Personality and Social Psychology

Action orientation overcomes the ego depletion effect

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Dang, J., Xiao, S., Shi, Y. & Mao, L. (2014). Action orientation overcomes the ego depletion effect. *Scandinavian Journal of Psychology*.

It has been consistently demonstrated that initial exertion of self-control had negative influence on people's performance on subsequent self-control tasks. This phenomenon is referred to as the ego depletion effect. Based on action control theory, the current research investigated whether the ego depletion effect could be moderated by individuals' action versus state orientation. Our results showed that only state-oriented individuals exhibited ego depletion. For individuals with action orientation, however, their performance was not influenced by initial exertion of self-control. The beneficial effect of action orientation against ego depletion in our experiment results from its facilitation for adapting to the depleting task.

Key words: Self-control, ego depletion, action versus state orientation, adaptation.

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INTRODUCTION

Folk discussions of self-control often invoke the idea of willpower. Scientifically, self-control refers to the capacity that allows people to override their predominant but maladaptive thoughts, emotions, and behaviors in order to keep them in line with overarching goals (Baumeister, Vohs & Tice, 2007). The importance of such capacity in people's daily life is undisputable and its failure often relates to personal misadjustments and social problems (Baumeister, Heatherton & Tice, 1994). One of the most important factors leading to self-control failure was attributed to individuals' vulnerability to be influenced by preceding exertion of self-control. It has been consistently demonstrated that individuals who completed an initial self-control task performed more poorly on subsequent self-control tasks than did individuals who did not exert self-control (see Hagger, Wood, Stiff & Chatzisarantis, 2010, for a recent review). This phenomenon is referred to as the ego depletion effect. According to the self-control strength model, ego depletion occurs because self-control taxes a limited resource that is similar to energy or strength (Muraven & Baumeister, 2000). Such resource can be depleted by any act of self-control. Once depleted, people have a hard time to effectively regulate their subsequent self-control performances.

Since self-control is so important but the willpower seems fragile, a crucial question would be whether self-control failure due to ego depletion can be circumvented. In addressing this question, we draw from action control theory (Kuhl, 1984, 1994a, 2000), a theoretical perspective that is rooted in the tradition of German will psychology (Gollwitzer, 1993; Heckhausen & Kuhl, 1985). Although action control theory originally sought to explain what laypeople refer to as willpower, it is surprising that so far no direct connection has been built between this theory and the ego depletion effect. We aim to fill this void by investigating the moderating role of action versus state orientation emphasized by action control theory in the ego depletion effect.

According to action control theory, people react to demanding situations in either an action- or state-oriented manner (Koole, Jostmann & Baumann, 2012; Kuhl, 1984, 1994a, 2000). When people are action-oriented, they adopt a meta-static (change promoting) regulatory mode characterized by decisiveness and initiative. That is to say, action-oriented individuals can adapt positively to increases in demands, guiding their ongoing behaviors in line with high-level goals and intentions despite of the hindrances of high demands. By contrast, when people are state-oriented, they adopt a cata-static (change preventing) regulatory mode characterized by indecisiveness and hesitation, which makes them adapt negatively to increases in demands. Under demanding conditions, behaviors of individuals with state orientation will be more guided by behavioral routines rather than high-level goals. The difference between individuals with action orientation and state orientation when facing high demands has been demonstrated on various dimensions including cognitive, affective and behavioral outcomes. For example, compared with individuals with state orientation, action-oriented individuals reported less intrusive thoughts (Kuhl & Fuhrmann, 1998) and fewer lapses of attention (Kuhl & Goschke, 1994). Action-oriented individuals are also better able to maintain or restore positive affective state in demanding situations than state oriented individuals (Baumann, Kaschel & Kuhl, 2005), and such affective shielding can even take place on an intuitive level without conscious control (Jostmann, Koole, Van der Wulp & Fockenberg, 2005; Koole & Jostmann, 2004). Behaviorally, researchers have found that action-oriented individuals performed better than state-oriented individuals in dieting (Palfai, 2002), controlling alcohol consumption (Palfai, McNally & Roy, 2002), as well as implementing exercise intentions (Kendzierski, 1990).

