



CHICAGO JOURNALS

Journal of Consumer Research, Inc.

---

Carryover Effects of Self-Control on Decision Making: A Construal-Level Perspective

Author(s): Echo Wen Wan and Nidhi Agrawal

Source: *Journal of Consumer Research*, Vol. 38, No. 1 (June 2011), pp. 199-214

Published by: [The University of Chicago Press](#)

Stable URL: <http://www.jstor.org/stable/10.1086/658471>

Accessed: 28/05/2013 17:33

---

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



*The University of Chicago Press and Journal of Consumer Research, Inc. are collaborating with JSTOR to digitize, preserve and extend access to Journal of Consumer Research.*

<http://www.jstor.org>

# Carryover Effects of Self-Control on Decision Making: A Construal-Level Perspective

ECHO WEN WAN  
NIDHI AGRAWAL

Six experiments examine how exerting self-control systematically influences subsequent decision making. Exerting self-control led individuals to rely on feasibility over desirability attributes, favor secondary over primary attributes, and choose products framed in a proximal rather than distal perspective. Process measures suggest that these effects occur because depletion from self-control heightens one's focus on resources and prompts a lower construal level that is carried over to subsequent tasks. Stimulating individuals to adopt higher level construals diminishes these effects. These findings offer insight into the psychological process by which self-control influences subsequent decisions.

Mary steps out of a meeting that required a great deal of discretion and self-control in how she expressed her views. Immediately after this meeting, she sits down to make dinner reservations. She needs to choose between two restaurants. One restaurant serves incredibly delicious food, but it does not have a good view. The other restaurant has sweeping views of the city's skyline but less impressive food. Which restaurant is Mary likely to choose?

Past research on how exerting self-control affects subsequent decision making can serve as a starting point to examine Mary's choice. According to regulatory depletion theory, exerting self-control leads to a temporary depletion of regulatory resources, which in turn influences subsequent self-control behaviors (Muraven, Tice, and Baumeister 1998; Vohs and Faber 2007; Vohs et al. 2008a). For ex-

ample, Muraven et al. (1998) had participants either exert self-control by suppressing thoughts or not exert such self-control when performing a writing task. Participants then solved anagrams that required high levels of persistence. Participants who had exerted self-control in the writing task exhibited less persistence on the anagram task than participants who had not exerted self-control. While existing research has extensively documented such depletion effects, the literature examining the psychological processes underlying these effects remains limited. Our research employs construal-level theory (Trope and Liberman 2003) to illuminate one such psychological process triggered by the experience of resource depletion.

While previous research on construal-level theory has examined the role of construal levels in shaping self-control, regulatory depletion and construal level have been seen as unrelated processes in determining self-control (Fujita et al. 2006). We view extant findings related to regulatory depletion theory (Vohs, Baumeister, and Tice 2008b) through the lens of construal-level theory (Trope and Liberman 2003) and suggest that regulatory depletion triggers a psychological process that involves systematic shifts in construal levels. We propose that exerting self-control may influence subsequent judgments and decisions by altering the level at which information is construed. Specifically, we posit that exerting self-control heightens a focus on resources and current feelings of fatigue, which leads consumers to adopt lower construal levels in subsequent situations. This construal-level process complements the resource depletion accounts in previous literature and illuminates the psychology

---

Echo Wen Wan (ewan@business.hku.hk) is assistant professor at the School of Business, University of Hong Kong, Pokfulam Road, Hong Kong. Nidhi Agrawal (nidhi-agrawal@kellogg.northwestern.edu) is associate professor at the Kellogg School of Management, Northwestern University, 2001 Sheridan Road, Evanston, IL 60208-2001. Order of authorship is reverse-alphabetical and reflects equal contributions by both authors. Correspondence: Echo Wen Wan. The authors would like to thank a Hong Kong SAR RGC research grant (HKU 752908H) awarded to the first author and Kellogg School of Management for the financial support for this project. The authors also thank Brian Sternthal for his comments on earlier drafts of this article.

*John Deighton served as editor and Russell Belk served as associate editor for this article.*

*Electronically published January 11, 2011*

of self-regulatory depletion. It predicts systematic carryover effects of depletion on consumer decisions: exerting self-control will systematically influence subsequent decisions by prompting a preference for attractive lower level construal features.

Lower level construals highlight feasibility over desirability, secondary over primary concerns, and proximity over distance (Trope and Liberman 2003). In the dinner reservation choice facing Mary, the first restaurant scores on food, and the second restaurant wins on view. Since a restaurant would not be a restaurant if it didn't serve food, food is a defining and primary feature for restaurants. In comparison, view is a secondary, albeit sometimes important, feature for a restaurant. Thus, construal-level theory suggests that food constitutes "higher level" construals whereas view characterizes "lower level" construals of restaurants. Our theorizing predicts that Mary, being depleted and focused on lower level construals, is likely to choose a restaurant with a great view but mediocre food over a restaurant with great food but no view.

This article presents six studies that examine this depletion-driven downward shift in construal level and its carryover effects on decisions. We show that exerting self-control affects decisions involving the choice between higher level attributes (desirability, primary feature, temporal distance) and lower level attributes (feasibility, secondary feature, temporal proximity). We also examine the psychological processes underlying this shift in construal level. Next, we review the relevant literature to draw our propositions and describe the studies. We conclude with the contributions of our research to resource depletion theory and construal-level theory.

## HOW DOES SELF-CONTROL AFFECT CONSTRUAL LEVELS?

### The Psychological Consequences of Exerting Self-Control

*Self-Control and Resources.* Research in the regulatory depletion literature has documented that individuals who have exerted self-control (i.e., depleted individuals) report greater feelings of fatigue than those who have not exerted self-control (i.e., nondepleted individuals; see, e.g., Baumeister et al. 1998; Muraven et al. 1998). This finding is explained by postulating that exerting self-control (i.e., depletion) prompts a feeling of fatigue, which is interpreted as a resource limitation (e.g., Vohs and Schmeichel 2003) and leads people to reduce subsequent self-control (Agrawal and Wan 2009).

We extend this account by proposing that one psychological process triggered by depletion involves a shift in the individual's construal level. We suggest that the feelings of fatigue not only increase the salience of current lack of resources, as argued by Agrawal and Wan (2009), but also lead to a general focus on resources. This focus in turn leads to lower level construals. Leveraging the idea that depletion

leads to resource considerations, we employ construal-level theory (Trope and Liberman 2003) to propose that exerting self-control (i.e., depletion) can lead to lower level construals, which then influence subsequent decisions.

*Self-Control Resources and Construal Levels.* Construal-level theory posits that the same action can be represented at different levels, depending on whether individuals consider the goal (e.g., why they are performing the act) or the means (e.g., how to perform the act or the resources available/needed for the act) of the action (Trope and Liberman 2003). When considering the means of performing the action, individuals tend to adopt lower rather than higher levels of construal. Exerting self-control (i.e., depletion) prompts feelings of fatigue, which individuals are likely to construe as a resource constraint. Because resource concerns are related to lower level construals, we expect that depletion will lower individuals' construal levels.

Action identification theory also makes a convergent prediction (Vallacher and Wegner 1985, 1987), positing that the level at which an individual identifies an activity depends on its difficulty. When the task is easy or individuals feel resourceful about the task (e.g., driving a car for an experienced driver), individuals are likely to focus on the higher level identities of the task (e.g., why they are going somewhere, what they will do once they reach their destination, what is the best route). In contrast, when the task is difficult or poses a significant challenge (e.g., driving a car for someone who has just learned to drive), individuals tend to focus on lower level identities such as what specific steps need to be taken and what is needed to execute the task (e.g., remember to give a signal before turning left, press the brake and not the accelerator at the stop sign, pay attention to other cars). Self-control involves overriding default responses and often represents a difficult and effortful task (Baumeister et al. 1998) that might be best tackled by focusing on action steps and resources. Thus, individuals who have exerted self-control (i.e., those who have performed a depleting task), relative to individuals who have not exerted self-control (i.e., those who have performed a nondepleting task), are more likely to construe the task at lower levels. Such lower level construals might carry over to a subsequent task (Freitas, Gollwitzer, and Trope 2004).

Existing findings in the regulatory depletion literature provide support for our proposed process. The proposition that exerting self-control leads to lower level construals is consistent with the past finding that exerting self-control (i.e., depletion) induces the feeling that "each moment is drawn out and the present feels longer than it would normally" (Vohs and Schmeichel 2003, 219), leading to time elongation (see also Wan and Sternthal 2008). Time elongation can be seen as a manifestation of our proposition. If depletion leads to lower level construals, depleted individuals are likely to focus on their present feelings and resources such as time (e.g., "How long it has been?"), and attending closely to time has been found to produce time elongation (Block and Zakay 1997). Individuals who have not exerted self-control (i.e., nondepleted individuals) do

not show time elongation, presumably because they maintain relatively higher levels of construal. Our proposition is also consistent with research by Bruyneel and Dewitte (2006) showing that exerting self-control leads to a narrow attention span and lower breadth of categorization. These findings are consistent with our proposition that self-control leads to lower levels of construal, which are typically narrow and concrete. In sum, we propose that the fatigue from exerting self-control leads to a focus on resources that in turn leads to lower level construal.

