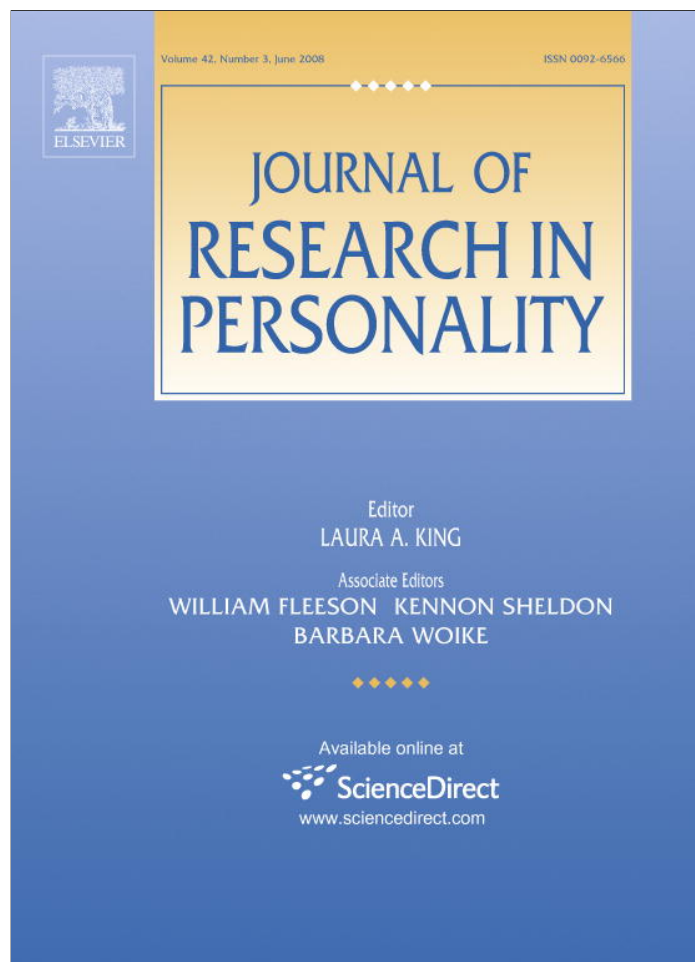


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## Brief Report

Autonomous self-control is less depleting <sup>☆</sup>

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**Abstract**

Autonomously motivated self-control may be less depleting than extrinsically motivated self-control. Participants were asked to not eat cookies and their motivation orientation for resisting that temptation was assessed. Their self-control performance was assessed immediately before and after fighting the temptation. As compared to their baseline performance, participants who avoided eating the cookies for more autonomous reasons performed better at the second measure relative to participants who did not eat for more extrinsic reasons. Mood, arousal, and demographic factors were not related to self-control performance and feelings of autonomy. Overall, it appears that feeling compelled to exert self-control may deplete more strength than having more freedom when exerting self-control. The results may increase our understanding of how self-control strength and feelings of autonomy interact.

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*Keywords:* Self-control; Depletion; Self-determination theory

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**1. Introduction**

Does why someone diets matter? Regardless of whether one is dieting to look good to other people, improve one's health, or to prove that one can lose weight, the person must fight against the temptation of eating a cookie. Yet research has found that people who diet for more personal reasons tend to be more successful at losing weight than people who diet for more external reasons (Williams, Grow, Freedman, Ryan, & Deci, 1996). Research has found similar effects of autonomous motivation on alcohol abstinence

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(Ryan, Plant, & O'Malley, 1995) and smoking cessation (Curry, Wagner, & Grothaus, 1990; Williams, Gagné, Ryan, & Deci, 2002).

Research on Self-Determination Theory (SDT) has found that individuals fall upon a continuum of motivation (Deci & Ryan, 2000). At one end, intrinsically motivated individuals engage in an act out of personal interest or volition. They may, for example, study for a class for autonomous reasons, as they find the class interesting and studying personally enjoyable. At the other end of the continuum, extrinsically motivated individuals act for controlled or non-autonomous reasons, as they may study for the class because they might get a new car if they get an A in the class.

The point of the present research is to examine the effects of autonomous motivation on self-control. Although it is rare that self-control is totally intrinsically motivated, it is likely that individuals may have very different reasons for regulating themselves. For example, in the Williams et al. (1996) research, some dieters reported that their pursuit of a weight loss goal was driven by more external pressure than others. In this research, the greater the perceived external pressure, the less likely the person was to adhere to his or her weight loss goal.

