



## The effects of exercising self-control on creativity



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### ARTICLE INFO

#### Article history:

Received 5 July 2013

Received in revised form 25 May 2014

Accepted 20 June 2014

Available online 8 July 2014

#### Keywords:

Creativity

Exercising self-control

Insight problem

Promotion focus

### ABSTRACT

The purpose of this study is to examine whether exercising of self-control improves creativity. Previous studies have indicated that promotion focus increases creativity; therefore, in Experiment 1, it had to be verified that exercising self-control could improve individual's promotion focus. After confirming exercising self-control could improve promotion focus, it might indicate that exercising self-control could also improve creativity (Experiment 2 and 3 examine this hypothesis). The results of Experiment 1 showed that the participants' promotion focus increased following exercising self-control. The participants' insight problem-solving performances in Experiment 2 was improved following activities of exercising self-control. The results of Experiment 3 indicated that promotion focus mediates the relationship among exercising self-control, fluency and flexibility. However, the originality indicator did not demonstrate this mediating effect. In summary, the data indicated that exercising self-control could increase creativity, and promotion focus could mediate the relationship between creativity and exercising self-control.

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### 1. Introduction

Creativity is generally defined as the ability to generate novel and appropriate ideas (Chiu & Tu, 2014; Chiu, 2012; Sternberg & Lubart, 1999). For example, creativity is demonstrated in developing an executable idea of unprecedented cars that could operate effectively. In discussions of its cognitive attributes, creativity is regarded as the broad realm of knowledge activation (Eysenck, 1995), and the ability to obtain insights by restructuring the problem representation (Mayer, 1995) and to form remote associations (Mednick, 1962). In creativity studies, various measurements have been adopted to distinguish people with high and low creativity. When evaluating individual's creative potential, one's divergent thinking ability was measured (Guilford, 1957). Divergent thinking refers to the ability to generate many diverse creative ideas (Guilford, 1956). Examples of practical measurements include the test of Unusual Uses employed by Guilford (1956), who instructed participants to provide unusual or alternative uses for bricks. This test employs the indicators of fluency, originality, and flexibility. Fluency is the ability to generate numerous ideas; originality is the ability to generate novel ideas; and flexibility is the ability to generate ideas for several conceptual categories.

Additionally, previous studies have measured people's creative problem-solving abilities. When dealing with an insight problem, a person first encounters obstacles. After spending a period of time on thinking, an "Aha!" experience occurs when a solution is identified (Dominowski, 1995). For example, in the candle problem (Duncker, 1945), participants are instructed to employ any available object (such as matchboxes and tacks) to attach a candle to a wall. Typically, participants

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encounter initial obstacles and cannot solve the problem because their functional fixedness restricts them to consider tack boxes as containers. If they could perform representational changes (Knoblich, Ohlsson, Haider, & Rhenius, 1999), solutions may be identified (e.g., using a tack box as a candlestick). In this study, participant's creative potential was regarded as a creativity indicator. These indicators which are individuals' performance in insight problem solving and responses on the divergent-thinking task can be used to calculate the scores of fluency, originality, and flexibility.

In previous studies, low self-control was found to be related to crime (Pratt & Cullen, 2000), aggression (Stucke & Baumeister, 2006), and risk-taking behaviors (Freeman & Muraven, 2010). According to a resource model of self-control, individuals' resources of self-control are limited. When these resources are consumed by performing a certain self-control activity, the control of subsequent behavior is weakened (Baumeister, Gailliot, DeWall, & Oaten, 2006; Muraven & Baumeister, 2000). For example, after performing a self-control activity in which one is required to restrain his/her desire to consume cookies and chocolates, it leads to less persistence of a subsequent mental challenge and lower anagram-solving performance (Baumeister, Bratslavsky, Muraven, & Tice, 1998). In summary, exercising self-control results in a subsequent decline in self-control or cognitive task performance.