### Construal Levels and Decision Making

According to research on construal levels (Trope and Liberman 2003), higher levels of construal highlight the desirability of an event (e.g., how meaningful would it be), central and goal-relevant features of an object, and product features emphasizing temporal distance. In contrast, lower levels of construal emphasize the feasibility of an event (e.g., how one would perform a given action), secondary and goal-irrelevant features of an object, and product features emphasizing temporal proximity. Such differences in construal levels can systematically influence individuals' judgments and decisions. Illustrating such effects, Liberman and Trope (1998) found that when considering whether to attend a concert, participants at lower construal levels were more influenced by the feasibility of the event (i.e., the ticket price) than its desirability (i.e., liking the band), whereas those at higher construal levels were more influenced by desirability than by feasibility. Based on our proposition that exerting self-control leads to lower construal levels, and the findings in the literature about how construal levels influence decision making, we predict that the carryover effect of exerting self-control (vs. not exerting self-control) should affect subsequent decisions by conferring a preference for options with high feasibility (vs. desirability), attractive secondary (vs. primary) features, and features highlighting temporal proximity (vs. distance).

## OVERVIEW OF CURRENT STUDIES

We tested the proposed effects and the underlying processes in six studies. Study 1 measured participants' construal levels using a scale for behavioral identification (Vallacher and Wagner 1989) after they had or had not exerted substantial self-control. The remaining five studies tested the effect of construal level that is prompted by prior self-control on subsequent decision making. In each of these studies, participants first performed a task that required them to either exert self-control or not and then faced a judgment or choice task that involved decision options varying in features associated with higher and lower construal levels: options varying in feasibility and desirability in studies 2, 5, and 6; options varying in primary and secondary features in study 3; and options highlighting temporal proximity versus distance in study 4. Moreover, studies 5 and 6 also examined the process underlying these systematic effects of exerting self-control on decision making. Study 5 tested whether the

construal-level-driven effects of self-control on subsequent decisions would be eliminated when individuals were prevented from lowering their construal levels after self-control. Study 6 further examined why exerting self-control leads to lower levels of construal by measuring participants' focus on resources and examining its mediating role in the carry-over effect.

## STUDY 1: CONSTRUAL LEVELS VARY AS A FUNCTION OF EXERTING SELF-CONTROL

Study 1 tested the basic proposition that exerting self-control leads to lower construal levels. We had participants first exert self-control or not and then measured their construal level using the behavioral identification form (BIF; Vallacher and Wegner 1989). We predicted that individuals who had exerted prior self-control would score lower on the construal-level measure than those who had not exerted self-control previously.

### Method

Forty-two undergraduate students from Northwestern University participated in this study for \$10 payment. They were randomly assigned to either the prior self-control present or prior self-control absent condition.

*Manipulation of Prior Self-Control and Its Manipulation Check.* Participants first performed a cross-off-letters task, adapted from the literature, that manipulated prior self-control (Baumeister et al. 1998). In the prior self-control absent condition, participants were asked simply to cross off all instances of the letter "e" in a one-page text. In the prior self-control present condition, participants were instructed to cross off instances of "e" in the same text following two rules: the letter "e" must not be adjacent to another vowel, and it must not be one letter away from another vowel. This task involved self-control in that participants needed to override their impulse to cross off the letter whenever the specified rules were not met. Upon completing the task, participants reported how tired they were on a scale of 1 (not at all) to 9 (very much) (Baumeister et al. 1998). According to past research (e.g., Baumeister et al. 1998), individuals who had exerted self-control would feel more tired than individuals who had not exerted self-control. Consistent with the expectation, a one-way ANOVA showed that participants who had previously exerted self-control felt more tired ( $M = 6.05$ ,  $SD = 2.08$ ) than those who had not exerted prior self-control ( $M = 4.23$ ,  $SD = 1.99$ ;  $F(1, 41) = 8.55$ ,  $p < .01$ ). This result confirmed that our prior self-control manipulation was successful. This measure of fatigue most likely tapped into mental fatigue rather than physical fatigue. In study 6, we administered a comprehensive set of measures specifying mental tiredness/energy and obtained converging results that supported our mental effort interpretation of the fatigue measure. We administered this measure of tiredness and fatigue in all our studies and confirmed the successful

manipulation of prior self-control. This measure will not be discussed further.

**Construal-Level Measure.** Participants then responded to the BIF (Vallacher and Wegner 1989). The BIF consists of 25 questions assessing the level at which individuals construe certain activities. For each question, participants read a statement of an action (e.g., making a list), followed by two options describing the action in terms of either how it is performed, which is consistent with lower level construals (e.g., writing something down), or why it is performed, which is consistent with higher level construals (e.g., getting things organized). Participants were asked to choose the description that better captured their view of the activity.

## Results and Discussion

**Construal Levels.** We first assigned a score of 0 for choosing the lower level construal option and a score of 1 for choosing the higher level construal option for each of the 25 actions stated in the BIF questionnaire. A construal-level score was obtained for each participant by summing up his or her scores for all 25 items, with an overall lower score indicating lower construal levels. A one-way ANOVA showed that participants with prior self-control scored lower ( $M = 12.43$ ,  $SD = 5.70$ ) than participants without prior self-control ( $M = 15.55$ ,  $SD = 3.92$ ;  $F(1, 41) = 4.39$ ,  $p < .05$ ). These results supported our proposition that experiencing depletion in exerting self-control would lower one's construal level. In the next study, we examine the carryover effect of exerting self-control on subsequent decisions involving construal levels.

### STUDY 2: SELF-CONTROL INCREASES THE PREFERENCE FOR FEASIBILITY IN JOB CHOICE

Study 2 examined the carryover effect of exerting self-control on a subsequent decision involving options that varied in feasibility and desirability. Adapted from previous literature (Trope and Liberman 2000), this task assessed participants' intention to undertake a particular job that featured strong desirability but weak feasibility, or one that featured strong feasibility but weak desirability. Based on our proposition that exerting self-control would lower one's construal level, we expected that the feasibility of acquiring the job would have an increased impact on participants' decisions if they had previously exerted self-control. In other words, individuals who had exerted prior self-control would have a greater preference for the high-feasibility and low-desirability option relative to those who had not exerted self-control.

#### Method

Forty-seven undergraduate students from Northwestern University participated in this study for \$10 payment. They were randomly assigned to one of four conditions in a 2

(prior self-control: present vs. absent)  $\times$  2 (job feature: high desirability and low feasibility vs. high feasibility and low desirability) between-subject design.

**Manipulation of Prior Self-Control.** Participants first performed the same cross-off-letters task as was used in study 1 (Baumeister et al. 1998), which manipulated prior self-control.

**Task Involving Feasibility versus Desirability and Related Pretest.** After the prior self-control task, participants were presented with a decision task about a work-study job adapted from Trope and Liberman (2000, their study 2). The job was described either as being interesting but requiring difficult training or as being uninteresting but having easy training (Trope and Liberman 2000). For the high-desirability and low-feasibility (interesting job and difficult skill training) condition, participants read that the work-study job involved interesting tasks of reading funny cartoons, movies, and jokes and predicting people's attitudes toward these materials; to perform the job, they needed boring training to learn methods for attitude measurement, scale construction, and scale validation. For the low-desirability and high-feasibility (uninteresting job and easy skill training) condition, participants read that the work-study job involved uninteresting tasks of data entry and testing whether different scales influenced the measurement of people's attitudes about abstract figures and political issues; to perform the job, training involved the easy task of analyzing commercial ads. After reading the description of the job, participants completed a task intention measure: they were asked to imagine that they were looking for a work-study job and indicate their likelihood of taking up the given job on a scale of 1 (not likely at all) to 9 (very likely).

To confirm that the manipulation described above indeed framed desirability features at higher levels of construal than feasibility features, we ran a pretest in the same subject pool, following the method recommended in Sagristano, Trope, and Liberman (2002). Participants indicated the importance of knowing the feasibility (desirability) information, given that the desirability (feasibility) level was high or low. Sagristano et al.'s (2002) criterion for identifying the feasibility and desirability aspects was that the subjective importance of feasibility should depend on the level of desirability more than the subjective importance of desirability depended on the level of feasibility. In the pretest, participants rated the importance of knowing whether it was easy to acquire the job skill, given that the job was interesting (uninteresting), and the importance of knowing whether the job was interesting, given that acquiring the job skill was easy (difficult), on scales anchored at 1 (not important at all) to 9 (very important). A 2 (the provided dimension: feasibility [skill training] vs. desirability [job])  $\times$  2 (level: high vs. low) ANOVA showed a significant interaction effect ( $F(1, 69) = 5.73$ ,  $p < .02$ ): the importance of knowing the feasibility (whether the training was easy) was lower when the job was described as boring ( $M = 4.69$ ) versus interesting ( $M = 6.68$ ), whereas the importance of knowing the desirability

(whether the job was interesting) did not vary by the description of the training as difficult ( $M = 6.72$ ) or easy ( $M = 7.00$ ). These results confirmed that the nature of the job captured the higher level construals involving desirability, whereas the skill training captured the lower level construals of feasibility.

**Results and Discussion**

*Intention to Take the Job.* The  $2 \times 2$  ANOVA on the intention to take this job showed that the main effect of prior self-control was not significant ( $F < 1$ ), and the main effect of job feature was significant ( $F(1, 43) = 5.30, p < .03$ ); overall people preferred the job with attractive desirability (interesting job) to the job with attractive feasibility (easy skill training). More important, the prior self-control  $\times$  job feature interaction was significant ( $F(1, 43) = 4.42, p < .05$ ; see table 1). Simple contrasts showed that participants had a greater intention of taking the job with high feasibility (easy training) when they had exerted prior self-control ( $M = 5.62, SD = 1.29$ ) than when prior self-control was absent ( $M = 4.32, SD = 1.75; F(1, 43) = 3.98, p = .05$ ). The results showed that participants without prior self-control exhibited a greater intention to work when the job had high desirability (interesting job;  $M = 6.36, SD = 1.93$ ) than when the job had high feasibility (easy skill training;  $M = 4.32, SD = 1.75; F(1, 43) = 9.12, p < .01$ ). In contrast, intentions to work did not differ for those who had exercised prior self-control whether the job was interesting ( $M = 5.71, SD = 1.35$ ) or the training was easy ( $M = 5.62, SD = 1.29; F < 1$ ). These results showed that exerting self-control increased preferences for the option with high feasibility but low desirability, supporting our predicted carryover effect of prior self-control on consumer decisions due to the construal-level shifts.