The self-control strength model might help explain why feeling forced to exert self-control may lead to poorer outcomes. In particular, this model suggests that any and all exertions of self-control (and only self-control) deplete a limited resource, known as self-control strength (Muraven & Baumeister, 2000). Because this strength is required for the success of self-control, individuals whose strength is depleted should be at greater risk for a loss of control, as compared to individuals whose strength is less depleted. For example, individuals who were asked not to eat chocolate chip cookies were subsequently less able to regulate their emotions and failed to persist as long on a frustrating task as compared to individuals who were asked not to eat radishes (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Subsequent research has found that this difference in persistence was not due to differences in mood, arousal, frustration or many alternatives; to date the only predictor of persistence in these experiments is the amount of self-control exerted on in the initial task (Muraven, Tice, & Baumeister, 1998).

I suggest, however, that the same self-control task may be more or less depleting, based on the individuals' feelings of autonomy. When a person resists eating sweets because dieting is valuable to him or her, it may require less self-control strength than when a person avoids eating a cookie because he or she was ordered to do so. Autonomous self-control may involve less feelings of internal conflict and may be more energizing (Nix, Ryan, Manly, & Deci, 1999) than compelled self-control. This reduced conflict and increased feelings of energy may increase individuals' level of self-control strength and hence lead to better self-control performance subsequently.

The present study was designed with that idea in mind. This study examined participants' feelings of autonomy while exerting self-control using a correlational approach. This design closely represents what happens when an individual decides to exert self-control, such as when beginning a diet and captures the full range of motivation toward that particular task. Thus, this study was designed to provide insight into the relationship between self-control strength and feelings of autonomy.

More precisely, participants were asked to resist eating cookies. Resisting a temptation like cookies requires a great deal of self-control, as the person has to override the natural desire to eat a tempting substance. Thus, resisting a temptation should deplete self-control strength. Previous research has indeed found that resisting cookies requires self-control

and is depleting (Baumeister et al., 1998). Individuals may differ in their reasons for not eating the cookies, however. Some may not eat the cookies because they fear they will get in trouble if they do (controlled motivation), whereas others may not eat the cookies because it is important to them (autonomous motivation). This design should capture a wider range of autonomy in a more naturalistic way than previous experimental studies (Moller, Deci, & Ryan, 2006; Muraven, Gagné, & Rosman, submitted for publication; Muraven, Rosman, & Gagné, in press). After resisting the temptation of the cookie, participants engaged in a final self-control task. We expected that there should be a relationship between participants' feelings of autonomy and final self-control performance: Participants who felt more compelled by external reasons not to eat the cookies should be more depleted and perform more poorly on the final measure of self-control performance than participants who ate the cookies for more internal reasons.

## 2. Method

### 2.1. Participants

Eighty-two (57 men and 25 women) University at Albany undergraduates participated in return for partial fulfillment of a course requirement. Three participants ate at least one cookie and therefore their data was rendered invalid; thus, the data for 79 participants (55 men and 24 women) were analyzed. Participants were run in individual sessions of approximately 30 min.

### 2.2. Procedure

Participants were told that the purpose of the study was to investigate the effect of sugar on strength. Thus, participants were not aware of the true purpose of the study, nor did they have any reason to suspect that their reasons for resisting eating the cookies might influence their self-control performance. The experimenter was blind to participants' feelings of autonomy.

After obtaining consent from the participant, a baseline measure of handgrip performance was taken. Following the procedures described in previous research (e.g., Muraven, Baumeister, & Tice, 1999; Muraven et al., 1998), participants squeezed the handles of a commercially available handgrip using their dominant hand for as long as possible. In order to keep the handles together against the resistance of a spring, the individual must fight the natural urge to release his or her grip. Individuals with a greater self-control capacity should be better able to override the desire to let go, and therefore how long participants hold the handgrip should assess their self-control capacity (after controlling for physical endurance and strength). Indeed, research has found that performance on the handgrip is related to previous self-control exertions, so that individuals who are depleted release the handgrip sooner than individuals who have greater self-control strength (e.g., Muraven et al., 1999, 1998).

After the initial assessment of handgrip performance, the experimenter placed three plates of cookies (Fig Newtons, Cameos, and Sugar Wafers) in front of participants. The experimenter then told participants "I need to get your questionnaire now. I will be back shortly. You have a choice whether you eat the cookies or not. We need people in the cookie and no cookie condition, but we especially need people in the no cookie con-

Table 1  
Means, Standard Deviations, internal consistency, and correlations of the Self-Regulation Questionnaire

	<i>M</i>	<i>SD</i>	1	2	3	4
1. Extrinsic	14.56	11.88	(.79)			
2. Introjected	23.68	8.76	.25	(.81)		
3. Identified	20.80	11.24	.07	.28	(.79)	
4. Intrinsic	15.88	9.20	−.09	.12	.27	(.68)

Note.  $N = 79$ . Scores on diagonal reflect internal consistency (coefficient alpha).

dition. The choice is entirely yours, but we would really appreciate it if you would not eat the cookies.”

