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The Bright Side of Impulse: Depletion Heightens Self-Protective Behavior in the Face of Danger

MONIKA LISJAK
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Ample research suggests that after engaging in a self-regulatory task, people become depleted and are more likely to behave in maladaptive ways by yielding to their impulses. However, yielding to impulses may not always be maladaptive. This research suggests that when people are depleted, they feel more vulnerable when encountering potential danger and are therefore more likely to engage in self-protection. Across five studies, depleted (vs. nondepleted) participants reported being less likely to engage in risky behaviors such as having unprotected sex (study 1) and more likely to engage in risk-reduction behaviors such as getting tested for kidney diseases and chlamydia (studies 2 and 3). Depleted individuals also preferred products that emphasize safety (studies 4 and 5). Perceived vulnerability is shown to mediate the effect of depletion on self-protective behavior (studies 1 and 2). Together, these findings show that yielding to impulses may sometimes help attain beneficial and healthful goals.

Consumers engage in self-regulation on a daily basis in the pursuit of goals that benefit the self: they control their calorie intake, make difficult decisions that involve trade-offs, and keep to their workout routine even with a busy schedule. It is generally agreed that self-regulation, which involves overriding or altering one's spontaneous and impulsive responses, is necessary to attain goals that are normatively viewed as beneficial, healthful, and virtuous (e.g., Baumeister and Heatherton 1996; for exception, see Rawn and Vohs 2011). Consistent with this premise, studies have shown that people yield to their impulses and engage

in maladaptive, unhealthful, and harmful behaviors when their self-regulatory resource is depleted (for a review, see Baumeister and Heatherton 1996). For example, after engaging in a self-regulatory task that involves suppressing one's facial expressions while watching an emotional video, dieters were more likely to break their diets (Vohs and Heatherton 2000). And after controlling their attention while watching a video, people responded more violently when provoked by their partner (Finkel et al. 2009). These findings are consistent with the notion that people yield to their impulses when they are depleted, which results in maladaptive and unhealthful behaviors.

However, we suggest that yielding to impulses may not always be maladaptive and unhealthful. Our view is that people's sense of vulnerability is heightened when they are depleted and sense danger in the environment because they have less self-regulatory resource to guard against dangers. This increased vulnerability in turn enhances their motivation to protect the self, resulting in a reversal of the pattern of harmful behaviors. Thus, we posit that depleted (vs. nondepleted) individuals will follow their self-protective impulse and behave in more—rather than less—beneficial and healthful ways when faced with potential dangers; in particular, they would be more likely to take steps to guard against or reduce the risk of potential dangers and demonstrate stronger preference for products that emphasize safety.

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In what follows, we first review the self-regulation and depletion literatures. Next, we draw on the health and consumer psychology literatures to formulate our hypothesis that depletion activates a self-protection motivation. We then present five studies designed to test this hypothesis and to uncover the underlying process. Finally, we discuss the implications of the findings in a broader context.

THEORETICAL BACKGROUND

Self-regulation is the process of overriding or altering one's spontaneous and impulsive responses (Baumeister and Heatherton 1996) and has often been associated with the attainment of beneficial, healthful, and virtuous goals such as being healthy, performing well academically, and maintaining loving relationships. There is ample evidence that failures in self-regulation are responsible for a broad range of maladaptive, unhealthy, and harmful behaviors such as crime, domestic violence, and academic underachievement. One of the most prevalent models of self-regulation suggests that all acts of self-regulation draw from a common, limited pool of resources such that after engaging in an act of self-regulation, people become depleted and have less resource to engage in subsequent self-regulatory acts (Muraven and Baumeister 2000). Indeed, many studies have shown that engaging in one self-regulatory task undermines the performance of subsequent self-regulatory tasks (Baumeister et al. 1998; Muraven, Tice, and Baumeister 1998; for a review, see Baumeister, Schmeichel, and Vohs 2007; Hagger et al. 2010). For example, it has been shown that people spent money more freely after suppressing (vs. not) unwanted thoughts (Vohs and Faber 2007). And after learning about a stressful (vs. nonstressful) administrative reform that presumably requires resources for coping, administrative staff were less effective in handling customer complaints (Chan and Wan 2012).