Therefore, action versus state orientation is an important moderator of how people respond to high demands. In a demanding situation like depletion of self-control resource, it is natural to expect that the ego depletion effect may be stronger for state-oriented people but weaker for action-oriented people due to their different manners of responding to high demands. Though

indirect, some previous research is consistent with this prediction. For instance, in Jostmann and Koole' s (2007) Study 1, these authors asked participants to complete a Stroop task that requires great self-control to override predominant responses right after a working memory task, a demanding task that is similar to the depleting tasks used for examining ego depletion (c.f., Schmeichel, 2007). Results showed that action-oriented participants displayed less Stroop interference than did state-oriented participants, thus providing primal support for our prediction. In the current experiment, we adopt the typical paradigm testing ego depletion and employ frequently used self-control tasks to examine the moderating role of action versus state orientation in the ego depletion effect.

METHOD

Participants and procedures

Sixty students (29 women; mean age = 22.35 years, *SD* = 2.09) from a Chinese university took part in the experiment in return for 15 RMB (approximately $2.42) in compensation. Before each testing day, the experimenter used the software Excel to randomly assign appointed participants to the control and the depletion conditions. Participants completed the experiment individually.

Upon arrival, participants were first asked to fulfill the Demand-Related Action Orientation subscale (AOD) of the Action Control Scale (Jostmann & Koole, 2007; Kuhl, 1994b). The validity and reliability of the AOD scale have been well established by over 60 published studies (Koole *et al*., 2012). These studies have shown that the effects of action versus state orientation were independent from at least 24 individual difference variables such as the Big Five personality dimensions and achievement motivation. In the present study, the AOD scale, which consists of 12 items, was translated into Chinese and back translated into English. Each item describes a demanding situation and an action-oriented versus a state-oriented coping way. Participants were asked to indicate the way that best describes their own reaction to that situation. Action-oriented responses were coded as 1 whereas state-oriented responses as 0. Scores summed for the entire scale could range from 0–12. Participants who gave seven or more action-oriented responses were considered as action-oriented (n = 29). Those who gave six or fewer action-oriented responses were considered as state-oriented (n = 31). This split is a common method used in previous literature (e.g., Jostmann & Koole, 2007; Koole & Jostmann, 2004).

Participants assigned to the depletion condition were then directed to complete an incongruent Stroop task in which the ink color of the word was incompatible with the meaning of the word (e.g., red in blue). That task has been often used to deplete self-control resource (e.g., Govorun & Payne, 2006; Webb & Sheeran, 2003). The control condition completed the congruent Stroop task that is not depleting because the ink color and the meaning of the word were compatible (e.g., red in red). During the Stroop task, the stimuli were displayed in red or blue on a computer screen. Half of the stimuli were color words and the other half were meaningless strings (i.e., XXXX in red or blue). On each trial, participants had to read the color of the stimulus aloud and then press the space bar to proceed toward the next trial. Participants' response times were recorded by the computer and their verbal responses were recorded by an experimenter sitting out of sight. This task consisted of 12 practice trials and 48 experimental trials, lasting for approximately 3 minutes.

Immediately following the Stroop task, all participants were required to fill in a short questionnaire for manipulation check and the measurement of two control variables (i.e., self-efficacy and mood, see below). After that, all participants completed an ostensibly unrelated attentional concentration task that requires effortful self-control and has been used to measure the ego depletion effect (e.g., Dang, Dewitte, Mao, Xiao & Shi, 2013; Muraven, Gagne & Rosman, 2008). During this task, six numbers (1–6) were presented on the center of the computer screen for 500ms one at a time. Participants were instructed to hit the space bar if they saw the number "4" following the number "6." The task lasted for 5 minutes. The number of errors made on this task served as the dependent variable. Finally, participants filled in several items measuring their motivation to perform this task (the third control variable, see below).

