in their lives when it had been particularly important. Participants in the *no-affirmation condition* wrote a brief essay describing why and when the value they had ranked seventh (i.e., middling) in importance might be important to the average college student. All participants wrote for 6 min. After the manipulation, participants completed a state measure of mood and arousal (Brief Mood Introspection Scale [BMIS]; Mayer & Gaschke, 1988) to assess and control for any possible mood effects.

Dependent measure of self-control. Next, participants performed a classic measure of pain tolerance—the cold pressor task. Participants immersed their nondominant hand in cold water (temperature $M = 33.71^\circ\text{F}$, $SD = 1.30$; the water was circulated by an electric air pump) and kept it immersed until the pain felt too uncomfortable to continue. A 4-min limit was imposed on cold pressor persistence, but participants were not informed of the time limit prior to the task. (Two participants persisted up to the 4-min limit.) The experimenter recorded the initial temperature of the ice water and duration for which participants kept their hand submerged in the icy water.

After the cold pressor task, participants warmed their hand in warm water for 30 s to alleviate any lingering discomfort. Then they reported how much effort they had expended on the story-writing task and the cold pressor task (ranging from 1 [*none*] to 7 [*a lot*]).

Results

Cold pressor persistence. Our primary hypothesis was that exercising self-control at the start of the study would undermine pain tolerance at the end of the study, unless participants affirmed the self between the two tasks. A 2 (regulated writing vs. free writing) \times 2 (self-affirmation vs. no affirmation) analysis of variance (ANOVA) on pain tolerance (in seconds) revealed the predicted interaction between the two factors, $F(1, 55) = 4.25$, $p = .04$. The main effects of prior self-control, $F(1, 55) = 1.49$, $p = .23$, and of

self-affirmation condition $F < 1$) fell short of statistical significance. The means are displayed in Figure 1.

Planned comparisons revealed an ego depletion effect among nonaffirmed participants, such that pain tolerance was reduced after performing the self-regulated writing task ($M = 27.11$) compared with the free-writing task ($M = 78.20$), $t(55) = 2.33$, $p = .02$. Among participants who were prompted to affirm the self between the two self-control tasks, however, the self-regulated writing task ($M = 61.58$) did not impact subsequent pain tolerance, and thus these participants exercised self-control just as well as nondepleted participants did ($M = 48.47$; $t < 1$). The simple effect of self-affirmation was not significant in the free-writing condition, $t(55) = -1.41$, $p = .16$. These patterns indicate that self-affirmation eliminated the detrimental effect of effortful self-control on a subsequent self-control attempt.

Mood and arousal. Participants completed a measure of mood and arousal immediately prior to the cold pressor test. Parallel 2×2 ANOVAs on the valence and arousal subscales of this measure, the BMIS, revealed two effects. First, regarding valence, an effect of self-affirmation condition emerged, $F(1, 55) = 3.87$, $p = .05$, such that affirmed participants reported being in a somewhat more positive mood ($M = 14.31$, $SD = 10.38$) than did nonaffirmed participants ($M = 8.67$, $SD = 11.38$). Neither the main effect of depletion condition nor the Depletion \times Affirmation interaction approached significance ($F_s < 1$).

Second, regarding arousal, we observed a main effect of depletion condition, $F(1, 55) = 4.84$, $p = .03$. Participants who had performed the self-regulated writing task at the start of the experiment reported being more aroused ($M = 25.52$, $SD = 8.71$) than participants who had performed the free-writing task ($M = 21.53$, $SD = 5.20$). Neither the main effect of self-affirmation nor the Depletion \times Affirmation interaction approached significance ($p_s > .30$).

We repeated the central 2×2 analysis on pain tolerance, also including as covariates mood valence and arousal. The covariates did not reliably predict pain tolerance ($F_s < 1$), whereas the predicted Depletion \times Affirmation interaction remained significant, $F(1, 53) = 4.50$, $p < .05$. Hence, although the manipulations had an unexpected impact on self-reported mood and arousal, these effects did not account for the pain tolerance patterns.

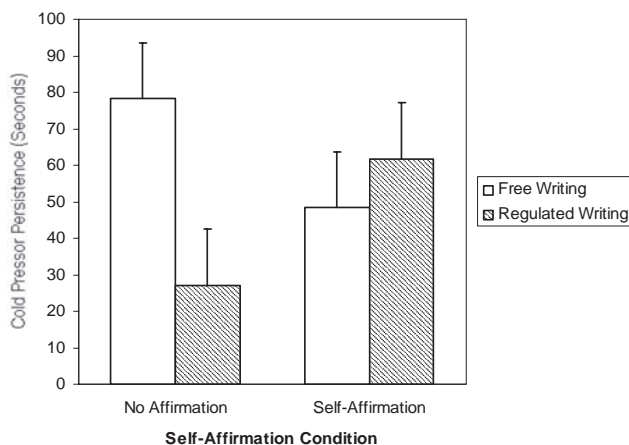


Figure 1. Cold pressor persistence in Experiment 1. Maximum duration was set at 240 s. Error bars represent standard errors.

Subjective evaluations of the tasks. At the end of the study, participants rated how much effort they had expended on the story-writing task and the cold pressor task, respectively. Factorial ANOVAs on the effort ratings revealed that more effort was expended on the self-regulated writing task ($M = 5.00$, $SD = 1.44$) than the free-writing task ($M = 4.13$, $SD = 1.36$), $F(1, 55) = 5.49$, $p = .02$, consistent with the idea that the two sets of writing instructions elicited different degrees of self-control. Furthermore, ratings of effort expended on the cold pressor test did not differ across groups ($F_s < 1$; overall $M = 4.98$, $SD = 1.21$). Thus, although we observed substantial groupwise variation in pain tolerance, the experimental manipulations did not influence the effort participants reported expending on the cold pressor test.

Discussion

The results of Experiment 1 supported the hypothesis that self-affirmation counteracts ego depletion. Initial efforts at self-control undermined later pain tolerance, but only among participants who did not affirm a cherished value between the two tasks. Among participants who affirmed a cherished value, the ability to withstand pain was unimpaired by a previous self-control task. These findings did not appear to be due to mood or changes in effort expenditure.

The results revealed that self-affirmation facilitated pain tolerance, but only among participants who had previously exerted self-control. Self-affirmation did not facilitate pain tolerance among those who had not previously exerted self-control (i.e., nondepleted participants). The subsequent experiments further assessed the impact of self-affirmation on self-control, both in the presence and absence of prior efforts at self-control.

Experiment 2

In a second test of the hypothesis that self-affirmation counteracts ego depletion, we addressed a residual issue from Experiment 1. Specifically, in Experiment 1 we found that affirming a core value induced a mildly positive mood state. We had not expected to find differences in positive mood because previous research using self-affirmation manipulations very similar or identical to the one we used have found no differences in positive mood (e.g., Cohen et al., 2000; Harris & Napper, 2005; Matz & Wood, 2005; Shira & Martin, 2005). We statistically controlled mood's influence on pain tolerance and found no support for the notion that mood was responsible for self-affirmation's beneficial effect on self-control. Nevertheless, a more direct examination of mood's role was deemed necessary, so we experimentally manipulated positive mood and compared its effects with self-affirmation in Experiment 2.