The experimenter re-entered the room 5 min later and asked the participant which condition he or she chose (the experimenter verified the participant's report by counting the number of cookies remaining). All but three participants chose to not eat the cookies. The participant then completed the Self-Regulation Questionnaire (SRQ; Ryan & Connell, 1989), modified for use in this experiment. The SRQ is a well-established measure of individuals' type of motivation that has been used in a variety of settings. The measure consists of four subscales consisting of four questions each that asked participants why they did not eat the cookie: external (e.g., “I did not eat the cookies because I want the experimenter to like me”), introjected (e.g., “I did not eat the cookies because I would feel guilty if I did”), identified (e.g., “I did not eat the cookies because it is important to me not to eat them”), and intrinsic (e.g., “I did not eat the cookies because it is fun to challenge myself not to eat them”). These questions were answered on a 1 (not to all true) to 9 (very true) scale. Internal consistency and correlations among the scales is reported on Table 1.

Consistent with previous research (see, e.g., Grolnick & Ryan, 1989), the simplex structure of the data indicates that these subscales can be weighted and combined using the following formula to create the Relative Autonomy Index (RAI), which is a single measure of relative autonomous motivation:  $2 \times (\text{intrinsic}) + (\text{identified}) - (\text{introjected}) - 2 \times (\text{external})$ . Therefore, participants' response on the SRQ provides a valid measure of their type of motivation for not eating the cookies. Participants then squeezed the handgrip again, using the same hand as the first assessment. Participants then completed a short questionnaire to assess the perception of the experiment, such as the degree of their motivation to not eat the cookies (e.g., “how much did you not want to eat the cookies?”), how unpleasant it was to resist eating the cookies (e.g., “how unpleasant was it to not eat the cookies?”), and the amount of effort exerted to resist the urge to eat the cookies (“how much effort did you exert to not eat the cookies?”). These questions were answered on a 7-point Likert-type scale with anchors of 1 = *not at all* and 7 = *very much*. Finally, participants were debriefed about their experience and dismissed.

### 3. Results

Participants' RAI was normally distributed, with a mean of  $-0.54$  and a standard deviation of  $7.43$ . This indicates that participants differed in their motivation for not eating the cookies, with some participants exerting self-control for more controlled reasons whereas others exerted self-control for more autonomous reasons. Participants' RAI was unrelated to their age, gender, or other demographic factors, nor was it related to their self-reported

degree of motivation to not eat the cookies,  $r(79) = .10$ , *ns*, unpleasantness of not eating the cookies,  $r(79) = .02$ , *ns*, or effort exerted to overcome the urge to eat the cookies,  $r(79) = .02$ , *ns*. The reasons for not eating the cookies were separate from the degree of their motivation not to eat them. Similarly, feelings of autonomy were not related to physical discomfort,  $r(79) = .03$ , *ns*, anxiety,  $r(79) = .06$ , *ns*, or thoughts about the cookies,  $r(79) = -.07$ , *ns*. Overall, these results suggest that participants' motivation for not eating was likely determined by their own internal beliefs or approach to the act of resisting the temptation of eating the cookies.

Participants held the handgrip on average 74.0 s ( $SD = 49.7$ ) at Time 1 and 61.7 s ( $SD = 35.4$ ) at Time 2. Neither Time 1,  $r(79) = -.085$ , *ns* nor Time 2,  $r(79) = .086$ , *ns*, correlated with RAI. However, as would be expected, Time 1 and Time 2 performance were highly correlated,  $r(79) = .81$ ,  $p < .001$ , probably because of individual differences in physical strength. Hence, consistent with prior research (Muraven et al., 1998), Time 2 performance was analyzed after controlling for performance at Time 1. As shown in Table 2, individuals who resisted the cookies for more autonomous reasons held the handgrip longer than individuals who resisted the cookies for controlled reasons, as compared to their baseline. Moreover, an examination of the separate components of the RAI suggest that the more participants were extrinsically motivated, the sooner they released the handgrip (relative to their baseline) and the more identified and intrinsically motivated, the longer they held the handgrip.

Additional analyses indicated that effort exerted to not eat the cookies interacted with feelings of autonomy,  $B = .117$ ,  $SE = .07$ ,  $t(76) = 1.68$ ,  $p < .09$ . That is, there was a relationship between self-reported effort and handgrip performance at Time 2 (controlling for Time 1 performance) among participants low ( $-1 SD$ ) in relative autonomy,  $B = .127$ ,  $SE = .52$ ,  $t(37) = 1.97$ ,  $p < .05$ . This replicates previous research on depletion. However, that relationship disappeared for participants high ( $+1 SD$ ) in relative autonomy,  $B = .194$ ,  $SE = .584$ ,  $t(36) = .336$ , *ns*. More simply, exerting self-control for autonomous reasons is less depleting than exerting self-control for controlled reasons.