Manipulation check

As in previous literature, participants completed a brief manipulation check measure right after the Stroop task. They rated the difficulty of this task and the frustration related to this task on a seven-point scale. These two items were highly correlated ($r = 0.53$, $p < 0.001$) and were combined into a unitary index.

Control variables

Three variables were measured to rule out alternative explanations. First, we measured participants' sense of self-efficacy regarding performing the Stroop task with a single item right after they completed the manipulation check items (i.e., "How much confidence do you have that you can perform the color-naming task well?"). Second, we asked participants to complete the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) after the self-efficacy item to test whether our results were mediated by mood. The BMIS is a well-validated reliable measure of pleasant mood ($\alpha = 0.87$) and unpleasant mood ($\alpha = 0.85$). Third, after the attentional concentration task, we also had participants evaluate their motivation to perform the concentration task on three items (e.g., "How motivated were you to perform well on the concentration task?"; $\alpha = 0.91$).

RESULTS

Manipulation check

A 2 (depletion vs. control) × 2 (action orientation vs. state orientation) ANOVA with manipulation check as the dependent variable revealed only a significant main effect of the depletion manipulation, $F(1, 56) = 4.46$, $p < 0.05$, $\eta^2 = 0.07$. Participants in the depletion condition ($M = 2.81$) experienced more depletion than did participants in the control condition ($M = 2.06$). Both the main effect of action vs. state orientation and the interaction were insignificant, Fs < 1.

Dependent measure

The number of errors made on the concentration task, calculated by summing the times that participants failed to hit the space bar in the case they saw "4" after "6" and the times they did hit the space bar when there was no such event, served as the dependent measure. A 2 (depletion vs. control) × 2 (action orientation vs. state orientation) ANOVA revealed significant main effects of both the depletion manipulation, $F(1, 56) = 10.68$, $p < 0.01$, partial $\eta^2 = 0.16$, and action vs. state orientation, $F(1, 56) = 9.68$, $p < 0.01$, partial $\eta^2 = 0.15$. Most importantly, as depicted in Fig. 1, the predicted two-way interaction was also significant,[1] $F(1, 56) = 20.70$, $p < 0.01$, partial $\eta^2 = 0.27$. Simple effects analysis showed that state-oriented individuals exhibited the ego depletion effect, $F(1, 56) = 34.13$, $p < 0.01$, partial $\eta^2 = 0.38$.

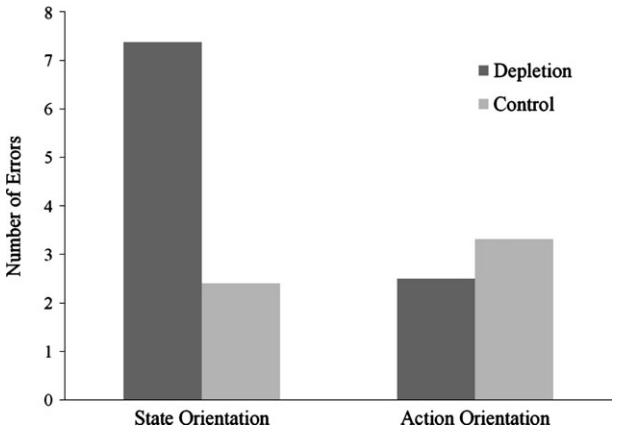

Fig. 1. Interactive effect of the depletion manipulation and action vs. state orientation on the number of errors made on the concentration task. High scores indicate more errors.

They made more errors on the concentration task in the depletion condition (M = 7.38, SD = 3.59) than did they in the control condition (M = 2.40, SD = 1.92). However, action-oriented people overcame the ego depletion effect, $F < 1$, since they performed equally well in both the control condition (M = 3.32, SD = 1.77) and the depletion condition (M = 2.50, SD = 1.51). To describe the interaction differently, action-oriented participants made less errors than did state-oriented participants in the depletion condition, $F(1, 56) = 32.41$, $p < 0.01$, partial η^2 = 0.37. However, they did not differ with each other in the control condition, $F < 1$.