Previous research has found mixed evidence regarding the effect of positive mood on self-control. Positive mood has been found to enhance self-control (e.g., Fredrickson, Mancuso, Branigan, & Tugade, 2000; Tice et al., 2007), undermine self-control (e.g., Cyders & Smith, 2007; Fishbach & Labroo, 2007; Wyland & Forgas, 2007), and have no effect (e.g., Muraven et al., 1998; Schmeichel, Demaree, Robinson, & Pu, 2006; Wallace & Baumeister, 2002). The purpose of the present experiment was not to address the issue of whether positive mood influences self-control. Rather, we wished to assess whether self-affirmation has

the same effect on self-control as does a positive mood. If we find that self-affirmation counteracts ego depletion but a positive mood induction does not, then it would be difficult to argue that mood produces the self-affirmation effect (see also Steele, Spencer, & Lynch, 1993). Hence, we compared self-affirmation with a positive mood induction and with a neutral (no affirmation) treatment in Experiment 2.

To increase the generalizability of this research, Experiment 2 featured a different manipulation of ego depletion and a different dependent measure of self-control than those used in the preceding experiment. Participants in Experiment 2 watched a videotape under instructions to regulate their attention or under no such instructions (borrowed from Vohs & Faber, 2007) followed by a self-affirmation, no affirmation, or a positive mood induction. Last, as a test of self-control, all participants attempted to find specific strings of numbers within a large number grid. This task is tedious, and therefore people are disinclined to persist at it. The dependent variable was the duration for which participants persisted at finding numbers. We predicted that controlling (vs. not controlling) attention at the start of the study would reduce persistence at the subsequent number search task, unless participants had self-affirmed in the interim.

Method

Participants and design. Seventy-six undergraduates (28 men) participated in exchange for partial course credit. Participants were assigned to condition at random in a 2 (depletion condition: attention control vs. no control) \times 3 (intervention condition: self-affirmation vs. no affirmation vs. positive mood) between-participants factorial design. Four participants' data were unusable, leaving a final sample of 72. One participant reported a recent emotional event that invalidated the self-affirmation manipulation, and the other 3 expressed suspicion regarding the cover story for the depletion manipulation.

Ego depletion manipulation. Participants reported to the lab individually for a study investigating how people think about their own and others' personalities. The first task participants performed comprised the ego depletion manipulation. Participants were told that one goal of the study was to understand the role of nonverbal behavioral cues in the perception of others. To this end, participants watched a 5-min videotape of a woman being interviewed with the sound muted. Participants were led to believe that later they would answer questions about the woman's personality (see Vohs & Faber, 2007).

Participants in the *no-control condition* simply watched the video. Before participants in the *attention control condition* watched the video, they were told that a series of words would also appear on the screen. They were also instructed that it was important for them to focus on the woman's face (i.e., the interviewee) and that if they found themselves looking at the words, then they were to refocus their attention on the woman's face as quickly as possible. After the videotape, participants completed the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) as a mood measure.

Intervention condition. Next, participants in the *self-affirmation condition* ranked a list of values in terms of personal importance and then wrote briefly about their top-ranked value. Participants in the *no-affirmation condition* saw the same list of

values, but unlike the previous experiment, they ranked the values in terms of another person (specifically, computer magnate Bill Gates) and wrote about why one of the values listed on the value-ranking page (specifically, neatness and tidiness) might be important to that person. Bill Gates was chosen because of his familiarity to college students, because it was plausible that he valued neatness and tidiness, and because neatness and tidiness were unlikely to be chosen as the most important values by our participants. (We were correct in this assumption.) Thus, participants in the no-affirmation condition focused on someone else's values and elaborated on why that person might hold dear a value (i.e., neatness and tidiness) that was unlikely to be one of the participants' own core values.

Participants in the *positive mood condition* did not see, consider, or write about their own or anyone else's values, but rather sat quietly and listened to a selection of happy music. The piece they heard was David Byrne's "Beleza Tropical, Brazil Classics 1," which has been used successfully in past research to elicit positive mood (Erber, Wegner, & Theriault, 1996).

Dependent measure of self-control. After the intervention (i.e., affirmation, no affirmation, or positive mood), participants reported their mood state again using the PANAS. Then they completed the dependent measure, which was persistence on a numeric puzzle. The goal of the puzzle task was to find specific strings of numbers within a large number grid. This task is akin to a search-a-word task and has been used in previous studies of self-control (Vohs, Baumeister, & Ciarocco, 2005). As in past research, participants were told to work on the task for as long as they could, until they gave up, or decided to stop. We imposed a 20-min limit on puzzle persistence, but participants were not informed of the time limit prior to the task. Subsequent to the puzzle, participants completed postexperimental questionnaires, were debriefed, and dismissed.

Results

Puzzle persistence. Our main prediction was that depletion condition (attention control vs. no control) and intervention condition (self-affirmation vs. no affirmation vs. positive mood) would combine to produce differences in persistence at a numeric puzzle. This hypothesis was supported by an ANOVA that revealed an interaction between the two manipulations, $F(2, 66) = 3.52, p < .04$. This interaction qualified the two main effects, which were also significant: for depletion condition, $F(1, 66) = 8.40, p < .01$, and for intervention condition, $F(2, 66) = 15.09, p < .01$. Please refer to Figure 2.

Planned comparisons showed that prior efforts at attention control reduced persistence among nonaffirmed participants, $t(66) = 3.20, p < .01$, and positive mood participants, $t(66) = 2.14, p < .04$, but did not change persistence among self-affirmed participants ($t < 1$). Once again, self-affirmation counteracted the incapacity of self-control that typically follows effortful acts of self-control.

Examined another way, in the attention control condition, self-affirmed participants ($M = 752.64$) persisted longer than nonaffirmed participants ($M = 414.50$), $t(66) = 4.05, p < .001$, and longer than positive mood participants ($M = 349.09$), $t(66) = 5.13, p < .001$. The latter groups did not differ from each other ($t < 1$). In the no-control (i.e., no depletion) condition, self-

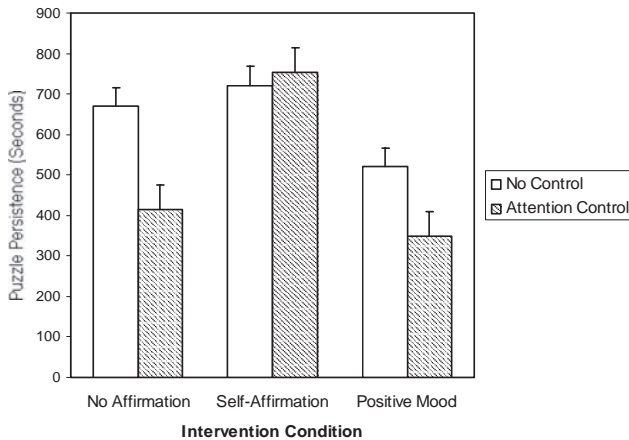


Figure 2. Persistence at the numeric puzzle in Experiment 2. Maximum duration was set at 1,200 s. Error bars represent standard errors.

affirmation led to an increase in puzzle persistence ($M = 720.80$) relative to the positive mood induction ($M = 520.69$), $t(66) = 2.44$, $p < .02$, but not relative to the no-affirmation condition ($M = 669.58$; $t < 1$). Puzzle persistence was also marginally higher in the no-affirmation condition relative to the positive mood induction condition, $t(66) = 1.91$, $p = .06$.

Manipulation checks. Positive and negative affect were measured twice using the PANAS. The first assessment occurred after the attention control manipulation. In line with previous research, no differences in mood emerged as a result of the attention control manipulation ($F_s < 1$).