Like the RAI scores, participants' change in handgrip performance was unrelated to participants' self-reported unpleasantness of not eating the cookies,  $B = .55$ ,  $SE = 1.24$ ,  $t(76) = .44$ , *ns*, and overall enjoyment of the experiment,  $B = .18$ ,  $SE = 1.45$ ,  $t(76) = .13$ , *ns*. In the current experiment, the best predictor of change in handgrip performance was participants' feeling of autonomy. Moreover, the effects of autonomy were independent of other variables, such as effort, degree of motivation, or liking of the experiment.

#### 4. Discussion

Participants who resisted the temptation of eating cookies for more controlled reasons performed more poorly on a subsequent test of self-control than participants who resisted the temptation of eating cookies for more autonomous reasons. Participants' feelings of autonomy were related to the amount of self-control strength depleted.

Using a correlational design has both strengths and weaknesses. Because participants determined their own reasons for not eating the cookies, rather than being assigned to a condition, certain experimental controls associated with randomization are lost. Careful assessment of key variables suggested the instructions only affected feelings of autonomy and that only feelings of autonomy was related to self-control performance, although it

Table 2  
Multiple regressions analysis of Self-Regulation Questionnaire on handgrip performance (Time 2)

	RAI			Extrinsic			Introjected			Identified			Intrinsic		
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>B</i>	<i>SE</i>	<i>t</i>
<i>Step 1</i>															
Time 1	.579	.047	12.24***	.579	.047	12.24***	.579	.047	12.24***	.579	.047	12.24***	.579	.047	12.24***
<i>Step 2</i>															
Time 1	.589	.046	12.77***	.585	.048	12.20***	.578	.049	11.85***	.576	.048	12.07***	.591	.047	12.49***
Variable	.742	.308	2.407**	−1.72	.792	2.17*	−1.84	1.11	1.66†	1.69	.84	2.00*	1.91	1.02	1.87†

Note. *N* = 79. RAI, Relative Autonomy Index.

- † *p* < .10.
- \* *p* < .05.
- \*\* *p* < .025.
- \*\*\* *p* < .01.

may be possible that some third variable may produce both changes in self-control performance and feeling controlled. However, because no individual difference variables, like age or gender, or experimental variables, such as degree of motivation or effort exerted were related to either autonomy or depletion, it is unlikely that any hidden variable is directly affected both feelings of autonomy and the decline in self-control performance.

Similarly, only the difference in handgrip times was related to feelings of autonomy; overall time at each testing was not. Finally, the interaction between effort exerted and feelings of autonomy suggest that the decline in handgrip performance is being driven by externally compelled efforts to resist eating the cookies. When the person feels forced (low in autonomy) to not eat the cookies but the cookies are not a strong temptation, the decline in self-control performance is small. That indicates that a lack of autonomous motivation on its own cannot account for the effects.

Experimental research that directly manipulates feelings of autonomy has found similar effects: exerting self-control for personal reasons is less depleting (Muraven et al., submitted for publication; Muraven et al., in press). Similarly, experimental research by Moller et al. (2006) found that making choices that feel autonomous leads to less depletion and better self-control performance than making choices when one feels forced. The present study complements and extends those results by using natural variation in feelings of autonomy. Based on this research, we believe that autonomously motivated self-control is less depleting because it is more energizing and vitalizing than self-control that feels forced upon the person (see, e.g., Nix et al., 1999; Tice, Baumeister, Shmueli, & Muraven, 2007) and because it may involve less internal conflict.

These findings are particularly noteworthy, as previous research on self-control strength has suggested that all self-control is alike. The results of this study indicate that the model needs a significant revision, as autonomous self-control appears to deplete far less self-control strength than compelled self-control. In addition, the results suggest that avoidant behaviors, such as not eating cookies, can be pursued autonomously (Deci & Ryan, 2000). Within such an avoidance-orientated situation, feelings of autonomy versus feeling controlled leads to different outcomes, which is also consistent with recent theorizing within Self-Determination Theory.

One strength of the current study is that it more accurately reflects the processes underlying self-determination theory. Individuals may approach a task with a range of feelings of autonomy. Thus, the present results more closely represent what happens in the world, when someone decides to diet, for example. Likewise, the current design enables us to test a wider range of autonomous functions (although it was likely restricted due to the laboratory setting), from external to intrinsic, rather than a small subsection of the theory.

In conclusion, it appears that autonomous self-control depletes less self-control strength than controlled guided self-control. This means that autonomous self-control should help protect against the effects of depletion and should leave more resources available for other attempts at self-control. Indeed, this may help explain why previous research (Curry et al., 1990; Ryan, Plant, & O'Malley, 1995; Williams et al., 2002) has found autonomously motivated self-control is much more likely to succeed than extrinsically motivated self-control.

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