FlashReport

Self-affirmation improves performance on tasks related to executive functioning

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HIGHLIGHTS

- We assessed performance on executive functioning tasks following self-affirmation.
- The tasks measured core executive functioning aspects: working memory and inhibition.
- Self-affirmation improved performance on both tasks.
- This may help explain the wide range of beneficial effects of self-affirmation

ARTICLE INFO

ABSTRACT

Objectives: The current study explored the effect of self-affirmation on two aspects of performance that have been related to executive functioning: working memory (assessed by a 2-back task) and inhibition (assessed by a Stroop task). The goal was to establish whether self-affirmation improved performance on these tasks.
Method: Participants ($N = 83$) were randomized to either a self-affirmation or a control task and then completed the computerized tasks, in a fixed sequence.
Results: Self-affirmed participants performed better than non-affirmed participants on both tasks.
Conclusion: Self-affirmation can improve aspects of performance related to executive functioning. This finding may help to explain the wide range of beneficial effects that self-affirmation can have on cognition and behavior.
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Self-affirmation (e.g., reflecting upon a personally important value) has elicited a broad range of positive effects in many studies in social and health psychology (for reviews, see Cohen & Sherman, 2014; Sherman & Cohen, 2006). These include beneficial effects on academic achievement (e.g., Cohen, Garcia, Purdie-Vaughns, Apfel, & Brzustoski, 2009), self-control (Schmeichel & Vohs, 2009), task performance (Creswell, Dutcher, Klein, Harris, & Levine, 2013), and health-related behavior (e.g. Epton, Harris, Kane, van Koningsbruggen, & Sheeran, 2014).

How does self-affirmation have such diverse effects? One possibility is that it influences an underlying ability that has broad consequences. One candidate for such a general ability with broad performance implications is executive functioning. To explore this possibility, the current study tested the effects of self-affirmation on performance on two tasks that are related to executive functioning: working memory and inhibition.

1. Self-affirmation and executive functioning

According to self-affirmation theory (Steele, 1988), people are strongly motivated to uphold their self-integrity – their sense of being "adaptively and morally adequate" (Steele, 1988, p. 262). Self-integrity can be maintained by affirming the self, whereby individuals remind themselves of their important self-aspects through action or thought. Executive functioning refers to "those mental capacities necessary for formulating goals, planning how to achieve them, and carrying out the plans effectively" (Lezak, 1982, p. 281). It is considered essential for reasoning, maintaining focus and attention, and generating and completing goals and plans (Miyake et al., 2000).

Experimental manipulations of self-affirmation have been shown to affect outcomes that involve executive functioning. For example, self-affirmed individuals form stronger intentions to act in healthier ways than non-affirmed individuals after reading health-risk information and may subsequently act more healthily (Epton et al., 2014; Sweeney & Moyer, 2015). Executive functioning is thought to be crucial both to forming (Allan, Johnston, & Campbell, 2011) and executing (Hofmann, Schmeichel, & Baddeley, 2012) the intention to act more healthily. Self-affirmation has been associated with academic achievement at

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school (Cohen et al., 2009) and college (Miyake et al., 2010), and with better problem-solving (Creswell et al., 2013). Executive functioning is believed to play an important role in both academic achievement (St Clair-Thompson & Gathercole, 2006) and general problem-solving (Suchy, 2009).

Executive functioning consists of many different processes. However, two broad processes have been identified as being key (Jurado & Rosselli, 2007): working memory and inhibition, which interact dynamically (Roberts & Pennington, 1996). Working memory is heavily implemented in making short- and long-term plans, and successful goal achievement (Suchy, 2009). Inhibition allows the suppression of responses that may interfere with a goal (Kane & Engle, 2003). To date, however, there is only limited evidence that self-affirmation affects either. Logel and Cohen (2012) found self-affirmation improved working memory performance some 2.5 months (on average) after the self-affirmation task. Legault, Al-Khindi, and Inzlicht (2012) found self-affirmation improved performance on an inhibition task (the Go/No-Go task, in which participants inhibit responses to a stimulus). These findings are promising, but have some interpretative issues that undermine the evidence that self-affirmation can improve performance on such tasks. For instance, given the time lag between manipulation and measure, it is unclear whether the improvement in working memory observed by Logel and Cohen (2012) was an immediate or delayed effect of self-affirmation, perhaps induced by changes in behavior or cognitions that also affect executive functioning, such as physical activity (Kramer & Erickson, 2007) or self-efficacy perceptions (Bouffard-Bouchard, 1990). Likewise, the Go/No-Go task is considered primarily a measure of motor response inhibition (Nigg, 2000) and it would be useful to test the effects on a task that also assesses other aspects of inhibitory control that are key to successful self-regulation, such as the ability to focus on a goal despite distractions (Rueda, Posner, & Rothbart, 2005). One such task is the Stroop task (Stroop, 1935), which is considered a measure of response inhibition, attentional vigilance, response selection (Suchy, 2009) and goal maintenance (Kane & Engle, 2003).