The second assessment of affect occurred after the intervention (i.e., self-affirmation, no affirmation, or positive mood induction). We predicted that only participants in the positive mood induction condition would report better mood at this measurement, and a 2 (depletion condition) \times 3 (intervention condition) ANOVA confirmed this prediction. The main effect of intervention condition was significant for both positive (PA) and negative affect (NA): for PA, $F(2, 66) = 3.28$, $p < .04$, and for NA, $F(2, 66) = 5.91$, $p < .01$. There were no other significant effects (all $F_s < 1$). As predicted, participants who listened to happy music felt more positive and less negative than participants in both the self-affirmation and no-affirmation conditions: for PA, positive affect group $M = 22.17$ ($SD = 5.33$), self-affirmation $M = 18.67$ ($SD = 4.77$), and no affirmation $M = 18.08$ ($SD = 7.89$); for NA, positive affect group $M = 10.46$ ($SD = 0.78$), self-affirmation $M = 13.29$ ($SD = 3.38$), and no affirmation $M = 12.88$ ($SD = 3.81$).

A postexperimental questionnaire asked participants to rate the difficulty of the video-watching task, and as expected, there was a significant difference in the difficulty of the task as a function of viewing instructions, $F(1, 66) = 17.40$, $p < .001$ (attention control $M = 6.70$, $SD = 2.47$, vs. no control $M = 1.71$, $SD = 1.18$).

Participants were also asked about the difficulty of the puzzle task. No main effects or interactions emerged (all $F_s < 1$), indicating that the subjective difficulty of the puzzle task did not differ as a function of condition. Ratings of enjoyment of the puzzle likewise showed no differences across conditions ($F_s < 1.77$, $p_s > .18$). Thus, there appeared to be no differences in subjective aspects of the puzzle task, such as enjoyment or perceived diffi-

culty, which may have otherwise accounted for the observed differences in persistence.

Discussion

The results of Experiment 2 converged with findings from the previous experiment to support the hypothesis that self-affirmation counteracts ego depletion. Initial efforts at self-control undermined later persistence at a challenging puzzle task, but only among participants who did not affirm a cherished value between the two tasks. Moreover, Experiment 2 provided the clearest evidence yet that the benefits of self-affirmation were not due to improvements in mood. Some participants in Experiment 2 were induced to feel more positive mood by listening to uplifting music, yet these participants still showed evidence of ego depletion after an initial exercise in self-control. Other participants expressed the values of someone else, a process that also failed to yield the protective benefits of self-affirmation. Only self-affirmed participants were buffered from the deleterious ego depletion effect.

Once again, self-affirmation's effect on self-control was limited to the condition in which participants had previously exerted self-control. Self-affirmation did not facilitate self-control in the absence of ego depletion. Also, consistent with some previous work (e.g., Muraven et al., 1998, Study 3), but inconsistent with other work (e.g., Tice et al., 2007), we found that a positive mood induction did not impact self-control. Our findings did not attempt to resolve the inconsistencies regarding positive mood's effect on self-control. Rather, the key detail for the present purposes is that self-affirmation and positive mood had distinct effects on self-control and that positive mood could not explain the self-affirmation effect.

Experiment 3

If positive mood is not responsible, then by what means does self-affirmation counteract ego depletion? In the next two experiments, we explored changes in mental construal level as a possible means for self-affirmation's effect. Our hypothesis was that self-affirmation facilitates self-control by promoting abstract or high-level mental construal.

People may construe events at different levels of abstraction. For example, a person may construe the act of voting as an opportunity to influence an election, or they may construe it as making marks on a ballot. A *high-level construal* (e.g., influencing an election) refers to the global, superordinate, abstract features of an event, whereas a *low-level construal* (e.g., marking a ballot) refers to the local, subordinate, and concrete features of an event (Trope & Liberman, 2003; Vallacher & Wegner, 1987).

Low levels of mental construal have been associated with poor self-control. For example, Vallacher and Wegner (1989) reported that people who have difficulty exercising self-control (i.e., those high in impulsiveness) tend to identify their behavior at low levels of construal. Rather than identifying the act of eating as an opportunity to gain nutrition, for example, an impulsive person may be more likely to construe eating as moving one's mouth to chew and swallow (see Heatherton & Baumeister, 1991, for evidence of this process in binge eating episodes). Depleted individuals also operate under concrete or low levels of mental construal (Vohs & Schmeichel, 2003).

Conversely, high levels of mental construal have been linked to good self-control. High levels of construal promote a focus on long-term goals and the abstract meanings of behavior, rather than short-term gratifications and concrete sensations. Given that many forms of self-control pit the pursuit of long-term goals against the temptation of immediate gratification, high levels of mental construal facilitate self-control. Experiments have found that inducing a mindset that is conducive to high levels of mental construal (by asking people to consider why they pursue a particular goal) results in better self-control than does inducing a mindset that entails low levels of mental construal (by asking people to consider how they pursue a goal; Fujita et al., 2006).

One possibility, then, is that self-affirmation aids self-control by moving the person's level of mental construal to a relatively high level. Encouraging participants to ponder why their core values are important to them (as we did in the previous experiments and as is typical in most self-affirmation experiments; McQueen & Klein, 2006) seems likely to promote the kind of broad-minded, big-picture perspective that is associated with good self-control. Hence, in Experiment 3, we tested the extent to which self-affirmation induces a high level of mental construal by administering a self-affirmation manipulation and then measuring preferred levels of mental construal with Vallacher and Wegner's (1989) Behavioral Identification Form. We predicted self-affirmed participants would favor abstract or high-level descriptions of events compared with nonaffirmed participants, consistent with the idea that self-affirmation improves self-control by altering a person's level of mental construal.

Method

Participants and design. Twenty-nine undergraduate students (12 men) reported to a classroom for a study in which personality characteristics and thought patterns were investigated. They received credit toward a course requirement for their participation. Students were randomly assigned between the self-affirmation and no-affirmation conditions.

Self-affirmation manipulation. Participants received a packet that contained all the materials for the experiment. The first item in the packet was a demographic questionnaire. The second and third items were the value ranking and writing forms from Experiment 1 (see Cohen et al., 2000). After ranking the list of values and personal characteristics in terms of personal importance, participants in the self-affirmation condition wrote a brief essay explaining why their top-ranked value was important to them and described a time in their lives when it had been particularly important. Participants in the no-affirmation condition wrote a brief essay describing why and when the value they had ranked 7th (i.e., middling) in importance might be important to the average college student. All participants wrote for 6 min.

Measure of preferred level of mental construal. The next item in the packet was the Behavioral Identification Form (BIF; Vallacher & Wegner, 1989). The BIF presents 25 behaviors and asks participants to choose which one of two descriptions they prefer to describe each behavior. One description is at a low level of construal, and the other is at a high level of construal. For example, participants must choose whether "Locking a door" is best described as "Securing the house" (high level) or "Putting a key in

the lock" (low level). The number of high-level descriptions participants chose served as our dependent measure.

Results

Participants who had completed the self-affirmation task selected more of the high-level behavioral descriptions ($M = 18.13$, $SD = 4.50$) than did participants who had completed the nonaffirming task ($M = 14.07$, $SD = 3.91$), $t(27) = 2.59$, $p = .02$. Thus, self-affirmation, relative to no affirmation, caused participants to embrace more abstract (fewer concrete) descriptions of behavioral events, a finding that supports the hypothesis that self-affirmation induces high levels of mental construal.