Control variables

The 2 (depletion vs. control) × 2 (action orientation vs. state orientation) ANOVA with self-efficacy, pleasant mood, unpleasant mood, and motivation as the dependent variables only found a marginally significant main effect of action vs. state orientation on pleasant mood, $F = 3.28$, $p < 0.10$. All other effects were insignificant, Fs < 1.5. Further, A 2 (depletion vs. control) × 2 (action orientation vs. state orientation) ANCOVA of the number of errors made on the concentration task with self-efficacy, pleasant mood, unpleasant mood, and motivation as covariates revealed that the predicted two-way interaction remained significant after controlling these variables, $F(1, 43) = 20.70$, $p < 0.01$, partial $\eta^2 = 0.33$, suggesting our results were not mediated by self-efficacy, mood, and motivation.

Additional analysis

In our depletion condition, all participants initially performed the demanding incongruent Stroop task that was used to deplete self-control resource. We examined whether action-oriented and state-oriented participants differed in their performance on the incongruent Stroop task, and whether such differences were related to our main findings. In order to do this, first we computed the Stroop interference effect by subtracting the response times to the neutral stimuli from the response times to the color words.[2] An independent sample t test showed that action-oriented participants (M = 22 ms) displayed smaller Stroop interference than did state-oriented participants (M = 81 ms), $t(24) = 2.54$, $p < 0.05$. Next, we tested whether the performance difference on the concentration task between action-oriented and state-oriented participants were mediated by the Stroop interference effect. Participants' scores on the AOD subscale (continuous variable) predicted both the number of errors made on the concentration task, $\beta = -0.47$, $t(24) = -2.61$, $p < 0.05$, and the interference effect during the incongruent Stroop task, $\beta = -0.41$, $t(24) = -2.20$, $p < 0.05$. When scores on the AOD subscale and the Stroop interference were both added to predict the number of errors made on the concentration task, the Stroop interference remained significant, $\beta = 0.49$, $t(23) = 2.80$, $p < 0.05$, but AOD subscale scores were no longer significant, $\beta = -0.27$, $t(23) = -1.55$, $p > 0.10$. A bootstrap analysis showed that the 95% confidence interval for the size of the indirect effect excluded zero (–0.9099, –0.0149), thus suggesting a significant indirect effect.

DISCUSSION

Previous research suggests that action versus state orientation serves as an important moderator responding to demanding situations such as depletion of self-control resource. The current research provided direct evidence showing that the typical ego depletion effect was only limited to a subsample with state orientation. For action-oriented individuals, however, ego depletion was successfully overcome. Our findings were not influenced by participants' mood, self-efficacy regarding performing the initial task, as well as motivation to perform well on the final task.

So far, several factors have been identified as effective ways eliminating the ego depletion effect, such as meditation (Friese, Messner & Schaffner, 2012), self-awareness (Alberts, Martijn & de Vries, 2011), and self-affirmation (Schmeichel & Vohs, 2009). Most of these works focused on situational variables and little attention has been paid to individual differences variables. The current research examined the interaction between an individual differences variable (i.e., action versus state orientation) and a situational variable (i.e., the depletion manipulation). By doing this, we also connected two important subfields of self-regulation, action control against demands and the ego depletion effect. To the extent that action versus state orientation mainly arises from people's socialization experiences rather than heredity (Kuhl, 2000), our findings suggest that the willpower is not so fragile in nature as the strength model posits. State-oriented individuals exhibit ego depletion because their coping manner is not compatible with high demands. In low-demanding contexts, however, state-oriented individuals can perform as well as or even better than action-oriented individuals (Koole, Kuhl, Jostmann & Vohs, 2005). Certainly, our results need to be replicated in other samples with different cultural backgrounds, since the self-reported measure of action vs. state orientation may be susceptible to social desirability such that participants respond in accordance with social norms within a given cultural group.

