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Eating on impulse: Implicit attitudes, self-regulatory resources, and trait self-control as determinants of food consumption

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ABSTRACT

Self-regulatory resources and trait self-control have been found to moderate the impulse–behavior relationship. The current study investigated whether the interaction of self-regulatory resources and trait self-control moderates the association between implicit attitudes and food consumption. One hundred twenty female participants were randomly assigned to either a depletion condition in which their self-regulatory resources were reduced or a no-depletion condition. Participants' implicit attitudes for chocolate were measured with the Single Category Implicit Association Test and self-report measures of trait self-control were collected. The dependent variable was chocolate consumption in an ostensible taste and rate task. Implicit attitudes predicted chocolate consumption in depleted participants but not in non-depleted participants. However, this predictive power of implicit attitudes on eating in depleted condition disappeared in participants with high trait self-control. Thus, trait self-control and self-regulatory resources interact to moderate the prediction of implicit attitude on eating behavior. Results suggest that high trait self-control buffers the effect of self-regulatory depletion on impulsive eating.

1. Introduction

Overconsumption of calorie-rich foods may lead to overweight and obesity (Rosenheck, 2008). The worldwide prevalence of obesity almost doubled over the last three decades, with 35% of adults aged 20 and over overweight and 11% obese (World Health Organization, 2013). In modern societies, the high availability of calorie-rich foods causes some people to eat them impulsively, contrary to their intentions to manage weight (Novak & Brownell, 2011). However, not every person likes each high-calorie food to the same extent (Hofmann, Friese, & Wiers, 2011). Impulse can be operationalized as a specific desire to perform a particular action (such as eating candies), and it occurs automatically and without effort (Friese & Hofmann, 2009). Food consumption quantity is largely determined by which food a person is confronting and how much he or she likes it (Haynes, Kemps, Moffitt & Mohr, 2015). Positive attitudes toward specific food are likely to increase its intake, and negative attitudes toward it are likely to decrease its intake (Lebens et al., 2011).

Researchers are increasingly using implicit measures to index automatic attitudes or impulses, for implicit measures predict variation in behavior that is not accounted for by explicit measures (Nosek, Hawkins, & Frazier, 2011; Sheeran, Gollwitzer, & Bargh, 2013). However, the extent of implicit measures to predict behavior varied a lot across studies (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). For example, some studies found that implicit attitudes as measured by implicit association test (IAT, Greenwald, McGhee, & Schwartz, 1998) predicted choice between snacks and fruits (Richetin, Perugini, Prestwich, & O'Gorman, 2007; Perugini, 2005), whereas another study found that IAT did not predict choice between a candy bar and an apple (Karpinski & Hilton, 2001). Therefore, how well implicit measures predict eating behavior may depend critically on several moderating variables (Friese, Hofmann & Schmitt, 2008). Previous studies have identified situational moderators (such as cognitive load, self-regulatory resources, and alcohol) and dispositional moderators (such as working memory capacity and trait self-control) that increase the predictive validity of implicit measures of eating behavior (Hofmann, Friese, & Wiers, 2008). The present study focuses on situational difference in self-regulatory resources and dispositional difference in trait self-control.

Self-regulation refers to the efforts by persons to alter their thoughts, feelings, desires, and actions to achieve a desired goal or outcome (de Ridder & de Wit, 2006). Self-control can be viewed as the conscious and deliberate form of self-regulation, and it is a large subset of self-regulation (Baumeister & Alquist, 2009). These two terms are often used interchangeably in the literature (Baumeister, Vohs, & Tice, 2007). According to the limited resource model of self-regulation (Baumeister & Heatherton, 1996), self-regulation relies on common domain-general resources which restrict self-regulatory capacity. The exertion of self-control depletes these resources and leads to reduced capacity for further self-control, an effect called ego depletion (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Controlling impulses, such as the impulse to eat palatable but unhealthy foods, constitutes an important domain of self-control (Baumeister et al., 2007). Studies of

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ego depletion demonstrated that depleted individuals ate more unhealthy food than those who were not depleted (Vohs & Heatherton, 2000), and reduced self-regulatory resources were associated with an unfavorable dietary pattern (Sproesser, Strohbach, Schupp, & Renner, 2011).

Researchers have adopted the dual-system accounts, such as the reflective–impulsive model (RIM; Strack & Deutsch, 2004), to the study of ego depletion and related outcomes (Masicampo & Baumeister, 2008; Hofmann, Friese, & Strack, 2009). As proposed by RIM, behaviors are determined by the interaction between the impulsive system and the reflective system. Resource depletion was assumed to decrease the propensity of the reflective system to override the influence of the impulsive system on behavior (Hagger, Wood, Stiff, & Chatzisarantis, 2010). To directly prove that self-regulatory resources moderate the influence of impulsive precursors on eating, measures of impulsive precursors should be included (Hofmann et al., 2008). A study measured automatic candy attitudes with a Single Category IAT (SC-IAT), and results showed that the SC-IAT predicted candy consumption in a taste-and-rate task for participants whose self-regulatory resources were depleted but not for participants whose resources were intact (Hofmann, Rauch, & Gawronski, 2007). Similarly, a SC-IAT predicted potato consumption for the depleted participants but not for the non-depleted participants (Friese, Hofmann & Wänke, 2008).