Discussion

The results from the first three experiments are broadly consistent with the idea that self-affirmation improves self-control by moving mental construal to higher levels. We have found two related effects: one, that self-affirmation improves self-control when participants are in a depleted state and, two, that self-affirmation moves mental construal to higher levels. We have yet to test, however, whether construal level serves as an intervening cause of self-affirmation's beneficial effect on self-control. We conducted a fourth experiment to do just that.

Experiment 4

Whereas we found in Experiment 3 that self-affirmation induced high levels of mental construal, in Experiment 4 we sought causal evidence for the role of high levels of construal in overcoming ego depletion. Accordingly, we manipulated both the initial exercise of self-control as well as the construal level at which participants affirmed a self-defining value, and then we measured self-control.

Participants in Experiment 4 wrote a story in a manner that required exertion of self-control or did not require much exertion of self-control (as in Experiment 1). Then participants rank ordered a list of values and proceeded to describe why they pursue their top-ranked value (high-level affirmation) or how they pursue their top value (low-level affirmation). Note that these instructions constitute a manipulation of the psychological mechanism (i.e., level of mental construal) that is proposed to mediate the effect of self-affirmation on self-control in a depleted state. This experimental approach to mediation has been recommended by several theorists because it permits strong inferences about causal chains of events (Sigall & Mills, 1998; Spencer, Zanna, & Fong, 2005).

To measure the consequences for self-control, we had participants play a computer game in which they chose between short delays that were paired with small rewards versus longer delays that were paired with larger rewards (cf. delay of gratification; Mischel & Ebbesen, 1970). The best tactic for achieving the most rewards (points) is to wait for the larger but delayed rewards. The wait is boring; hence, participants must override the temptation to choose the more stimulating but less rewarding option, which are shorter delays that yield fewer points. Consistent with this reasoning, research has found that impulsive individuals earn fewer points on this game than do nonimpulsive individuals (e.g., Cherek & Lane, 1999; Dougherty, Bjork, Huckabee, Moeller, & Swan,

1999; Moeller et al., 2002). We therefore interpreted higher point totals to reflect better self-control.

We predicted that affirming the self at a high level of construal would overcome the depleting effect of prior self-control, whereas affirming the self at a low level of construal would not. Thus, prior self-control should lead to fewer points on the delay of gratification game, unless participants affirmed the self at a high level of mental construal before playing the game. Such a pattern would strongly suggest that construal level plays an influential role in the effects of self-affirmation on self-control. However, it is possible that expressing one's core values facilitates self-control regardless of the construal level at which values are expressed. If expressing core values is the key to self-affirmation's restorative effect on the resource for self-control, then we should find that self-affirmation promotes the choice of larger but delayed rewards in the low-level and high-level affirmation conditions alike.

Method

Participants and design. Ninety-six undergraduate students (31 men) reported individually to a laboratory experiment described as an investigation of behavior and personal values. They were randomly assigned to condition in a 2 (free writing vs. regulated writing) \times 2 (high-level affirmation vs. low-level affirmation) factorial design.

Ego depletion manipulation. The experiment began with a brief writing task. The same writing task as in Experiment 1 was used. Participants in the free-writing condition were instructed to write a story about a recent trip they had taken, whereas participants in the regulated writing condition were instructed further not to use the letters *a* or *n* anywhere in their story. Hence, one group was required to regulate their writing by avoiding the use of the two common letters, and the other group wrote without restrictions. After participants indicated they understood the writing instructions, they began writing and were stopped 6 min later.

Self-affirmation manipulation: High-level construal versus low-level construal. Immediately after the story-writing task, participants reviewed a list of values and characteristics and were asked to rank them in order of personal importance. After ranking the values, participants completed a short exercise that composed the construal level manipulation (adapted from Freitas, Gollwitzer, & Trope, 2004; see also Fujita et al., 2006). Participants in the high-level affirmation condition wrote their most important value from the value-ranking form in the box at the bottom of a sheet of paper and then were asked to indicate why they pursue this particular value in four additional boxes moving vertically up the sheet of paper. Participants in the low-level affirmation condition wrote their most important value in the box at the top of a sheet of paper and then were asked to indicate how they pursue this particular value in four additional boxes moving down the sheet of paper. After indicating why (or how) they pursue their top-ranked value, participants completed a state measure of mood, the University of Wales Institute of Science and Technology (UWIST) Mood-Adjective Checklist (Matthews, Jones, & Chamberlain, 1990).

Dependent measure of self-control. Participants' final task was to play a computer game inspired by classic research on the delay of gratification (e.g., Mischel, Shoda, & Rodriguez, 1989). The game proceeded as follows: Two shapes (a circle and a

square) appeared on screen. The participants' goal was to select (click) the shapes in order to accumulate points. If participants selected the circle, the computer screen froze (i.e., neither shape could be selected) for 3 s, after which time 3 points were added to a counter displayed at the top of the screen. This option represented the smaller, more immediate reward. If participants selected the square, the screen froze for 15 s, after which time 15 points were added to the counter. This option represented the larger but delayed reward. Hence, on each trial of the game participants had to choose either the shape that delivered a few points fairly quickly or the shape that delivered several points after a longer delay. Not only was the delay boring, which led to impatience, but research also indicates that people desire to obtain points even if the points are of little or no value (i.e., medium maximization; Hsee, Fang, Zhang, & Zhang, 2003).

Participants learned the reward structure of the game by completing four practice trials and then played 30 official (scored) trials. The number of points earned over 30 trials was the dependent variable. Choosing larger but delayed rewards rather than smaller and more immediate rewards is a common indicator of good self-control (e.g., Mischel & Ebbsen, 1970), so it was reasoned that the more points participants earned on the delay-of-gratification game, the better self-control they exhibited.

Results

Our primary hypothesis was that exercising self-control on the writing task at the start of the study would reduce the number of points participants earned on a computer game at the end of the study, unless participants affirmed the self at a high (vs. low) level of construal in the interim between the two tasks. A 2 (free writing vs. regulated writing) \times 2 (low-level affirmation vs. high-level affirmation) ANOVA revealed the predicted interaction effect, $F(1, 92) = 4.04, p < .05$. We also observed a marginal main effect of writing condition, $F(1, 92) = 3.47, p = .07$, and a significant main effect of affirming the self at high versus low levels of mental construal, $F(1, 92) = 4.63, p = .03$. The means are displayed in Figure 3.

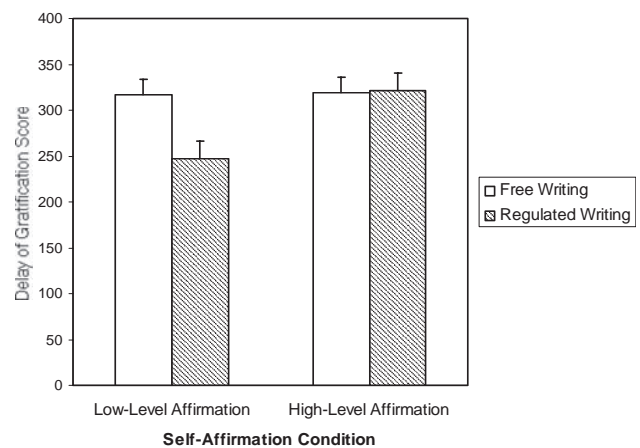


Figure 3. Score on the delay-of-gratification game in Experiment 4. Higher scores reflect a greater tendency to delay gratification. The highest possible score was 450. Error bars represent standard errors.