However, Schmeichel, Harmon-Jones, & Harmon-Jones (2010) recently found that after exercising self-control, people's approach motivation increases. On the other hand, studies have found that personal creativity increases following temporary promotion focus priming (Friedman & Förster, 2000, 2001, 2002, 2005; Herman & Reiter-Palmon, 2011; Rook & van Knippenberg, 2011). Approach motivation and promotion focus are motivations for experiencing positive outcome, namely, they are relevant constructs; hence one's creativity performance might increase after exercising self-control. In addition, previous researchers have examined the negative effects caused by exercising self-control (Baumeister et al., 1998; Schmeichel, 2007), but have ignored the potential positive effects (exercising self-control might improve creativity).

In summary, except some behaviors would be diminished after exercising self-control, the performance of creativity might be enhanced. If creativity could be improved by exercising self-control, the merit of exercising self-control would be unveiled. In addition, a new way to improve creativity could be unfolded and to further enlighten the researchers in creativity. Therefore, this study aims to explore whether exercising self-control activity improves creativity.

### 1.1. *Exercising self-control increases approach motivation*

Self-control can be defined as the interaction between two competing forces: impulse motivation and the force that overrides an impulse. The former is known as impulse strength, and the latter is self-control strength. When control is stronger and impulse is weaker, self-control succeeds. By contrast, the failure of self-control may originate from a stronger impulse and weaker control (Schmeichel et al., 2010). Therefore, self-control is defined as an attempt to transform or override one's impulsive response tendencies and to regulate one's thoughts and behavior (Vohs & Baumeister, 2004). For example, the motivation to diet attempts to override the impulse to enjoy delicious food. In this study, response inhibition was utilized to manipulate self-control (von Hippel & Gonsalkorale, 2005). Namely, the participants were required to write a story under instructions not to use two common letters (i.e., A or N), so that participants had to inhibit the use of the forbidden letters and find alternative ways to express their thoughts (Schmeichel et al., 2010). Using the two common letters, A or N, was considered as impulse motivation, and the inhibiting ability that not to use the two letters was considered as self-control in this study; therefore, the researchers applied the way used by Schmeichel et al. to manipulate self-control.

According to the resource model of self-control, which hypothesizes that the inner mechanism of exercising self-control is based on limited resources; after exercising self-control, a person's control intensity may be depleted, leading to self-control failure (Muraven & Baumeister, 2000). The potential for self-control to override an impulse is partially based on a person's previous self-control behavior. If a person has recently exercised self-control, the force that controls his/her impulses may be depleted, resulting in self-control failure. This argument indicates that exercising self-control reduces self-control strength. For example, Stucke and Baumeister (2006) found that by requiring participants to resist consuming delicious food, they exhibited greater aggression in their response to being insulted. In other words, self-control activities consume self-control resources and reduce people's ability to control their subsequent aggressive impulses. Several studies have supported this argument (Freeman & Muraven, 2010; Miller, DeWall, Pattison, Molet, & Zentall, 2012; Muraven, Collins, & Nienhaus, 2002; Vohs & Heatherton, 2000).

However, Schmeichel et al. (2010) recently proposed that exercising self-control increases approach motivation. This is the proposition of the approach-motivated impulse strength model, developed and inferred from the Reinforcement Sensitivity Theory (RST) structure (Corr, 2008). Schmeichel et al. proposed that lowering the behavioral inhibition system (BIS) may increase the activation of the behavioral activation system (BAS), resulting in the increase of approach motivation and appetitive behavior. That is, following exercise of self-control, the BIS is relatively deactivated and the BAS becomes more activated (Schmeichel et al., 2010).

To examine the approach-motivated impulse strength model hypothesis, in Study 1, Schmeichel et al. (2010) instructed the participants to view 28 photographs. These photos elicited high negative arousal effects. Under the express condition, the participants were instructed to feel and express emotions in a natural manner while viewing the photographs. Under the suppress condition (exercising self-control), the participants were instructed to control their emotional reactions and not facially express their emotions to maintain self-control. The results showed that the participants under the exercising self-control condition achieved higher BAS scale scores (Carver & White, 1994) comparing with the participants in the express condition. In Studies 2b and 3, the participants were required to compose a travel story. The participants under

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