**STUDY 3: SELF-CONTROL AND THE EMPHASIS ON SECONDARY FEATURES IN RESTAURANT CHOICE**

Study 3 tested the carryover effect in a context different from study 2. Specifically, study 3 examined the effect of

prior self-control on subsequent decisions when the target options varied in their primary and secondary features. This decision task assessed individuals' intention to eat in a restaurant described as having attractive primary or secondary features. Based on our proposition that exerting self-control lowers one's construal level, we expected that the secondary feature would be emphasized more in individuals' restaurant decisions when they had exerted prior self-control than when they had not exerted prior self-control. Thus, we expected that individuals who had exerted prior self-control, compared with those who had not exerted self-control, would exhibit a greater preference for the option with an attractive secondary feature. We also measured the importance of the primary and secondary features and examined their roles in individuals' restaurant decisions. Study 3 employed a different self-control manipulation to establish the robustness of the construal-level-driven carryover effect.

**Method**

Sixty-six undergraduate students from Northwestern University participated in this study for \$10 payment. They were randomly assigned to one of the four conditions in a  $2$  (prior self-control: present vs. absent)  $\times$   $2$  (restaurant feature: attractive primary feature and nonattractive secondary feature [great food without much of a view] vs. attractive secondary feature and nonattractive primary feature [medicre food with a great view]) between-subject design.

*Manipulation of Prior Self-Control.* The first task, adapted from past research, manipulated self-control in an everyday choice context (Vohs et al. 2008a). All participants received a list of five categories of products: T-shirts, scented candles, candy bars, shampoo, and posters, with 10–12 different options in each category. In the prior self-control present condition, participants were asked to choose between two different versions of each product (e.g., a jasmine-scented candle and a lavender-scented candle). In total, these participants made 60 binary choices. In the prior self-control absent condition, participants read the same list of products but identified the products they had used rather than made choices. Vohs et al. (2008a) have found that making sub-

**TABLE 1**

EXERTING SELF-CONTROL INCREASE PREFERENCE FOR LOWER LEVEL FEATURES (STUDIES 2, 3, 4, AND 6)

Studies	Decision options	Exerting prior self-control	No exerting prior self-control
Study 2 <sup>a</sup>	Intention to work for the highly feasible job	5.62 (1.29)	4.32 (1.75)
	Intention to work for the highly desirable job	5.71 (1.35)	6.36 (1.93)
Study 3 <sup>a</sup>	Intention to eat in the restaurant with an attractive secondary feature	4.07 (1.49)	2.83 (1.03)
	Intention to eat in the restaurant with an attractive primary feature	7.29 (1.44)	7.88 (.99)
Study 4	Choice share of the weekly calendar	65.38%	33.33%
	Choice share of the monthly calendar	34.62%	66.67%
Study 6	Choice share of the hiking park with high feasibility	42.86%	17.24%
	Choice share of the hiking park with high desirability	57.14%	82.76%

<sup>a</sup>The intention to undertake the job and eat in the restaurant in studies 2 and 3, respectively, was measured on a scale of 1 (not likely at all) to 9 (very likely).

stantial rounds of deliberative choices requires self-control, whereas simply viewing product information without making choices does not. Subsequently, participants completed the PANAS (positive and negative affect schedule) mood measure (Watson, Clark, and Tellegen 1988). There were no significant effects on PANAS, and we will not discuss it further.

*Task Involving Primary versus Secondary Features and Related Pretests.* Next, participants were presented a decision problem of going to a restaurant with great food but not much of a view, or a restaurant with a great view but mediocre food. Because food is a defining element for the restaurant category, food quality is likely to be a primary feature for restaurant choice. In contrast, having a view is an optional characteristic for restaurants and is more likely to be a secondary consideration in restaurant choice. Participants in the “great food without much of a view” condition read the following: “After reading customer reviews for this restaurant, you feel that the food this restaurant offers sounds good. But customer reviews mention that this restaurant does not have a good dining view.” Participants in the “mediocre food with a great view” condition read this description: “After reading customer reviews for this restaurant, you feel that the food this restaurant offers may not be good. But customer reviews mention that this restaurant has a good dining view.” After reading the description of the restaurant, participants indicated their likelihood of eating at this restaurant on a scale of 1 (not likely at all) to 9 (very likely). Finally, participants rated the importance of the primary and secondary features in their decision by answering two questions: “In making your decision of eating in this restaurant, how important was it for your decision whether or not the food this restaurant offers was great (how important was it for your decision whether or not this restaurant offers a great dining view)?” Responses were anchored on scales of 1 (not important at all) to 9 (very important).

We conducted a pretest to confirm whether food quality was indeed construed at a higher level than dining view by following the method used in study 1 (see also Sagristano et al. 2002). Seventy-three participants drawn from the same respondent pool rated (1) the importance of knowing whether the restaurant offered a great dining view given that it offered great (mediocre) food, and (2) the importance of knowing whether the restaurant offered great food, given that it had a great dining view (not much of a view), using scales similar to those used in study 1. The ANOVA indicated a significant interaction ( $F(1, 69) = 3.81, p = .055$ ) such that the importance of knowing about the dining view was lower when the food was described as mediocre ( $M = 3.91$ ) versus great ( $M = 5.93$ ); however, the importance of knowing food quality did not vary by the attractiveness of the view ( $M = 6.11$  vs.  $M = 6.62; F < 1$ ). These results confirm that food quality is construed at a higher level than dining view (Sagristano et al. 2002).

## Results and Discussion

*Dining Intention.* A  $2 \times 2$  ANOVA showed that the main effect of prior self-control was not significant ( $F < 1$ ) and that the main effect of restaurant feature was significant ( $F(1, 62) = 116.60, p < .001$ ); overall, participants indicated a greater intention of eating in the restaurant when it offered great food than when it offered a great view, reaffirming that food quality is the primary feature. More important, the prior self-control  $\times$  restaurant feature interaction was significant ( $F(1, 62) = 5.08, p = .02$ ; see table 1). Simple contrasts showed that participants without prior self-control indicated greater intention to go to the restaurant when it offered an attractive primary feature (great food,  $M = 7.88, SD = .99$ ) than when it offered an attractive secondary feature (great view,  $M = 2.83, SD = 1.03, F(1, 62) = 92.91, p < .001$ ). The same pattern emerged for participants who had previously exerted self-control: their intention of patronizing the restaurant was higher when it offered great food ( $M = 7.29, SD = 1.44$ ) than when it offered a great view ( $M = 4.07, SD = 1.49; F(1, 62) = 33.24, p < .001$ ). However, supporting our prediction, when the restaurant offered an attractive secondary feature (i.e., great view), participants had a greater intention of eating in the restaurant when they had previously exerted self-control than when they had not ( $F(1, 62) = 5.03, p < .03$ ).

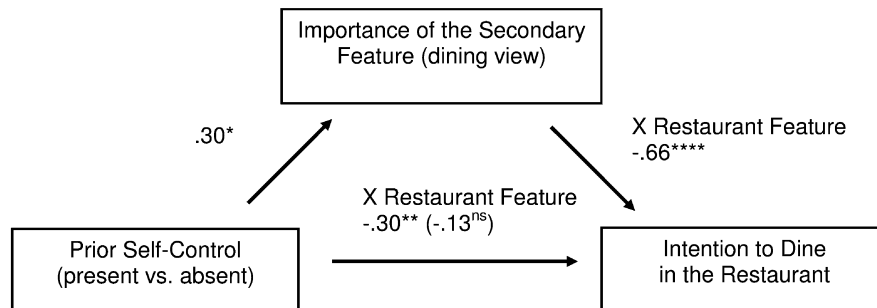
*Feature Importance as the Mediator.* To examine whether exerting self-control indeed influenced the perceived importance of the primary and secondary features and thus altered participants' decisions, we first performed a  $2 \times 2$  ANOVA on the importance of the secondary feature (i.e., dining view) in the restaurant decision. This analysis indicated a main effect of only prior self-control: participants with prior self-control reported greater importance of the secondary feature (i.e., dining view,  $M = 3.68, SD = .32$ ) than did participants without prior self-control ( $M = 2.56, SD = .30; F(1, 62) = 6.47, p < .02$ ). No other effects were significant. Then a  $2 \times 2$  ANOVA on the importance of the primary feature (i.e., food quality) revealed a main effect of prior self-control: participants with prior self-control reported less importance of the primary feature (i.e., food quality,  $M = 8.11, SD = .14$ ) than did participants without prior self-control ( $M = 8.58, SD = .12; F(1, 62) = 6.30, p < .02$ ). The analysis also found a main effect of restaurant feature: participants in the “great food without much of a view” condition reported greater importance of the food quality ( $M = 8.53, SD = .13$ ) than did those in the “mediocre food with a great view” condition ( $M = 8.15, SD = .34; F(1, 62) = 4.09, p < .05$ ). The interaction effect was not significant. These results showed that although overall food quality as a primary feature was viewed as important across conditions, participants with (vs. without) prior self-control placed greater importance on the secondary feature, dining view, and less importance on the primary feature, food quality.