Planned comparisons revealed an ego depletion effect among participants in the low-level affirmation condition, such that they scored fewer points on the computer game after performing the self-regulated writing task ($M = 247.37$) versus the free-writing task ($M = 316.52$), $t(92) = 2.58, p = .01$. Among participants who were prompted to affirm the self at a high level of mental construal, however, scores on the computer game revealed equally good self-control in the regulated writing ($M = 321.69$) and free-writing ($M = 319.07$) conditions ($p > .90$). Furthermore, the manipulation of self-affirmation did not influence points scored on the delay-of-gratification game among participants who had not previously exercised self-control ($F < 1$). Among participants who had exercised self-control on the initial writing task, however, those who affirmed a core value at a high level of construal scored more points than those who affirmed a core value at a low level of construal, $t(92) = 2.85, p < .01$. Thus, self-affirmation eliminated the ego depletion effect, but only when the affirmation was implemented at a high level of mental construal.

Construal level manipulation check. We followed a coding scheme established by Liberman and Trope (1998; see also Fujita et al., 2006) to verify that our self-affirmation manipulation successfully elicited different levels of mental construal. Two judges blind to condition coded participants' responses. A response that expressed a concrete means by which a person pursues a particular value was given a score of -1 point. For example, the response "calling them regularly on the phone" represented a means by which one participant pursued the value of relations with friends and family. A response that expressed an abstract reason why a person pursues a value was given a score of $+1$ point. For example, the response "they will always be there for me" represented a reason why one participant valued relations with friends and family. Responses that did not fit either criterion were awarded 0 points. Ratings of each participant's responses were then summed to create an index of construal level that could range from -4 to $+4$ (given that there were four items to which participants responded). Higher scores indicated a more abstract mental construal. The ratings of the two judges were highly correlated ($r = .89$) and were averaged together. As expected, participants who expressed why they pursued their top-ranked value generated more abstract responses ($M = 2.81, SD = 2.33$) compared with participants who expressed how they pursued their top-ranked value ($M = -3.70, SD = 0.72$), $F(1, 92) = 302.10, p < .001$. Neither the main effect of writing condition ($p = .27$) nor the interaction between writing condition and affirmation condition ($p = .42$) was statistically significant.

We also tested the extent to which level of mental construal mediated the effect of self-affirmation manipulation on subsequent performance on the delay-of-gratification game. Within the regulated-writing condition, the effect of the affirmation manipulation was mediated by level of mental construal. Specifically, the difference between the mediated and unmediated effects of the self-affirmation manipulation on subsequent self-control was estimated to lie between 3.76 and 77.94 with 95% confidence (based on procedures recommended by Preacher & Hayes, 2004, 2008). Because zero is not in the 95% confidence interval, we can conclude that the indirect (or mediated) effect is indeed significantly different from zero at $p < .05$. Thus, the effect of self-affirmation on subsequent self-control was reduced by adjusting for the influence of participants' expressed level of mental con-

strual. Looked at differently, among participants in the regulated-writing condition, level of mental construal expressed in the values task predicted subsequent performance on the computer game ($B = 6.74, p < .05$). Within the free-writing (i.e., no-depletion) condition, level of mental construal did not predict subsequent performance on the delay-of-gratification game ($t < 1$).

Discussion

The results of Experiment 4 supported the hypothesis that affirming the self at a high level of mental construal counteracts a depleted resource for self-control, whereas affirming the self at a low level of mental construal does not. Hence, level of mental construal plays an influential role in self-affirmation's beneficial effect on self-control in a depleted state.

The results indicated that not all kinds of reflections on one's core values facilitate good self-control. If that were correct, then we would have found that both high-level and low-level affirmations increased the choice of larger, delayed rewards following a depleting exercise of self-control. In contrast, we found that only high-level self-affirmations increased the choice of larger, delayed rewards in the ego depletion condition.

Consistent with Experiments 1 and 2, high-level self-affirmations boosted self-control only when participants had previously exercised self-control. In the absence of prior efforts at self-control, high-level affirmations did not impact subsequent self-control. This pattern again suggests that self-affirmation contributes to success at self-control only in the context of ego depletion. In the absence of depletion, self-affirmation appears to have little influence on self-control.

General Discussion

The present research revealed that self-affirmation counteracts ego depletion. We replicated the typical ego depletion pattern by finding that initial efforts at self-control caused subsequent reductions in further volitional efforts, including pain tolerance (Experiment 1), persistence at a difficult task (Experiment 2), and delay of gratification (Experiment 4). More remarkably, these effects were completely eliminated among participants who expressed their core life values during the interim separating the two tasks.

The evidence suggested that self-affirmation counteracts ego depletion by promoting high levels of mental construal. Previous research had indicated that high levels of mental construal contribute to successful self-control (Fujita et al., 2006; Vallacher & Wegner, 1987, 1989). In the present research, we found that affirming (vs. not affirming) core values caused participants to prefer more abstract descriptions of events (Experiment 3), a result suggesting that self-affirmation produces high levels of mental construal. Moreover, we found that affirming the self at a high level of mental construal eliminated the ego depletion effect, whereas affirming the self at a low level of construal did not (Experiment 4). Thus, high levels of mental construal appeared to be a key ingredient in self-affirmation's valuable effect on self-control in a depleted state.

Previous research established that self-affirmation acts as a powerful salve for negative feedback and other threats to the self, such that self-affirmed individuals forgo defensive, self-protective responses to threat in favor of more open and evenhanded responses. The present

findings extended the benefits of self-affirmation to essential volitional domains, including pain tolerance, task persistence, and delay of gratification. Combined with previous evidence that self-affirmation helps to counteract threats to self-regard, the present findings indicate that self-affirmation both fortifies the self-concept and boosts the self's regulatory function.

Self-Affirmation, Construal Levels, and Self-Control

We found that self-affirmation improved self-control, but only among depleted participants. Previous research observed that manipulations to increase levels of mental construal improved self-control even among nondepleted participants (Fujita et al., 2006). Why would self-affirmation improve self-control under a limited set of circumstances (i.e., ego depletion) relative to high levels of construal if, as we propose, high levels of construal contribute to the self-affirmation effect?

There are several possible explanations for the evidence that manipulations to increase construal level improve self-control among nondepleted individuals, whereas self-affirmation does not. First, the self-affirmation manipulations we used are not strictly equivalent to a construal level manipulation. We observed that self-affirmation increases the preference for abstract descriptions of behavior (consistent with higher levels of mental construal; Experiment 3), but the self-affirmation manipulation may have produced a mix of high and low levels of mental construal relative to the direct manipulations of construal level used in previous work. In Experiments 1, 2, and 3 of the present work, participants in the self-affirmation conditions described why their top-ranked value was important to them and described a specific time in their lives when the value had been particularly important. Contrast that to a classic manipulation to increase construal level wherein participants focus exclusively on why they pursue a goal (e.g., Fujita et al., 2006). This exclusive focus on why one pursues a goal is likely to promote a greater increase in construal level compared with our self-affirmation manipulation, which required participants to consider both why and when they pursued a particular value. If that is correct, then self-affirmation may not have increased levels of mental construal sufficiently enough to improve self-control among nondepleted participants. Note that under ego depletion (when construal level is likely to be lower; Vohs & Schmeichel, 2003), even a manipulation that mixes high and lower levels of construal may be sufficient to increase construal level and, in turn, facilitate self-control.