Not only state differences in self-regulatory resources moderated the effect of implicit attitudes for food on intake, also stable individual differences did. Trait self-control was defined as the ability to override one's inner impulses and refrains from acting on them (Tangney, Baumeister, & Boone, 2004). A meta-analysis study explored the relationship between dispositional self-control and behavior, and found a positive effect of trait self-control on behavior across a broad variety of domains including eating and weight-related behavior (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012). It has been argued that behavior of individuals low in trait self-control is more strongly influenced by impulses, compare with individuals high in trait self-control (Friese & Hofmann, 2009).

A series of studies supported the assumption that impulses predict eating behavior for participants low in trait self-control, but not for those high in trait self-control. In one study, a variant of the IAT was used to measure automatic affective reactions to potato chips, and result showed that IAT scores predict potato chips consumption for participants low but not high in trait self-control. In another study, automatic affective reactions assessed by affect misattribution procedure (AMP, Payne, Cheng, Govorun, & Stewart, 2005) predicted alcohol consumption more strongly for participants low than high in trait self-control (Friese & Hofmann, 2009). A large-scale survey study showed that dispositional self-control helps restrained eaters become successful in controlling their weight (Keller & Siegrist, 2014). Another study revealed that, those lower in trait self-control are more likely to increase their planned food consumption in response to variety, whereas those with high trait self-control successfully manage their food consumption (Haws & Redden, 2013). An intervention study found that trait self-control moderates the effect of changed implicit food evaluations on food intake, such that only participants low in trait self-control consumed less unhealthy snack food after the food negative training (Haynes, Kemps & Moffitt, 2015).

Trait self-control may reflect the extent of an individual's self-control reserves, and individuals high in trait self-control may have a large pool of resources available for allocation to self-control efforts (Muraven, Collins, Shiffman, & Paty, 2005). Consequently, trait self-control may moderate the effect of self-regulatory resources depletion on subsequent behavior. Evidence suggested that participants high in trait self-control are less vulnerable to the depletion of self-regulatory resources, as reflected in subsequent aggression (DeWall, Baumeister, Stillman, & Gailliot, 2007), sexual behavior (Gailliot & Baumeister, 2007), alcohol intake (Muraven et al., 2005), task persistence (Dvorak & Simons, 2009), and etc. However, to our knowledge, only two studies explored the interplay of self-regulatory resources and trait self-control in food consumption domain, and the results were inconsistent. One study found that high body mass index (BMI) participants consumed more cookies under depletion condition compared to normal BMI participants regardless of depletion condition and high BMI participants under no-depletion condition (Hagger et al., 2013). Nevertheless, this study failed to find that trait self-control moderated the effect of BMI and self-regulatory resources depletion on eating. Another study explored the interplay of trait self-control and ego depletion in candy consumption domain, and revealed that only participants high in trait self-control consumed more candy following an ego-depletion manipulation (Imhoff, Schmidt, & Gerstenberg, 2014, Study 1). This result suggested 'an ironic effect of greater situational depletion for participants who describe themselves as high in trait self-control' (Imhoff et al., 2014, p. 413).

In summary, it remains unclear how trait self-control and self-regulatory resources interact to influence food consumption. The existent two studies assumed that each participant had a latent impulse to eat high-calorie food, which did not take into account individual differences in the tendency to eat specific food. In the present study, we investigated whether self-regulatory resources and trait self-control interact to moderate the impact of implicit attitudes on eating. We hypothesized that, implicit attitude measure predicted food consumption for those whose self-regulatory resources were depleted, but not for those not depleted. Furthermore, we predicted that trait self-control moderated the effects of self-regulatory resources depletion on impulsive eating, such that the effect of implicit attitudes on actual consumption under depletion condition only existed in individuals with low trait self-control.

2. Methods

2.1. Participants

Participants were one hundred twenty female undergraduate students who took part for course credit or monetary compensation (approximately US$4). The mean age was 20.9 years ($SD = 2.3$ years). The mean BMI was 20.6 ($SD = 2.2$). Participants were randomly assigned to one of two conditions in which their self-regulatory resources were manipulated: no-depletion ($n = 60$) and depletion ($n = 60$).

2.2. Procedures

All participants took part in the study individually between 10:30 and 11:30 am, or between 3:30 and 5:30 pm. Each participant was greeted by a female experimenter and was seated at a separate room equipped with a computer. They were told that the study included a perception task, a product taste test, and some questionnaires. First, they completed the perception task, which measured their implicit attitudes for chocolate. Next, they performed a task that required them to cross out letters on two pages of text, which manipulated their self-regulatory resources. Then in the product taste test phase, they tasted and rated several plates of Kisses chocolates. Finally, participants completed the trait self-control scale, indicated the time since they last consumed food, and answered personal information questions. Participants were debriefed via email after data collection had been completed. This study was approved by the university's ethics committee.

2.3. Manipulation of self-regulatory resources

To deplete self-regulatory resources, we used an established "e-crossing" task (Baumeister et al., 1998). On the first page of a text, all participants were instructed to cross out all the letters "e". For the second page of the text, participants were given different instructions depending on the condition to which they had been assigned.