We then performed mediation analyses using the importance rating of the secondary feature (dining view), follow-

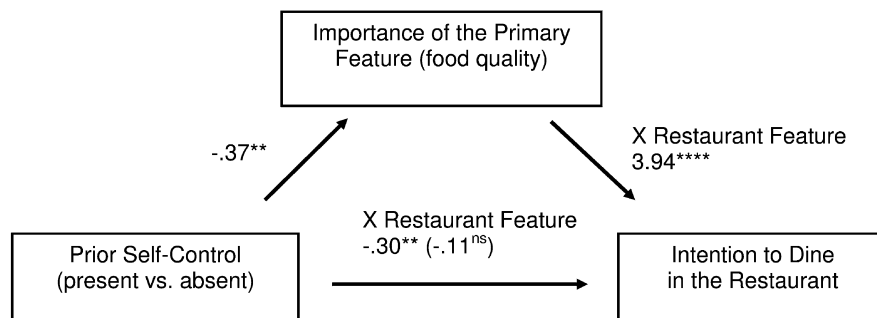
FIGURE 1

PATH MODELS OF MEDIATION ANALYSIS IN STUDY 3

A: Self-Reported Importance of the Secondary Feature as the Mediator



B: Self-Reported Importance of the Primary Feature as the Mediator



NOTE.—\* = significant at the .10 level; \*\* = significant at the .05 level; \*\*\*\* = significant at the .001 level.

ing the procedure recommended in Muller, Judd, and Yzerbyt (2005). First, we regressed the dining intention on prior self-control (0 = self-control absent, 1 = self-control present), restaurant feature (0 = mediocre food with a great view; 1 = great food without much of a view), and their interaction, which indicated a significant main effect of prior self-control ( $\beta = .24, t(1, 62) = 2.24, p < .03$ ), a significant main effect of restaurant feature ( $\beta = .96, t(1, 62) = 9.64, p < .001$ ), and a significant interaction ( $\beta = -.30, t(1, 62) = -2.38, p = .02$ ), consistent with our ANOVA results. Then a regression of the secondary feature importance on prior self-control, restaurant feature, and their interaction resulted in only a marginally significant main effect of prior self-control ( $\beta = .30, t(1, 62) = 1.76, p = .08$ ), consistent with the ANOVA results. Finally, regressing the dining intention on prior self-control, restaurant feature, prior self-control  $\times$  restaurant feature interaction, the secondary feature importance, and restaurant feature  $\times$  secondary feature importance interaction showed that the main effect of restaurant feature ( $\beta = 1.43, t(1, 60) = 11.62, p < .001$ ), the main effect of secondary feature importance ( $\beta = .39, t(1,$

60) = 4.60,  $p < .001$ ), and the restaurant feature  $\times$  secondary feature importance interaction ( $\beta = -.66, t(1, 60) = -5.02, p < .001$ ; see fig. 1A) were significant. However, the prior self-control  $\times$  restaurant feature interaction was no longer significant ( $\beta = -.13, t(1, 60) = -1.14, p > .25$ ). Thus, the prior self-control  $\times$  restaurant feature interaction effect on the dining intention was mediated by the importance of the secondary feature (dining view).

A similar analysis was performed for the primary feature (food quality) importance. The first regression indicated significant main effects of prior self-control ( $\beta = .24, t(1, 62) = 2.24, p < .03$ ) and restaurant feature ( $\beta = .96, t(1, 62) = 9.64, p < .001$ ) and a significant interaction ( $\beta = -.30, t(1, 62) = -2.38, p = .02$ ). The second regression indicated a significant main effect of prior self-control ( $\beta = -.37, t(1, 62) = -2.18, p < .04$ ). The third regression showed that the main effects of restaurant feature ( $\beta = -2.97, t(1, 60) = -4.21, p < .001$ ) and primary feature importance ( $\beta = -.38, t(1, 60) = -4.49, p < .001$ ) and the restaurant feature  $\times$  primary feature importance interaction ( $\beta = 3.94, t(1, 60) = 5.63, p < .001$ ; see fig. 1B) were significant,

whereas the prior self-control  $\times$  restaurant feature interaction was not ( $\beta = -.11$ ,  $t(1, 60) = -1.03$ ,  $p > .30$ ). These results suggest that the prior self-control  $\times$  restaurant feature interaction effect on the dining intention was mediated by the importance of the primary feature (food quality).

In sum, study 3 demonstrated that exerting self-control increases one's preference for a choice with an attractive secondary feature but an unattractive primary feature, again supporting our prediction that prior self-control has a carryover effect on consumer decisions due to lowered construal levels. The mediation analyses showed that exerting prior self-control (vs. no prior self-control) led participants to perceive the secondary feature as more important and the primary feature as less important. This process mediated the effect of prior self-control on their decision about eating in a restaurant. These analyses provided further evidence that the carryover effect was due to lowered construal levels.

#### STUDY 4: SELF-CONTROL AND PREFERENCE FOR TEMPORAL FRAMING IN CALENDAR CHOICE

There were two major goals in study 4. First, study 4 examined the predicted carryover effect by having participants make an actual choice rather than state their decision intentions as in studies 2 and 3. Second, study 4 tested the carryover effect in yet another decision context. Specifically, we asked participants to choose between two calendars, one organized by week (temporal proximity) and another by month (temporal distance). Prior research has shown that weekly frames are more consistent with lower level construals relative to monthly frames (Chandran and Menon 2004; Trope and Liberman 2003). We expected individuals who had previously exerted self-control to exhibit a greater preference for the week-based rather than month-based calendar. Also, we employed a different self-control manipulation for robustness.

#### Method

Sixty-two undergraduate students from Northwestern University participated in the study for \$10 payment. They were randomly assigned to either the prior self-control present (emotion suppression) or prior self-control absent (no emotion control) condition.

*Manipulation of Prior Self-Control.* Study 4 employed a self-control task that differed from those used in previous studies—emotion suppression. Past research has suggested that suppressing one's emotion requires overcoming the current emotional response and replacing it with a different one, which requires self-control, regardless of the emotion valence (Muraven et al. 1998; Vohs and Faber 2007). Adapted from the literature (Muraven et al. 1998), the first task was to watch 11 funny TV advertisements using emotional appeals for about 5 minutes. Participants in the self-control absent condition were instructed to let their emotions flow when watch-

ing the ads, whereas those in the self-control present condition were instructed to hold back their emotions. Then all participants reported their moods on items adopted from Lee and Sternthal (1999) and indicated the extent to which they found the ads amusing. Participants' responses did not differ in these items, and hence these items will not be discussed further.

*Choice Task Involving Temporal Perspective: Week or Month.* Participants were then offered a choice between one of two free calendars as a token of appreciation for their participation. They could pick either a week-based calendar or a month-based calendar for the entire year. The two calendars differed only in their display of dates (weekly vs. monthly) but not in the total time (i.e., one entire calendar year). Participants' calendar choices were recorded.

#### Results and Discussion

*Choice of Calendar.* We first performed a binary logistic regression using prior self-control as the independent variable (0 = self-control absent; 1 = self-control present) and choice as the dependent variable (0 = chose the weekly calendar; 1 = chose the monthly calendar). The results indicated that participants with (vs. without) prior self-control chose the weekly calendar more ( $B = -1.33$ , Wald test = 5.52,  $p < .02$ ). We then compared the choice share for each type of calendar across conditions. Among participants without prior self-control ( $n = 30$ ), a larger proportion of participants chose the monthly calendar (66.67%) than the weekly calendar (33.33%;  $z = -3.87$ ,  $p < .001$ ). The reverse was found for participants with prior self-control ( $n = 26$ ): a larger proportion of participants chose the weekly calendar (65.38%) compared to the monthly calendar (34.62%;  $z = 3.30$ ,  $p = .001$ ). Moreover, a larger proportion of participants without prior self-control (67.67%) compared to participants with prior self-control (34.62%;  $z = 2.39$ ,  $p < .02$ ) chose the monthly calendar, whereas a larger proportion of participants with prior self-control (65.38%) compared to participants without prior self-control chose the weekly calendar (33.33%;  $z = -2.39$ ,  $p < .02$ ; see table 1). Thus, exerting self-control leads individuals to construe decisions at lower levels and consequently prefer the option highlighting temporal proximity.

#### STUDY 5: MIND-SETS MODERATE THE EFFECT OF PRIOR SELF-CONTROL

Study 5 tests that the process underlying the carryover effect of exerting self-control on subsequent judgments and decisions involves construal-level changes by employing a moderation approach (Agrawal and Wan 2009; Schmeichel and Vohs 2009; Spencer, Zanna, and Fong 2005). If indeed the carryover effect is driven by a downward shift in construal levels, then we would observe that the effect would be eliminated when prompting individuals to maintain construals at higher levels after exerting self-control. To this end, we added a second independent variable—mind-set.

Specifically, after participants completed the prior self-control manipulation, we primed them with a why mind-set that encouraged higher levels of construal (Freitas et al. 2004). In the decision task, we had participants choose between two exhibitions, involving a trade-off between desirability (i.e., attractiveness of exhibited artwork) and feasibility (i.e., convenience of going to the exhibition). We anticipated that individuals who had exerted prior self-control would be more likely to choose the exhibition with high feasibility than those who had not exerted self-control. Moreover, we expected that priming a why mind-set would eliminate the increased preference for the highly feasible option.

## Method

One hundred and thirty-one undergraduate students from the University of Hong Kong participated in this study for HK\$60 (about US\$8) payment. They were randomly assigned to one of the four conditions in a 2 (prior self-control: present vs. absent)  $\times$  2 (mind-set: higher level construal [why mind-set] vs. control) between-subject design.