Second, research suggests that most people function at or near high levels of mental construal most of the time (e.g., Vallacher & Wegner, 1989). Thus, it may be difficult to increase mental construal substantially above baseline levels (and thereby improve self-control) because baseline construal levels are already quite high. In this view, manipulations to boost mental construal to higher levels will have more pronounced effects on self-control when the person's construal level is low or concrete. Depleted individuals operate at relatively concrete or low levels of mental construal (e.g., Vohs & Schmeichel, 2003). Thus, a manipulation that boosts levels of mental construal should have a greater impact on depleted individuals, whereas nondepleted individuals (who are presumed to be at relatively high levels of construal) benefit less. This is precisely the pattern we observed in our results.

A third possible explanation for evidence that high levels of mental construal increase self-control among nondepleted participants whereas self-affirmation does not concerns the differences in dependent measures used in the present work versus previous work. Specifically, most previous research showing that high levels of mental construal promote good self-control has used behavioral intentions, nonbinding choices, or responses to hypothetical scenarios to assess self-control. For example, participants in one experiment read scenarios describing products they might buy and then indicated how much money they would pay to receive the products immediately or at some future time; smaller differences in hypothetical willingness to pay values for future versus immediate products were thought to reflect better self-control (Fujita et al., 2006, Experiment 1). In contrast, in the present experiments, we used behavioral measures of self-control that required participants to override or alter a prepotent response tendency in the immediate moment (i.e., pain tolerance, task persistence, and delay of gratification). (Note that in Study 2 of Fujita et al., 2006, a behavior measure of self-control was used, namely persistence at a hand-grip task, and therefore is a notable exception in the construal level literature on self-control.) High levels of mental construal are especially likely to influence decisions about hypothetical future events versus immediate events (e.g., Liberman & Trope, 1998). It may be more difficult to influence behavior via high levels of mental construal than it is to influence behavioral intentions or responses to hypothetical scenarios (Baumeister, Vohs, & Funder, 2007), particularly if self-affirmation is less effective at increasing (already high) levels of mental construal relative to more direct manipulations of construal level.

We do not subscribe to the view that high levels of mental construal always improve self-control. To the contrary, both high levels and low levels of mental construal are needed for successful behavior control. Performing novel, unusual, or complicated tasks often requires a low level of mental construal or a focus on the concrete steps required for task performance (Vallacher & Wegner, 1987, 1989). Furthermore, forming concrete behavioral intentions has been shown to improve performance on myriad tasks (Gollwitzer, 1999). The self-control tasks used in the present studies were not particularly unusual or complicated, so they may have been especially likely to benefit from self-affirmation manipulations that facilitate high levels of mental construal. Future research using different self-control challenges, specifically novel self-control challenges that demand a narrow focus on concrete details, may find that self-affirmation or higher levels of mental construal have a different (potentially damaging) effect on self-control, in contrast to the beneficial effect observed in the present investigation.

The present findings suggest that high levels of mental construal contribute to self-affirmation's effect on self-control, but the extent to which levels of mental construal underlie other effects associated with self-affirmation remains an open question. For example, dismissing or defending against an ego threat may help to sustain positive self-regard in the short-term, but affirming a core value may facilitate a longer view, focused on health or self-improvement rather than on ego defense, and thereby promote constructive responses to ego threat. The tendency for self-affirmation to move individuals toward higher levels of mental construal may prove to be an essential ingredient in self-affirmation's effects on ego defense, in addition to its effects on self-control.

Ego Depletion and Ego Threat

Given that self-affirmation reduces defensive responses to ego threat and also counteracts ego depletion, it is worthwhile to compare and contrast ego threat and ego depletion. Is ego depletion simply another form of ego threat, akin to the experience of failure (Koole, Smeets, van Knippenberg, & Dijksterhuis, 1999) or attitudinal inconsistency (Steele & Liu, 1983)? Previous research suggests that ego depletion is not a form of threat. First, the vast majority of research on ego depletion has found little evidence to suggest that depletion is associated with negative mood or reduced self-esteem (Baumeister, Schmeichel, & Vohs, 2007). Conversely, ego threats tend to increase negative mood and reduce self-esteem. Attitudinal inconsistency, for example, produces an unpleasant and a discomforting psychological state (Elliot & Devine, 1994), and failure feedback reliably increases negative mood (Nummenmaa & Niemi, 2004) and reduces state self-esteem (Vohs & Heatherton, 2001).

Second, positive feedback does not counteract ego depletion (e.g., Wallace & Baumeister, 2002), whereas positive feedback does reduce defensive responses to threat (e.g., Greenberg et al., 1992). These differential effects of positive feedback suggest that ego depletion is distinct from ego threat. Note that some previous research has treated positive feedback as a form of self-affirmation (e.g., Cohen et al., 2000, Study 2), so the present evidence that affirming core values counteracts ego depletion may be contrasted with previous evidence that positive feedback does not counteract ego depletion. The divergent patterns of behavior suggest that there are important differences between the various operationalizations of self-affirmation.

We suspect that affirming one's core values and receiving positive feedback have different effects for at least four reasons. First, the value-affirmation method asks participants to affirm for themselves their core values in life, whereas another person (or a computer program) is typically required for positive feedback, creating an interpersonal contingency that is not present for value-based self-affirmation. Second, positive feedback typically results in increased self-esteem or improved mood (e.g., Cooper & Duncan, 1971; Nummenmaa & Niemi, 2004), whereas affirming one's core values typically does not affect self-esteem or positive mood (e.g., McQueen & Klein, 2006; Schmeichel & Martens, 2005). Third, the value-affirmation method is nonevaluative, such that individuals are not required to judge how successfully they are pursuing their values. Positive feedback, at its core, entails an evaluative component, whereby somebody else judges the worth of the individual. Fourth, receiving positive feedback may not increase the person's level of mental construal to the same degree as does affirming a core value, although evidence regarding this hypothesis is lacking.

To summarize, ego threat and ego depletion have divergent consequences on mood states and state self-esteem, and positive feedback differentially affects depleted selves versus threatened selves. These lines of evidence converge on the conclusion that ego depletion is not simply a form of ego threat.

It is possible that trying and failing at a self-control task that is high in personal importance may be threatening to the self and also depleting. We are aware of no empirical tests of this possibility. Most research on ego depletion has required participants to perform initial self-control tasks (such as suppressing thoughts about a white bear or performing the Stroop task) that are unlikely to be highly important to participants and therefore unlikely to pose a significant threat to

self-worth. In addition, note that in the present experiments participants were largely successful at the initial (depleting) self-control tasks. In Experiments 1 and 4, for example, participants in the depletion conditions successfully avoided the use of the letters *a* and *n* when writing a story, so it seems implausible to suggest that participants experienced failure or some other threat to self-regard as a result of having performed these self-control tasks.

Conversely, perhaps it is the case that ego threats lead to a state of ego depletion. More precisely, it may be that efforts to cope with threats to the self deplete the resource for self-control. Research regarding the psychological threat of personal mortality is consistent with this view. Reminders of mortality have been shown to undermine subsequent efforts at self-control. For example, one experiment prompted participants to ponder their own inevitable death or to ponder an aversive topic that was unrelated to death (Gailliot, Schmeichel, & Baumeister, 2006, Study 6). A few minutes later, participants performed the Stroop color-word interference task as a measure of the capacity to override an automatic response. Participants who had previously pondered death performed worse on the Stroop task, suggesting that efforts to cope with an ego threat (i.e., a reminder of death) impaired subsequent efforts at self-control. Thus, ego depletion may help to explain some of the consequences associated with confronting a threat to self-regard, although additional research on this issue is needed.