The current study therefore assessed the immediate impact of self-affirmation on performance on a working memory (2-back) and inhibition (Stroop) task and sought to provide laboratory-based evidence of the effects of self-affirmation on these key aspects of executive functioning. The study tested the hypothesis that self-affirmed participants would perform better than non-affirmed participants on both tasks.

2. Method

2.1. Participants

The sample consisted of 83 psychology undergraduates at the University of Sussex who participated for course credits. A priori power analyses indicated that the minimum required sample size to detect an effect of the size ($d = 0.7$) found in Logel and Cohen (2012) with 80% power would be 67 participants. To allow for potential losses through mistakes and misunderstandings, we continued data collection until the course credit deadline. Participants were between 18 and 35 years old ($M = 20.27$, $SD = 3.00$). Most were female (78.30%), white (71.10%) and British (78.30%).

2.2. Procedure and design

Participants completed an online questionnaire, followed by a face-to-face session held at least two days later. They were randomly allocated to the self-affirmation or control task (the experimenter remained blind to condition), both of which were presented as writing tasks. Participants, who were tested individually, spent 10 min writing and then completed the working memory task, followed by the inhibition task (described below). The study was presented as being on 'the link between personality and cognitive skills'. A funnel debrief (Chartrand & Bargh, 1996) confirmed no participant suspected otherwise.

Participants were not put under any explicit pressure to perform well on the tasks.

2.3. Materials and measures

2.3.1. Baseline measures

Participants answered questions relating to their demographic information (such as age, sex, nationality) in an online questionnaire.[1]

2.3.2. Self-affirmation manipulation

Participants in the self-affirmation condition wrote about their most important value (why it is important to them and how it influences their behaviors or attitudes; Sherman, Nelson, & Steele, 2000). In the control condition participants wrote about their least important value (why it might be important to someone else and how it might influence other people's behaviors or attitudes).

2.3.3. Working memory

Working memory was measured with the 2-back task, using the same instructions as Logel and Cohen (2012). Participants were presented with a sequence of 45 letters, each of which stayed on screen for 500 ms, followed by a blank screen for 2.5 s. For each letter, participants had to indicate whether or not the current letter matched the letter that had appeared two positions previously. The dependent measures were the proportion of correct trials, mean reaction time (RT), and inverse efficiency, which was calculated by dividing RT by the proportion of correct responses (Townsend & Ashby, 1983). It represents the time participants took per correct answer, and thus takes the trade-off between speed and accuracy into account. A lower score indicates quicker correct responding and therefore greater efficiency.

2.3.4. Inhibition

The Stroop task required participants to indicate the color of a string of letters. These were either a string of X's or color words, resulting in three trial types: Neutral (*XXXX* in red or blue), congruent (*red* in red or *blue* in blue) and incongruent (*red* in blue or *blue* in red). The task consisted of 60 trials (20 of each type, all in random order). The procedure was a replication of Jostmann and Koole (2007), with the exception that the interval blank screen was reduced from 2s to 1s to reduce inter-stimulus waiting time.

The dependent measures were the proportion of correct trials, mean RT, inverse efficiency and interference, calculated by subtracting mean accuracy and mean RT for neutral trials from the equivalent means for incongruent trials (Macleod, 1991).

3. Results

3.1. Preliminary analysis

Chi square analyses revealed no significant associations between condition and sex, ethnicity or nationality (all $ps > 0.42$). One-way ANOVA comparing age between self-affirmation ($M_{SA} = 19.71$ years, $SD = 2.75$) and control conditions ($M_{NA} = 20.83$ years, $SD = 3.17$)

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[1] All measures, manipulations, and exclusions in this study have been reported with the exception of several individual difference measures that are part of the broader program of research of which this study forms part, but that do not relate to the specific issues reported in this paper. These were measures of self-control (Tangney, Baumeister, & Boone, 2004), self-esteem (Rosenberg, 1965), positive affect (Usala & Hertzog, 1989), self-integrity (Sherman et al., 2009), spontaneous self-affirmation (Harris et al., n.d.), general self-efficacy (Schwarzer & Jerusalem, 1995), self-compassion (Neff, 2003), optimism (Scheier, Carver, & Bridges, 1994), heuristic/systematic processing (Griffin, Neuwirth, Giese, & Dunwoody, 1999) and empathic concern (Davis, 1983). Affect was also measured immediately following the manipulation, but no main effect of self-affirmation on affect was found. (The affect findings will be reported in a separate paper, Harris, Harris & Miles, in prep.)