*Manipulation of Prior Self-Control.* To test the robustness of the effects, study 5 used a different manipulation of prior self-control—the Stroop task. Stroop tasks (Stroop 1935) have been found to require substantial self-control in selective attention, external control, and executive behavioral control (Gailliot et al. 2007). In the prior self-control present condition, participants were presented with a target word that had the meaning of a color and was printed in a font color incongruent with its meaning (e.g., the word *red* printed in blue). Participants had to indicate the font colors in which the target words were printed. For example, when the word was *red* and it was printed in blue, the correct response was “blue.” To give this response, participants had to override their initial response of identifying the meaning of the word and pay attention to the font color. Participants performed a series of 200 items in total. In the prior self-control absent condition, this task was modified in such a way that for each of the 200 items, the meaning of the target word and the font color of the word were congruent (e.g., the word *red* was printed in red). This version of the task did not call for self-control.

*Mind-Set Manipulation.* Next, participants were administered the mind-set manipulation based on Freitas et al. (2004). Those in the higher level construal condition completed a task titled “Why do I do the things I do?” They reflected on why they would go about improving and maintaining their personal relationships. The task was illustrated by the example of “completing course requirements,” with descriptions of why performing small tasks can lead to achieving bigger goals: Why complete course requirements—to learn knowledge and skills? Why learn knowledge and skills—to get a good job? Why get a good job—to have a happy life? Participants were told to think and write about “improving and maintaining relationships” in a similar way. This manipulation required participants to repeatedly use

higher level construals and primed them to use such construals on subsequent tasks (Fujita et al. 2006). In the control condition, participants completed an unrelated filler task.

*Decision Task Involving Feasibility versus Desirability Preferences.* Following the mind-set manipulation was a decision task. Participants were asked to choose between two exhibitions that varied in desirability (i.e., whether the artwork in the exhibition appealed to them) and feasibility (i.e., whether there was convenient public transportation to the exhibition). Specifically, the exhibition with high desirability and low feasibility (low desirability and high feasibility) was described as follows: “This exhibition presents work of an artist that you like very much. (This exhibition presents work of an artist that you are not familiar with, and you are not sure if you will like his work.) However, it is conducted in an inconvenient place. The exhibition hall is very far away from where you live. You have to change buses and trains several times on your way. It takes about 1.5 to 2 hours to get there. (But this exhibition is conducted in a very convenient place. There is a direct bus to the exhibition. It takes only 15 to 20 minutes to get there from where you live.)” After indicating their choices, participants rated the importance of convenient transport on a scale of 1 (not important at all) to 9 (very important).

## Results and Discussion

*Choice of Exhibition.* We first performed a binary logistic regression. We regressed participants’ exhibition choice (0 = chose the high-feasibility [convenient transportation] option; 1 = chose the high desirability [appealing artwork] option) on prior self-control (0 = absence; 1 = presence), mind-set (0 = control; 1 = higher level construals [why mind-set]), and the prior self-control  $\times$  mind-set interaction. The results showed that the main effect of mind-set was not significant ( $p > .60$ ), the main effect of prior self-control was significant ( $B = 2.18$ , Wald test = 9.63,  $p = .002$ ), and the prior self-control  $\times$  mind-set interaction was significant ( $B = 2.14$ , Wald test = 4.31,  $p < .04$ ; see table 2 for choice shares across conditions). We then compared the proportion of the exhibition choice across conditions. Consistent with our predictions, in the control (i.e., absence of “why” mind-set manipulation) condition, a greater proportion of participants chose the exhibition with high feasibility when they had exerted prior self-control (46.88%) compared to when they hadn’t (9.09%;  $z = 3.13$ ,  $p < .01$ ), replicating our finding in study 2. In contrast, when participants were primed to adopt higher construal levels, the proportion of the high-feasibility choice did not differ between individuals who had exerted prior self-control (12.90%) and those who hadn’t (12.50%,  $p > .70$ ).

*Feature Importance as the Mediator.* A 2  $\times$  2 ANOVA on the feasibility importance rating indicated significant main effects of mind-set ( $F(1, 127) = 6.16$ ,  $p < .02$ ) and prior self-control ( $F(1, 127) = 12.30$ ,  $p = .001$ ) and a significant self-control  $\times$  mind-set interaction ( $F(1, 127) =$

**TABLE 2**  
CHOICE SHARE OF THE OPTION WITH HIGH FEASIBILITY FEATURE IN STUDY 5

Self-control exertion	Mind-set manipulation	
	Control (no manipulation)	Higher level construals (why mind-set)
Exerting prior self-control	46.88% (15 vs. 17)	12.90% (4 vs. 27)
No exerting prior self-control	9.09% (3 vs. 30)	12.50% (4 vs. 28)

NOTE.—The numbers in parentheses present the instances of choices for the exhibition with a high-feasibility feature (convenient transportation) versus the instances of choices for the exhibition with a high-desirability feature (favorable artwork).

4.06,  $p < .05$ ). Simple contrasts showed that in the control condition, participants with prior self-control ( $M = 6.76$ ,  $SD = .26$ ) rated feasibility as more important in their decision than did those without prior self-control ( $M = 5.27$ ,  $SD = .26$ ,  $F(1, 127) = 15.37$ ,  $p < .001$ ). In contrast, in the why mind-set condition, participants with ( $M = 5.54$ ,  $SD = .27$ ) and without prior self-control ( $M = 5.15$ ,  $SD = .26$ ,  $p > .29$ ) were similar in assessing the feasibility importance relatively low. These results suggest that, consistent with the proposition that exerting self-control leads to lower level construals, priming participants with prior self-control to maintain higher level construals eliminates their increased importance rating on feasibility of the option.

We then performed a mediation analysis following Muller et al.'s (2005) procedure. First, regressing the exhibition choice on prior self-control, mind-set, and their interaction in a logistic regression resulted in a significant main effect of prior self-control ( $B = 2.18$ , Wald test = 9.63,  $p = .002$ ) and a significant prior self-control  $\times$  mind-set interaction ( $B = 2.14$ , Wald test = 4.31,  $p < .04$ ). Then, regressing the feasibility importance on prior self-control, mind-set, and their interaction indicated a significant main effect of prior self-control ( $\beta = .45$ ,  $t(1, 127) = 3.92$ ,  $p < .001$ ) and a significant prior self-control  $\times$  mind-set interaction ( $\beta = -.28$ ,  $t(1, 127) = -2.01$ ,  $p < .05$ ). Finally, regressing the exhibition choice on prior self-control, mind-set, the prior self-control  $\times$  mind-set interaction, feasibility importance, and the mind-set  $\times$  feasibility importance interaction in a logistic regression showed that the feasibility importance was significant ( $B = -1.97$ , Wald test = 14.61,  $p < .001$ ; see fig. 2), and the prior self-control  $\times$  mind-set interaction was not ( $B = 2.43$ , Wald test = 2.35,  $p > .12$ ). These results suggest that the moderating effect of mind-set on the carryover effect of exerting self-control on choice was mediated by feasibility importance.

Study 5 showed that when participants with prior self-control were primed to think at higher level construals, their increased preference for the high-feasibility option was eliminated. These results and mediation analyses provide support for the proposed construal-level process: exerting self-control leads to lower level construals and a preference for lower level aspects.

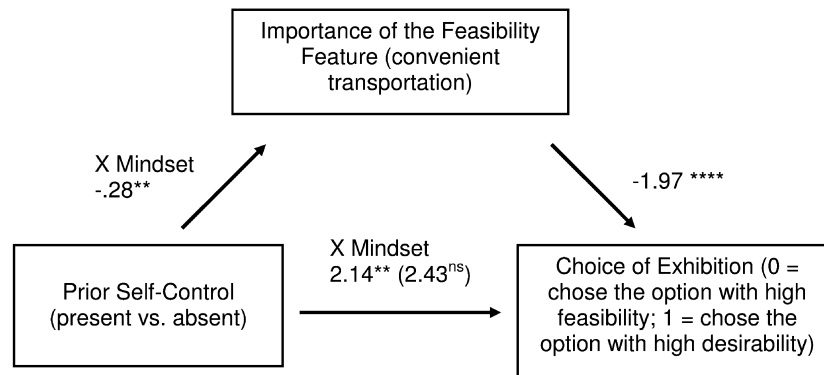
### STUDY 6: A HEIGHTENED FOCUS ON RESOURCES MEDIATES THE EFFECTS OF SELF-CONTROL ON CHOICE

In previous studies, we documented the construal-level-driven carryover effect: individuals who had exerted prior self-control (vs. those without prior self-control) preferred the option with favorable features corresponding to the lower level construals. We found that exerting self-control led participants to score lower in construal-level measures and increased the importance of features associated with lower level construals (feasibility, secondary feature), which mediated the effect of exerting self-control on subsequent judgments and choices. In addition, preventing individuals from lowering their construals after exerting self-control eliminated the carryover effect. All these studies confirm that a downward shift in construal levels drives the effect of self-control on subsequent judgments and decision making.

In study 6, we went a further step to address the question of why exerting self-control leads to lower construal levels. We argue that depletion from self-control heightens one's focus on resources (e.g., feeling of tiredness), which in turn conjures lower level construals. In this study, we examined the role of resource focus in the construal-level-driven carryover effect.

Specifically, we had participants either exert self-control or not, and then choose between two hiking parks that varied in their desirability (i.e., attractiveness of the park's scenery) and feasibility (i.e., the convenience of transportation to the park). We expected individuals who had exerted self-control previously to choose the park with high feasibility, compared with those who had not exerted prior self-control. It is important to note that we measured participants' focus on resources and examined its role in the mediation analysis. We also measured participants' time estimation and examined whether time elongation documented in the literature (Vohs and Schmeichel 2003; Wan and Sternthal 2008) was related to individuals' resource focus. To test for robustness, study 6 used a different manipulation of prior self-control (i.e., the white bear thought suppression).

FIGURE 2  
PATH MODEL OF MEDIATION ANALYSIS IN STUDY 5



NOTE.—Logistic regression was used when the predicted variable was the choice of exhibition.  
\*\* = significant at the .05 level; \*\*\*\* = significant at the .001 level.