Conclusion

The benefits of self-affirmation extend beyond assuaging a threatened self-concept to enabling good self-control. This conclusion was anticipated by Steele (1988), who conceived of self-affirmation as a strategy to reinforce the self as "competent, good, coherent, unitary, stable, capable of free choice, capable of controlling important outcomes" (p. 262). The present work was most relevant to the last element of Steele's list—capable of controlling important outcomes. Beyond making people feel capable of controlling important outcomes, however, we found that self-affirmation actually helps people to achieve self-control.

The present investigation wedded two elements of the human psyche that help to make humans unique in the animal kingdom. Unlike other animals, humans are capable of reflecting upon the guiding values in their lives, and humans also far exceed other animals in the capacity for self-control. Together these two capacities have bestowed upon humans the ability to move beyond the immediate stimulus environment and orient themselves toward abstract, long-range outcomes. The present investigation suggests that these two capacities are intertwined. Calling up one's guiding principles in life temporarily improves performance at self-control under conditions that otherwise hasten self-control failure.

References

- Aronson, E. (1969). The theory of cognitive dissonance: A current perspective. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 4, pp. 1–34). New York: Academic Press.
- Baker, S., & Kirsch, I. (1991). Cognitive mediators of pain perception and tolerance. *Journal of Personality and Social Psychology*, 61, 504–510.
- Baumeister, R. F. (1998). The self. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed., pp. 680–740). New York: McGraw-Hill.

- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1993). When ego threats lead to self-regulation failure: Negative consequences of high self-esteem. *Journal of Personality and Social Psychology*, 64, 141–156.
- Baumeister, R. F., Schmeichel, B. J., & Vohs, K. D. (2007). Self-regulation and the executive function: The self as controlling agent. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles*. (2nd ed., pp. 516–539). New York: Guilford Press.
- Baumeister, R. F., & Vohs, K. D. (2004). *Handbook of self-regulation: Research, theory, and applications*. New York: Guilford Press.
- Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the science of self-reports and finger movements: Whatever happened to actual behavior? *Perspectives on Psychological Science*, 2, 396–403.
- Campbell, W. K., & Sedikides, C. (1999). Self-threat magnifies the self-serving bias: A meta-analytic integration. *Review of General Psychology*, 3, 23–43.
- Cherek, D. R., & Lane, S. D. (1999). Laboratory and psychometric measurements of impulsivity among violent and nonviolent female parolees. *Biological Psychiatry*, 46, 273–280.
- Cohen, G. L., Aronson, J., & Steele, C. M. (2000). When beliefs yield to evidence: Reducing biased evaluation by affirming the self. *Personality and Social Psychology Bulletin*, 26, 1151–1164.
- Cooper, J., & Duncan, B. L. (1971). Cognitive dissonance as a function of self-esteem and logical inconsistency. *Journal of Personality*, 39, 289–302.
- Correll, J., Spencer, S. J., & Zanna, M. P. (2004). An affirmed self and an open mind: Self-affirmation and sensitivity to argument strength. *Journal of Experimental Social Psychology*, 40, 350–356.
- Crocker, J., Niiya, Y., & Mischkowski, D. (2008). Why does writing about important values reduce defensiveness? Self-affirmation and the role of positive, other-directed feelings. *Psychological Science*, 19, 740–747.
- Cyders, M. A., & Smith, G. T. (2007). Mood-based rash action and its components: Positive and negative urgency. *Personality and Individual Differences*, 43, 839–850.
- Ditto, P. H., & Boardman, A. F. (1995). Perceived accuracy of favorable and unfavorable psychological feedback. *Basic and Applied Social Psychology*, 16, 137–157.
- Dougherty, D. M., Bjork, J. M., Huckabee, H. C., Moeller, F. G., & Swan, A. C. (1999). Laboratory measures of aggression and impulsivity in women with borderline personality disorder. *Psychiatry Research*, 85, 315–326.
- Duckworth, A. L., & Seligman, M. E. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science*, 16, 939–944.
- Elliot, A. J., & Devine, P. G. (1994). On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort. *Journal of Personality and Social Psychology*, 67, 382–394.
- Erber, R., Wegner, D. M., & Theriault, N. (1996). On being cool and collected: Mood regulation in anticipation of social interaction. *Journal of Personality and Social Psychology*, 70, 757–766.
- Fein, S., & Spencer, S. J. (1997). Prejudice as self-image maintenance: Affirming the self through derogating others. *Journal of Personality and Social Psychology*, 73, 31–44.
- Fishbach, A., & Labroo, A. A. (2007). Be better or be merry: How mood affects self-control. *Journal of Personality and Social Psychology*, 93, 158–173.
- Fredrickson, B. L., Mancuso, R. A., Branigan, C., & Tugade, M. M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, 24, 237–258.
- Freitas, A. L., Gollwitzer, P. M., & Trope, Y. (2004). The influence of abstract and concrete mindsets on anticipating and guiding others' self-regulatory efforts. *Journal of Experimental Social Psychology*, 40, 739–752.
- Fujita, K., Trope, Y., Liberman, N., & Levin-Sagi, M. (2006). Construal levels and self-control. *Journal of Personality and Social Psychology*, 90, 351–367.
- Gailliot, M. T., & Baumeister, R. F. (2007). Self-regulation and sexual restraint: Dispositionally and temporarily poor self-regulatory abilities contribute to failures at restraining sexual behavior. *Personality and Social Psychology Bulletin*, 33, 173–186.
- Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., et al. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, 92, 325–336.
- Gailliot, M. T., Schmeichel, B. J., & Baumeister, R. F. (2006). Self-regulatory processes defend against the threat of death: Effects of self-control depletion and trait self-control on thoughts and fears of dying. *Journal of Personality and Social Psychology*, 91, 49–62.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503.
- Greenberg, J., Martens, A., Jonas, E., Eisenstadt, D., Pyszczynski, T., & Solomon, S. (2003). Psychological defense in anticipation of anxiety: Eliminating the potential for anxiety eliminates the effect of mortality salience on worldview defense. *Psychological Science*, 14, 516–519.
- Greenberg, J., Pyszczynski, T., Solomon, S., Rosenblatt, A., Veeder, M., Kirkland, S., & Lyon, D. (1990). Evidence for terror management theory II: The effects of mortality salience on reactions to those who threaten or bolster the cultural worldview. *Journal of Personality and Social Psychology*, 58, 308–318.
- Greenberg, J., Solomon, S., Pyszczynski, T., Rosenblatt, A., Burling, J., Lyon, D., et al. (1992). Why do people need self-esteem? Converging evidence that self-esteem serves an anxiety-buffering function. *Journal of Personality and Social Psychology*, 63, 913–922.
- Hajcak, G., Moser, J. S., Yeung, N., & Simons, R. F. (2005). On the ERN and the significance of errors. *Psychophysiology*, 42, 151–160.
- Harris, P. R., Mayle, K., Mabbott, L., & Napper, L. (2007). Self-affirmation reduces smokers' defensiveness to graphic on-pack cigarette warning labels. *Health Psychology*, 26, 437–446.
- Harris, P. R., & Napper, L. (2005). Self-affirmation and the biased processing of threatening health-risk information. *Personality and Social Psychology Bulletin*, 31, 1250–1263.
- Heatherton, T. F., & Baumeister, R. F. (1991). Bing eating as escape from self-awareness. *Psychological Bulletin*, 110, 86–108.
- Hsee, C. K., Fang, Y., Zhang, J., & Zhang, Y. (2003). Medium maximization. *Journal of Consumer Research*, 30, 1–14.
- Kelly, E. L., & Conley, J. J. (1987). Personality and compatibility: A prospective analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology*, 52, 27–40.
- Koole, S. L., Smeets, K., van Knippenberg, A., & Dijksterhuis, A. (1999). The cessation of rumination through self-affirmation. *Journal of Personality and Social Psychology*, 77, 111–125.
- Liberman, A., & Chaiken, S. (1992). Defensive processing of personally relevant health messages. *Personality and Social Psychology Bulletin*, 18, 669–679.
- Liberman, N., & Trope, Y. (1998). The role of feasibility and desirability considerations in near and distant future decisions: A test of temporal construal theory. *Journal of Personality and Social Psychology*, 75, 5–18.
- Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality and Social Psychology*, 37, 2098–2109.
- Mathews, G., Jones, D. M., & Chamberlain, A. G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology*, 81, 17–42.
- Matz, D. C., & Wood, W. (2005). Cognitive dissonance in groups: The consequences of disagreement. *Journal of Personality and Social Psychology*, 88, 22–37.

- Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology*, 55, 102–111.
- McGregor, I., & Marigold, D. C. (2003). Defensive zeal and the uncertain self: What makes you so sure? *Journal of Personality and Social Psychology*, 85, 838–852.
- McQueen, A., & Klein, W. M. P. (2006). Experimental manipulations of self-affirmation: A systematic review. *Self and Identity*, 5, 289–354.
- Mischel, W., & Ebbesen, E. B. (1970). Attention in delay of gratification. *Journal of Personality and Social Psychology*, 16, 329–337.
- Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989, May 26). Delay of gratification in children. *Science*, 244, 933–938.
- Moeller, F. G., Dougherty, D. M., Barratt, E. S., Oderinde, V., Mathias, C. W., Harper, R. A., & Swann, A. C. (2002). Increased impulsivity in cocaine dependent subjects independent of antisocial personality disorder and aggression. *Drug and Alcohol Dependence*, 68, 105–111.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126, 247–259.
- Muraven, M., Collins, R. L., & Nienhaus, K. (2002). Self-control and alcohol restraint. An initial application of the self-control strength model. *Psychology of Addictive Behaviors*, 16, 113–120.
- Muraven, M., & Slessareva, E. (2003). Mechanisms of self-control failure: Motivation and limited resources. *Personality and Social Psychology Bulletin*, 29, 894–906.
- Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74, 774–789.
- Nummenmaa, L., & Niemi, P. (2004). Inducing affective states with success—Failure manipulations: A meta-analysis. *Emotion*, 4, 207–214.
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36, 717–731.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.
- Reed, M. B., & Aspinwall, L. G. (1998). Self-affirmation reduces biased processing of health-risk information. *Motivation and Emotion*, 22, 99–132.
- Robinson, M. D., Schmeichel, B. J., & Inzlicht, M. (2008). *How does the self control itself? Questions and considerations based on a cognitive control perspective*. Manuscript submitted for publication.
- Schmeichel, B. J. (2007). Attention control, memory updating, and emotion regulation temporarily reduce the capacity for executive control. *Journal of Experimental Psychology: General*, 136, 241–255.
- Schmeichel, B. J., Demaree, H. A., Robinson, J. L., & Pu, J. (2006). Ego depletion by response exaggeration. *Journal of Experimental Social Psychology*, 42, 95–102.
- Schmeichel, B. J., & Martens, A. (2005). Self-affirmation and mortality salience: Affirming values reduces worldview defense and death-thought accessibility. *Personality and Social Psychology Bulletin*, 31, 658–667.
- Schmeichel, B. J., & Zell, A. (2007). Trait self-control predicts performance on behavioral tests of self-control. *Journal of Personality*, 75, 743–756.
- Sherman, D. A. K., Nelson, L. D., & Steele, C. M. (2000). Do messages about health risk threaten the self? Increasing acceptance of threatening health messages via self-affirmation. *Personality and Social Psychology Bulletin*, 26, 1046–1058.
- Sherman, D. K., & Cohen, G. L. (2006). The psychology of self-defense: Self-affirmation theory. In M. P. Zanna (Ed.) *Advances in experimental social psychology* (Vol. 38, pp. 183–242). San Diego, CA: Academic Press.
- Shrira, I., & Martin, L. L. (2005). Stereotyping, self-affirmation, and the cerebral hemispheres. *Personality and Social Psychology Bulletin*, 31, 846–856.
- Sigall, H., & Mills, J. (1998). Measures of independent variables and mediators are useful in social psychology experiments: But are they necessary? *Personality and Social Psychology Review*, 2, 218–226.
- Spencer, S. J., Zanna, M. P., & Fong, G. T. (2005). Establishing a causal chain: Why experiments are often more effective than mediational analyses in examining psychological processes. *Journal of Personality and Social Psychology*, 89, 845–851.
- Steele, C. M. (1988). The psychology of self-affirmation: Sustaining the integrity of the self. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 21, pp. 261–302). New York: Academic Press.
- Steele, C. M., & Liu, T. J. (1983). Dissonance processes as self-affirmation. *Journal of Personality and Social Psychology*, 45, 5–19.
- Steele, C. M., Spencer, S. J., & Lynch, M. (1993). Self-image resilience and dissonance: The role of affirmational resources. *Journal of Personality and Social Psychology*, 64, 885–896.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, 72, 271–322.
- Tesser, A. (2000). On the confluence of self-esteem maintenance mechanisms. *Personality and Social Psychology Review*, 4, 290–299.
- Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, 43, 379–384.
- Trope, Y., & Liberman, N. (2003). Temporal construal. *Psychological Review*, 110, 403–421.
- Vallacher, R. R., & Wegner, D. M. (1987). What do people think they're doing? Action identification and human behavior. *Psychological Review*, 94, 3–15.
- Vallacher, R. R., & Wegner, D. M. (1989). Levels of personal agency: Individual variation in action identification. *Journal of Personality and Social Psychology*, 57, 660–671.
- Vohs, K. D., Baumeister, R. F., & Ciarocco, N. J. (2005). Self-regulation and self-presentation: Regulatory resource depletion impairs impression management and effortful self-presentation depletes regulatory resources. *Journal of Personality and Social Psychology*, 88, 632–657.
- Vohs, K. D., & Faber, R. J. (2007). Spent resources: Self-regulatory resource availability affects impulse buying. *Journal of Consumer Research*, 33, 537–547.
- Vohs, K. D., & Heatherton, T. F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science*, 11, 249–254.
- Vohs, K. D., & Heatherton, T. F. (2001). Self-esteem and threats to self: Implications for self-construals and interpersonal perceptions. *Journal of Personality and Social Psychology*, 81, 1103–1118.
- Vohs, K. D., & Schmeichel, B. J. (2003). Self-regulation and the extended now: Controlling the self alters the subjective experience of time. *Journal of Personality and Social Psychology*, 85, 217–230.
- Wallace, H. M., & Baumeister, R. F. (2002). The effects of success versus failure feedback on further self-control. *Self and Identity*, 1, 35–42.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54, 1063–1070.
- Wicklund, R. A., & Gollwitzer, P. M. (1982). *Symbolic self-completion*. Hillsdale, NJ: Erlbaum.
- Wyland, C. L., & Forgas, J. P. (2007). On bad mood and white bears: The effects of mood state on ability to suppress unwanted thoughts. *Cognition & Emotion*, 21, 1513–1524.

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