An interesting question would be how specifically action orientation overcomes ego depletion. There are several possibilities. First, since previous studies have demonstrated that ego depletion could be offset by motivations that arise from either external incentives or internal preferences (e.g., Muraven & Slessareva,

2003), the beneficial effect of action orientation against ego depletion may be attributed to its link with self-motivation, such that action-oriented individuals are better than state-oriented individuals at motivating themselves to deal with high demands (Kuhl, 2000). However, our results did not find differences between action-oriented and state-oriented participants on their self-reported motivation. The second possibility may be that individuals with action orientation are better able to maintain and restore positive affective state (Baumann *et al*., 2005; Jostmann *et al*., 2005), as positive affect has been found to counteract ego depletion (e.g., Tice, Baumeister, Shmueli & Muraven, 2007). Indeed, action-oriented participants in our experiment also reported higher positive mood after finishing the first task. However, the main results were uninfluenced after controlling this variable.

Our additional analysis suggests a third mechanism that is most likely for explaining the main results. We found that action-oriented participants performed better on the depleting task, as indicated by smaller Stroop interference effect, which in turn mediated the relationship between action versus state orientation and the performance on the concentration task. This fits well with a cognitive control perspective of ego depletion. According to the cognitive control theory, ego depletion can be seen as a phenomenon similar to the "switch costs" (Kiesel, Steinhauser, Wendt *et al*., 2010), as the control processes being recruited to adapt to the first self-control task linger and hinder adaptation to the subsequent task which relies on different control processes (Botvinick, Braver, Barch, Carter & Cohen, 2001; Dewitte, Bruyneel & Geyskens, 2009). Based on this theory, it has been demonstrated that ego depletion disappeared when people had enough time to adapt to the depleting task (Dang *et al*., 2013). In the current experiment, the smaller Stroop interference effect exhibited by participants with action orientation suggests that they can adapt faster than state-oriented participants to the depleting task. It seems that action-oriented individuals have not fully adapted to the Stroop task since they still displayed marginally significant Stroop interference effect, $t = 2.13$, $p = 0.06$. However, the ego depletion effect has already been overcome by them. This is consistent with Dang *et al*.'s (2013) proposition that partial adaptation to the depleting task may suffice to free control processes for unhindered recruitment in the following task. The mediation analysis in this paper suggests a more nuanced mechanism, such that the more individuals adapt to the depleting task, the less likely the control processes recruited in this task will hinder the control processes required during the subsequent concentration task. As a result, the control processes being recruited in the concentration task will be freed earlier for action-oriented individuals, and thus fewer errors will be made by them. Certainly, we are not suggesting that this is the only way through which action oriented individuals successfully overcome ego depletion. The self-motivation mechanism and the positive-affect maintaining mechanism may function in situations employing other self-control tasks. Other mechanisms could also be relevant. For example, recent research found that individuals who believe self-control resources were unlimited did not display ego depletion (Job & Walton, 2010). This implies such belief may be chronically salient for action-oriented individuals, thus stimulating them to mobilize their resources for continuous exertion. Future studies are needed to specify.

This work was supported by National Basic Research Program of China (973 Program 2015CB351800) and National Natural Science Foundation of China (Project 31070897).

NOTES

[1] We also examined the data using participants' responses on the AOD subscale as a continuous variable in a hierarchical regression analysis. Scores on the AOD subscale and the depletion manipulation (control condition = 0, depletion condition = 1) were entered in the first step, and their interaction term was entered in the second step. As predicted, the interaction turned out to be significant, $\beta = -0.37$, $t(56) = -2.93$, $p < 0.01$.

[2] We also computed the Stroop interference effect in errors by subtracting the number of errors on neutral trials from the errors on incompatible trials. There was no significant difference between action-oriented participants and state-oriented participants, $t < 1$.

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Received 13 May 2014, accepted 10 October 2014