## Method

Fifty-seven undergraduate students from the University of Hong Kong participated in this study for HK\$60 (about US\$8) payment. They were randomly assigned to the prior self-control present or absent condition.

*Manipulation of Prior Self-Control.* Study 6 used a different manipulation of prior self-control—the white bear task adopted from the literature (e.g., Muraven et al. 1998; Vohs and Faber 2007). Following the procedure used in the previous research, all participants were asked to write about the thoughts entering their minds for 6 minutes. In the prior self-control present condition, participants were instructed that they could think of anything except a white bear (i.e., they had to suppress any thoughts about white bear in the writing task). In the prior self-control absent condition, participants were allowed to think about anything (including a white bear).

*Focus on Resource and Time Estimation.* Upon completing the self-control manipulation, participants answered four questions that assessed their resource focus: How tired were you? (anchored on a scale of 1 [not at all] to 9 [very much]); How much mental effort did you exert in the writing task? (anchored on a scale of 1 [very little] to 9 [a lot]); How often did you think about your feeling of tiredness when working on the writing task? (anchored on a scale of 1 [not at all] to 9 [very often]); How often did you think that you were running out of resources/energy when working on the writing task? (anchored on a scale of 1 [not at all] to 9 [very often]). Participants were also asked to estimate the amount of time (in minutes) they thought they had spent on the writing task (Vohs and Schmeichel 2003).

*Decision Task Involving Feasibility versus Desirability Preferences.* Participants then completed a decision task adapted from Liu (2008). This task involved choosing between two hiking parks that varied in desirability (i.e., whether the park's scenery was beautiful) and feasibility (i.e., whether the transportation to the park was convenient). Specifically, the park with high desirability and low feasibility (low desirability and high feasibility) was described as follows: "This park is located in a mountain area where there are beautiful scenes of waterfalls and creeks. Large and small cascades and falls can be found in many rivers and streams in this park. (This park is located in a mountain area where there are mostly boulders and bushes. It does not have waterfalls or creeks.) But this park is far away from where you live. It requires about 2 hours of driving to get there, and it has limited parking spaces. (However, this park is not far away from where you live. It requires about 40 minutes of driving to get there, and it has plenty of parking spaces.)" After indicating their choices, participants rated the importance of convenient transport on a scale of 1 (not important at all) to 9 (very important).

## Results and Discussion

*Choice of Hiking Park.* We first regressed participants' park choice (0 = chose the high-feasibility [convenient transportation] option; 1 = chose the high-desirability [beautiful scenes] option) on prior self-control (0 = absence; 1 = presence) in a binary logistic regression. The results showed that participants with (vs. without) prior self-control chose the park with high feasibility more ( $B = 1.28$ , Wald test = 4.23,  $p < .05$ ). We then compared choice shares across conditions (see table 1 for choice shares). Consistent with our predictions, a greater proportion of participants chose the park with high feasibility when they had exerted prior self-

control (42.86%) compared to when they hadn't (17.24%;  $z = 1.82, p < .07$ ). From a different perspective, when no prior self-control was exerted, more participants chose the park with high desirability (82.76%) than the park with high feasibility (17.24%;  $z = 4.73, p < .001$ ). This difference did not exist when participants had exerted prior self-control.

**Resource Focus as the Mediator.** A resource focus index was formed by averaging participants' responses to four items ( $\alpha = .85$ ): tiredness, effort exertion, thinking of fatigue, and thinking of resources. A one-way ANOVA showed that participants who had exerted prior self-control had a greater focus on resources ( $M = 6.06, SD = 1.83$ ) than those who hadn't exerted prior self-control ( $M = 4.47, SD = 1.43; F(1, 55) = 13.49, p = .001$ ). To examine whether a heightened focus on resources led to the construal-level-driven carryover effect on decision making, we conducted three sets of analyses to test (a) whether resource focus mediates the effect of self-control on the importance of feasibility, (b) whether resource focus mediates the effect of self-control on choice, and finally (c) whether resource focus mediates the effect of self-control on time elongation.

We found in studies 3 and 5 that exerting self-control elevates the importance of the feasibility feature in decision making, which in turn leads to the carryover effect. If the carryover effect is due to a heightened resource focus, then we should observe resource focus driving a change in the perceived importance of the options' feasibility (convenient transport). In the first set of analyses, we examined this possibility following the mediation procedure recommended in Baron and Kenny (1986). Regressing feasibility importance on prior self-control showed that participants with prior self-control evaluated feasibility as more important than did those without prior self-control ( $\beta = .28, t(1, 55) = 2.12, p < .04$ ). Regressing the resource focus index on prior self-control indicated that exerting self-control led to a greater resource focus ( $\beta = .44, t(1, 55) = 3.67, p = .001$ ). Regressing feasibility importance on the resource focus index indicated that greater resource focus led to assessing feasibility as more important ( $\beta = .55, t(1, 55) = 4.90, p < .001$ ). Finally, regressing feasibility importance on both prior self-control and the resource focus index showed that the effect of resource focus was significant ( $\beta = .53, t(1, 54) = 4.22, p < .001$ ), whereas that of prior self-control was not ( $\beta = .04, t < 1; Sobel z = 2.94, p < .01$ ; see fig. 3A). These results indicated that resource focus mediated the effect of prior self-control on one's evaluation of the importance of the hiking park's feasibility, suggesting that resource focus drove the change of construal level upon exerting self-control. These mediation findings implicating resource focus from self-control as the driver of subsequent lower level construals also contribute to the literature on depletion and on construal levels.

In the second set of analyses, we conducted a mediation analysis using prior self-control as the independent variable, hiking park choice as the dependent variable, and the resource focus index as the mediator (Baron and Kenny 1986).

We found that resource focus mediated the effect of exerting prior self-control on participants' choice of hiking park (Sobel  $z = -1.90, p = .05$ ; see fig. 3B for the analysis results).

**Resource Focus and Time Elongation.** We suggested that elongation might be the manifestation of the heightened focus on resources when one exerts self-control. Thus, we first analyzed the time estimate in a one-way ANOVA, which showed that participants with prior self-control estimated spending a longer time on the writing task ( $M = 7.40$  minutes,  $SD = 2.63$ ) than did those without prior self-control ( $M = 6.05$  minutes,  $SD = 2.47; F(1, 55) = 3.90, p = .05$ ), while in fact each participant spent the same 6 minutes. This finding replicated the previous finding of time elongation in depletion (Vohs and Schmeichel 2003; Wan and Sternthal 2008). Past research on depletion has suggested that time elongation results from exerting self-control and in turn affects subsequent self-control (Vohs and Schmeichel 2003). To better understand the process underlying this finding, we conducted a mediation analysis (Baron and Kenny 1986) and found that the effect of prior self-control on the time estimate was mediated by the resource focus (Sobel  $z = 2.19, p < .03$ ; see fig. 3C for the analysis results). These findings for time estimation are particularly interesting and show that our theorizing adds depth to the understanding of the psychological processes surrounding depletion effects.

Study 6 revealed that the resource focus resulting from depletion leads to lower construal levels and their effect on subsequent decisions. Mediation analyses showed that a heightened focus on resources occurred when exerting prior self-control; this resource focus led to (a) viewing the feasibility of a choice as more important, (b) preferring the choice with favorable feasibility feature, and (c) overestimating the time spent on the self-control task.

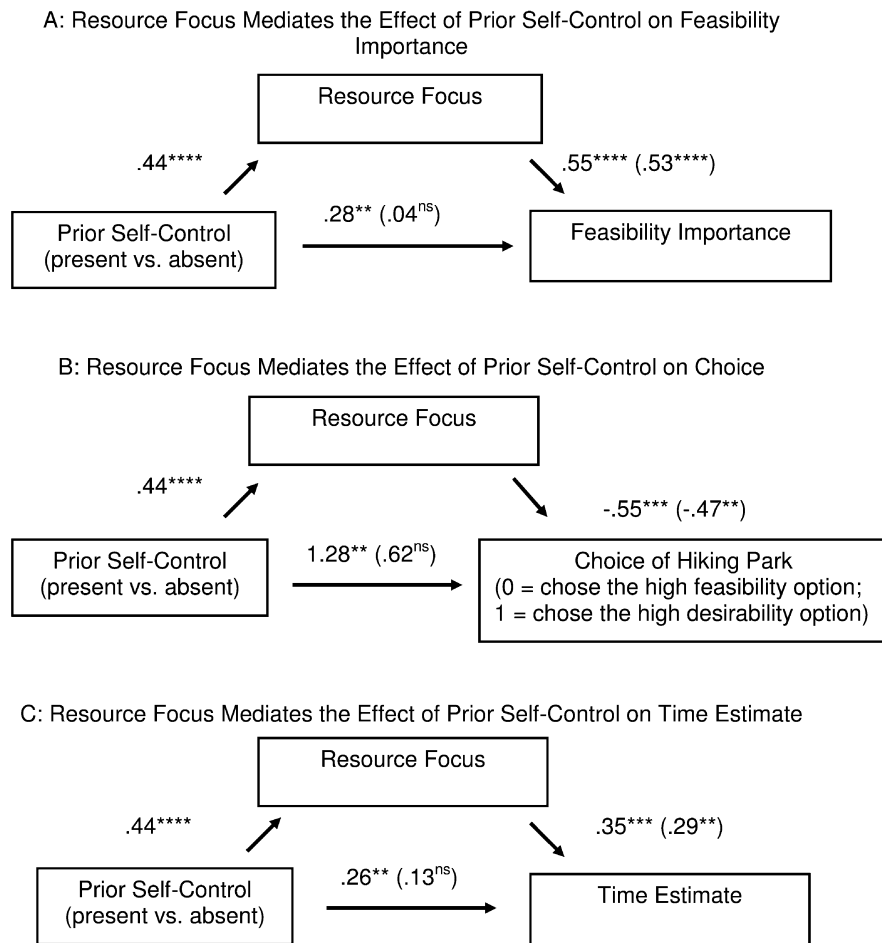
## GENERAL DISCUSSION

Past research on self-control and regulatory depletion suggests that exerting self-control affects judgments and decisions due to a temporary deficit in the accessible regulatory resources (Vohs et al. 2008b). The current research proposes a construal-level-driven complementary process through which regulatory depletion affects subsequent decisions. In doing so, this research adds an additional layer of explanation for the resource-depletion account of how self-control influences subsequent activities and allows us to predict and demonstrate novel carryover effects of self-control on judgments and decisions. Specifically, we show that depletion from self-control lowers decision makers' construal levels and thus increases their preference for decision options with attractive lower level features.

Results from six studies support our proposition. Individuals exerting prior self-control, as compared with individuals without prior self-control, indicated a greater preference for high feasibility (easy skill training, convenient transportation, easy accessibility) despite the low desirability

FIGURE 3

PATH MODELS OF MEDIATION ANALYSIS IN STUDY 6



NOTE.— In panel *B*, logistic regression was used when the predicted variable was the choice of hiking park. Because linear and logistic regressions were involved, the coefficients were standardized following the method recommended in MacKinnon and Dwyer (1993) in the Sobel test.  
 \*\* = significant at the .05 level; \*\*\* = significant at the .01 level; \*\*\*\* = significant at the .001 level.

(uninteresting job, not so interesting artwork, suboptimal views) of options, greater intention to eat in a restaurant with an attractive secondary feature (great dining view) despite nonattractive primary feature (mediocre food), and greater preference for a calendar highlighting temporal proximity (organized by weeks) than a calendar highlighting temporal distance (organized by months). These effects were robust across a variety of self-control tasks.

Most important, we provided evidence for the construal-level-driven process underlying these effects. First, individuals who had previously exerted self-control scored lower on the construal-level measure than those who had not exerted prior self-control. Second, individuals who had pre-

viously exerted self-control, compared with those who had not, rated features associated with lower level construals as more important and features associated with higher level construals as less important. Third, mediation analyses and a moderation approach showed that lowered construal levels drove the effects. Moreover, we explored why depletion from self-control led to the downward shift in construal level. We found that resource depletion heightened a focus on resources, and this resource focus mediated the effect of prior self-control on subsequent choices. Next, we discuss the contribution of our research to the research areas of regulatory depletion and construal-level theory as well as its practical implications.

## Regulatory Depletion and Consumer Decisions

The current research extends literature on self-control, regulatory depletion, and sequential decision making by uncovering a new mechanism that complements resource-depletion theory in explaining how self-control affects consumer judgments and decision making. Existing literature has largely demonstrated that prior self-control can affect subsequent consumer behaviors because of resource depletion—a temporary deficit in accessible self-control resources (Muraven et al. 1998; Vohs and Faber 2007). The current research reveals that resource depletion can alter consumers' psychology by lowering their construal level. This shift to lower level construals affects subsequent judgments in systematic ways. The present research contributes to the understanding of the process by which exerting self-control influences subsequent consumer decision in three ways.

First, we proposed that the shift toward lower level construals after exerting self-control is closely related to the perception of resource depletion. Resource depletion is experienced by feeling strong fatigue and the inadequacy of resources, which will heighten one's focus on resources. While past research has considered this role of resources and hence studied how resource focus might influence subsequent self-control by emphasizing resource limitations or temptations (e.g., Agrawal and Wan 2009), the current research extends this resource focus to a psychological process involving construal levels. One possibility that emerges from our process insight is that resource-depletion effects from self-control might occur by setting up an expectation of resource depletion or resource demand. Such expectations could shape psychological mind-sets and influence subsequent unrelated decisions and behaviors (Clarkson et al. 2010; Shiv, Carmon, and Ariely 2005).

Second, the construal-level shift process allows us to predict and find new carryover effects of self-control on consumer judgments and decision making that have not been documented in the regulatory depletion literature. We found that exerting self-control leads to the preference for decision options with favorable lower level attributes.

Finally, our research integrating the literature on regulatory depletion theory with construal-level theory opens up avenues for future research in the area of resource depletion. For example, if resource depletion affects construal level, it is also likely to influence several other related constructs (e.g., regulatory focus [Pennington and Roese 2003], consumer prior knowledge [Hong and Sternthal 2010], power [Smith and Trope 2006], psychological distance variables [Trope and Liberman 2003], and mood and emotions [Agrawal and Duhachek 2010; Agrawal, Menon, and Aaker 2007; Wan, Isen, and Sternthal 2010]). Such theoretical integration provides future research with a rich set of constructs through which depletion might affect judgments. Along the lines of our mind-set moderation study, this construal-level theory link to depletion can also illuminate new moderators of depletion.

Building such theoretical bridges encourages us to make and test novel and counterintuitive predictions. For example,

most past research has found that regulatory depletion has deleterious effects on subsequent tasks. Our proposition that depletion leads to lower construal highlights a new direction for future research by predicting that depletion might facilitate the performance of tasks that require lower level construals. For example, lower construal levels have been shown to help in contexts that involve identifying missing information (Deval et al. 2010) and to increase attitude stability (Kardes, Cronley, and Kim 2006). The current research predicts that depletion could help consumers make better decisions by increasing their sensitivity to missing information. Concern for details and feasibility, and focus on concrete and short-term aspects that are characteristics of lower construal levels, might be helpful in contexts where success depends on managing constraints and details. For example, lower (vs. higher) construal levels might alleviate procrastination by encouraging consumers to look for concrete and short-term progress. Future research should explore the beneficial effects of regulatory depletion and of lower construal levels in consumer behavior.

## Self-Control and Construal Level

Past research has shown that levels of construal influence self-control (Fujita et al. 2006). Our research documents the reverse phenomenon that exerting self-control affects construal levels. This research contributes to the construal-level literature by identifying self-control along with regulatory depletion as an important trigger of construal-level variation. Previous research has suggested that temporal, social, and spatial proximity can lead to lower levels of construal. We find that depletion from exerting self-control lowers individuals' construal levels. It should also be noted that construal-level theory posits that concerns about resources lead to lower level construals. However, this proposition has not yet been tested in the context of effort. Existing research has shown that proximity leads to concerns about feasibility (Liberman and Trope 1998) and that thinking about feasibility of a future outcome leads to perceptions of proximity (Liberman et al. 2007). The demonstration that the assessment or experience of one's own current resource levels or effort (i.e., fatigue) could lead to lower level construals is a contribution of our research to construal-level theory.

Past research has suggested that exerting self-control can lead to narrow perspectives and categorization (Bruyneel and Dewitte 2006). A narrow mind-set is consistent with lower level construals, but it represents only one part of the multifaceted construct of lower level construals (Trope and Liberman 2003). Our findings supplement the Bruyneel and Dewitte (2006) work by linking their narrow mind-set findings to construal-level theory. More important, our article reveals why this might occur and how this might affect subsequent decisions. We demonstrate that focus on resources is the process underlying the downward shift in construal level. We further show that such lower construal levels carry over to subsequent tasks and systematically influence consumers' judgments. It is also notable that the construal-level theory literature offers relatively little doc-

umentation of mediation analyses and underlying processes. Our studies also make a contribution by documenting the process underlying the effects of construal level on judgments via mediation analyses (see also Agrawal and Wan 2009; Cheema and Patrick 2008; Herzog, Hansen, and Wanke 2007). Specifically, we show that depletion-driven lower levels of construal affect judgments by altering the importance of higher and lower level features.

Drawing a link between depletion and construal levels could enrich construal-level theory by encouraging future research to examine the role of resources in shaping construal levels. For example, depletion has been linked to lower levels of blood glucose (Gailliot et al. 2007). Can blood glucose be responsible for a greater focus on effort and for lower levels of construal? Future research should examine the relationship between blood glucose and construal level.

It is also important to distinguish our construal-level-driven effects from effects arising from low involvement. One might wonder whether the carryover effects could result from heuristic processing when individuals are fatigued after self-control. We believe that, based on the dual process literature (Eagly and Chaiken 1993) and construal-level literature (Trope and Liberman 2003), heuristic processing is unlikely to explain our effects. Heuristic processing requires that the heuristic cue and product are linked by an implicit theory (Schwarz 2004). It is unlikely that feasibility cues are more susceptible to favorable inferences about the product than desirability cues. Hence, there is no reason to expect feasibility or secondary features to be employed as heuristics under depletion. Both aspects are information equally relevant to the decision option. In addition, heuristic processing cannot explain depleted individuals' preference for the week-based rather than month-based calendar that differed only in the mode of date display but not the total period of time (i.e., 1 year).

### Practical Implications

Our findings offer a new perspective, suggesting that marketers should consider the self-control implications of consumers' surroundings and contexts when designing messages and consumption settings. For instance, a grocery store should take into account the self-control challenge for consumers faced with a lot of choices on their subsequent decisions regarding purchase plans. Similarly, someone selling cell phone plans next to a great-smelling bakery might want to consider that consumers, having to exert self-control, might prefer plans with shorter time frames. Take Mary's situation described at the beginning of this research. A regulatory depletion perspective predicts that depleted consumers like Mary would lean toward indulgence and would prefer a restaurant with great food. Our research shows that depleted consumers are likely to choose a restaurant with a great view over one with great food. Thus, our findings highlight the need to understand the psychology of self-control in consumption contexts and design offerings accordingly. Our findings encourage consumers to be con-

scious of the self-control challenges in their lives and the effects of self-control on their subsequent decisions.

### REFERENCES

- Agrawal, Nidhi and Adam Duhachek (2010), "Emotional Compatibility and the Effectiveness of Anti-drinking Messages: A Defensive Processing Perspective on Shame and Guilt," *Journal of Marketing Research*, 47 (April), 263–73.
- Agrawal, Nidhi, Geeta Menon, and Jennifer Aaker (2007), "Getting Emotional about Health," *Journal of Marketing Research*, 34 (February), 100–113.
- Agrawal, Nidhi and Echo Wen Wan (2009), "Regulating Risk or Risking Regulation? Construal Levels and Depletion Effects in the Processing of Health Messages," *Journal of Consumer Research*, 36 (3), 448–62.
- Baron, Reuben M. and David A. Kenny (1986), "The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations," *Journal of Personality and Social Psychology*, 51 (December), 1173–82.
- Baumeister, Roy F., Ellen Bratslavsky, Mark Muraven, and Dianne M. Tice (1998), "Ego Depletion: Is the Active Self a Limited Resource?" *Journal of Personality and Social Psychology*, 74 (5), 1252–65.
- Block, Richard A. and Dan Zakay (1997), "Prospective and Retrospective Duration Judgments: A Meta-analytic Review," *Psychonomic Bulletin and Review*, 4 (2), 184–97.
- Bruyneel, Sabrina and Siegfried Dewitte (2006), "Exerting Self-Control Induces a Narrow Mindset," Working Paper No. MO-0603, Catholic University of Leuven.
- Chandran, Sucharita and Geeta Menon (2004), "When a Day Means More than a Year: Effects of Temporal Framing on Judgments of Health Risk," *Journal of Consumer Research*, 31 (2), 375–89.
- Cheema, Amar and Vanessa M. Patrick (2008), "Anytime versus Only: Mindsets Moderate the Effect of Expansive versus Restrictive Frames on Promotion Evaluation," *Journal of Marketing Research*, 45 (August), 462–72.
- Clarkson J. Joshua, Edward R. Hirt, Lile Jia, and Marla B. Alexander (2010), "When Perception Is More than Reality: The Effects of Perceived versus Actual Resource Depletion on Self-Regulatory Behavior," *Journal of Personality and Social Psychology*, 98 (1), 29–46.
- Deval, Hélèn, Bruce E. Pfeiffer, Douglas R. Ewing, Xiaoqi Han, Maria L. Cronley, and Frank R. Kardes (2010), "The Effect of Construal Level on Sensitivity to Missing Information," Working Paper, University of Cincinnati, OH.
- Eagly, Alice H. and Shelly Chaiken (1993), *The Psychology of Attitudes*, Fort Worth, TX: Harcourt Brace Jovanovich.
- Freitas, Antonio L., Peter Gollwitzer, and Yaacov Trope (2004), "The Influence of Abstract and Concrete Mindsets on Anticipating and Guiding Others' Self-Regulatory Efforts," *Journal of Experimental Social Psychology*, 40 (November), 739–52.
- Fujita, Kentaro, Yaacov Trope, Nira Liberman, and Maya Levin-Sagi (2006), "Construal Levels and Self-Control," *Journal of Personality and Social Psychology*, 90 (3), 351–67.
- Gailliot, Matthew T., Roy F. Baumeister, C. Nathan DeWall, Jon K. Maner, E. Ashby Plant, Dianne M. Tice, Lauren E. Brewer, and Brandon J. Schmeichel (2007), "Self-Control Relies on Glucose as a Limited Energy Source: Willpower Is More than a Metaphor," *Journal of Personality and Social Psychology*, 92 (2), 325–36.

- Herzog, Stefan M., Jochim Hansen, and Michaela Wanke (2007), "Temporal Distance and Ease of Retrieval," *Journal of Experimental Social Psychology*, 43 (3), 483–88.
- Hong, Jiewen and Brian Sternthal (2010), "The Effects of Consumer Prior Knowledge and Processing Strategies on Judgments," *Journal of Marketing Research*, 47 (2), 301–11.
- Kardes, Frank R., Maria L. Cronley, and John Kim (2006), "Construal-Level Effects on Preference Stability, Preference-Behavior Correspondence, and the Suppression of Competing Brands," *Journal of Consumer Psychology*, 16 (2), 135–44.
- Lee, Angela Y. and Brian Sternthal (1999), "The Effects of Positive Mood on Memory," *Journal of Consumer Research*, 26 (2), 115–27.
- Liberman, Nira and Yaacov Trope (1998), "The Role of Feasibility and Desirability Considerations in Near and Distant Future Decisions: A Test of Temporal Construal Theory," *Journal of Personality and Social Psychology*, 75 (July), 5–18.
- Liberman, Nira, Yaacov Trope, Sean M. McCrea, and Steven J. Sherman (2007), "The Effect of Level of Construal on the Temporal Distance of Activity Enactment," *Journal of Experimental Social Psychology*, 43 (1), 143–49.
- Liu, Wendy (2008), "Focusing on Desirability: The Effect of Decision Interruption and Suspension on Preferences," *Journal of Consumer Research*, 35 (4), 640–52.
- MacKinnon, David P. and James H. Dwyer (1993), "Estimating Mediated Effects in Prevention Studies," *Evaluation Review*, 17 (2), 144–58.
- Muller, Dominique, Charles M. Judd, and Vincent Y. Yzerbyt (2005), "When Moderation Is Mediated and Mediation Is Moderated," *Journal of Personality and Social Psychology*, 89 (December), 852–63.
- Muraven, Mark, Dianne M. Tice, and Roy F. Baumeister (1998), "Self-Control as Limited Resource: Regulatory Depletion Patterns," *Journal of Personality and Social Psychology*, 74 (3), 774–89.
- Pennington, Ginger L. and Neal J. Roese (2003), "Regulatory Focus and Temporal Perspective," *Journal of Experimental Social Psychology*, 39 (6), 563–76.
- Sagrastano, Michael D., Yaacov Trope, and Nira Liberman (2002), "Time-Dependent Gambling: Odds Now, Money Later," *Journal of Experimental Psychology: General*, 131 (3), 364–76.
- Schmeichel, Brandon J. and Kathleen D. Vohs (2009), "Self-Affirmation and Self-Control: Affirming Core Values Counteracts Ego Depletion," *Journal of Personality and Social Psychology*, 96 (4), 770–82.
- Schwarz, Nobert (2004), "Meta-Cognitive Experiences in Consumer Judgment and Decision Making," *Journal of Consumer Psychology*, 14 (4), 332–48.
- Shiv, Baba, Ziv Carmon, and Dan Ariely (2005), "Placebo Effects of Marketing Actions: Consumers May Get What They Pay For," *Journal of Marketing Research*, 42 (4), 383–93.
- Smith, Pamela K. and Yaacov Trope (2006), "You Focus on the Forest When You're in Charge of the Trees: Power Priming and Abstract Information Processing," *Journal of Personality and Social Psychology*, 90 (4), 578–96.
- Spencer, Steven J., Mark P. Zanna, and Geoffrey T. Fong (2005), "Establishing a Causal Chain: Why Experiments Are Often More Effective than Mediational Analyses in Examining Psychological Processes," *Journal of Personality and Social Psychology*, 89 (6), 845–51.
- Stroop, J. Ridley (1935), "Studies of Interference in Serial-Verbal Reaction," *Journal of Experimental Psychology*, 18 (6), 643–62.
- Trope, Yaacov and Nira Liberman (2000), "Temporal Construal and Time-Dependent Changes in Preference," *Journal of Personality and Social Psychology*, 79 (6), 876–89.
- (2003), "Temporal Construal," *Psychological Review*, 110 (July), 403–21.
- Vallacher, Robin R. and Daniel M. Wegner (1985), *A Theory of Action Identification*, Hillsdale, NJ: Erlbaum.
- (1987), "What Do People Think They're Doing? Action Identification and Human Behavior," *Psychological Review*, 94 (1), 3–15.
- (1989), "Levels of Personal Agency: Individual Variation in Action Identification," *Journal of Personality and Social Psychology*, 57 (October), 660–71.
- Vohs, Kathleen D., Roy F. Baumeister, Brandon J. Schmeichel, Jean M. Twenge, Noelle M. Nelson, and Dianne M. Tice (2008a), "Making Choices Impairs Subsequent Self-Control: A Limited-Resource Account of Decision Making, Self-Regulation, and Active Initiative," *Journal of Personality and Social Psychology*, 94 (5), 883–98.
- Vohs, Kathleen D., Roy F. Baumeister, and Dianne M. Tice (2008b), "Self-Regulation: Goals, Consumption, and Choices," in *Handbook of Consumer Psychology*, ed. Curtis P. Haugtvedt, Paul Herr, and Frank Kardes, New York: LEA/Psychology Press, 349–66.
- Vohs, Kathleen D. and Ronald J. Faber (2007), "Spent Resources: Self-Regulation Resource Availability Affects Impulse Buying," *Journal of Consumer Research*, 33 (March), 537–47.
- Vohs, Kathleen D. and Brandon Schmeichel (2003), "Self-Regulation and the Extended Now: Controlling the Self Alters the Subjective Experience of Time," *Journal of Personality and Social Psychology*, 85 (August), 217–30.
- Wan, Echo Wen, Alice M. Isen, and Brian Sternthal (2010), "The Influence of Positive Affect on Regulatory Depletion," Working Paper, University of Hong Kong.
- Wan, Echo Wen and Brian Sternthal (2008), "Regulating the Effects of Depletion through Monitoring," *Personality and Social Psychology Bulletin*, 34 (1), 47–60.
- Watson, David, Lee Anna Clark, and Auke Tellegen (1988), "Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales," *Journal of Personality and Social Psychology*, 54 (6), 1063–70.