The detrimental effects of self-regulation failures have been documented across a variety of depleting activities that include controlling impulses (e.g., resisting the impulse to read the word instead of naming the font color in a color-naming task; Pochepstova et al. 2009), regulating emotions (e.g., suppressing emotional responses when watching emotion-laden videos; Baumeister et al. 1998; Vohs and Heatherton 2000), or making a series of choices (e.g., choosing different product options; Vohs et al. 2008; Wang et al. 2010). The consequences of depletion have also been demonstrated across a variety of domains such as overeating (Vohs and Heatherton 2000), responding aggressively to provocations (DeWall et al. 2007; Finkel et al. 2009), impaired intellectual performance (Schmeichel, Vohs, and Baumeister 2003), and weakened physical persistence (Muraven et al. 1998). Together, these findings suggest that depletion diminishes subsequent self-regulation, leading to maladaptive and unhealthy behaviors that undermine people's long-term goals.

DEPLETION HEIGHTENS SELF-PROTECTION MOTIVATION IN THE FACE OF DANGER

In this article, we suggest that depletion may not always result in behaviors that are inconsistent with their healthful and virtuous goals. In particular, we propose that depleted people may feel more vulnerable when faced with danger. As a result of this heightened vulnerability, depleted people may ironically behave in more self-protective and healthful ways than their nondepleted counterparts.

Self-protection is a fundamental motivational system for dealing with dangers (for a review, see Kenrick et al. 2010) and is widely agreed as central to survival. According to Darwin (1859/1981), the "struggle for existence" is the result of self-protection motivation. Maslow (1943) also views safety as a fundamental motivation that takes precedence over other motivations in guiding behavior. Studies showing that people are automatically attuned to danger-related cues provide empirical evidence for the fundamental and instinctive nature of self-protection (e.g., Dijksterhuis and Aarts 2003; Öhman, Lundqvist, and Esteves 2001; Pratto and John 1991; Wentura, Rothermund, and Bak 2000). Importantly, we note that while self-protection has been conceptualized as a broad motivation, the tendency to avoid danger when confronted with risky situations is impulsive and spontaneous in nature (Kenrick et al. 2010; Öhman et al. 2001). This is consistent with the notion that impulses are behavioral tendencies that are "specific rather than unspecific, arising when more global motivations (e.g., thirst) meet specific activating stimuli in the environment," such as a refreshing drink (Hofmann, Friese, and Strack 2009, 163; see also Rawn and Vohs 2011).

Similar to other motivational orientations, the motivation to protect the self may be chronically salient among individuals, like the chronically anxious who constantly believe they are at risk (e.g., MacLeod, Mathews, and Tata 1986). But people's self-protection motivation can also be temporarily heightened in the presence of contextual cues such as angry facial expressions (e.g., Ackerman et al. 2006) or ambient darkness (e.g., Schaller, Park, and Faulkner 2003). When people's self-protection motivation is salient, either chronically or temporarily, they are more attuned to danger-related cues and are less likely to engage in risky behaviors (e.g., MacLeod et al. 1986). In the health domain, a self-protection motivation has been shown to increase health-oriented behaviors such as avoiding unprotected sex (e.g., Fisher and Fisher 1992) or getting tested for a disease (e.g., Luce and Kahn 1999; Menon, Block, and Ramanathan 2002).

In this research, we propose that, analogous to how ambient darkness undermines people's visual system and heightens self-protection motivation, the state of depletion, which is known to undermine people's cognitive system, also heightens self-protection motivation. Suggestive evidence that depletion arouses a self-protection motivation has been documented in the empathy gap, neuroscience, and

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animal literatures. First, findings in the empathy gap literature (Loewenstein 1996) show that people in a cold or nonimpulsive state often underestimate the influence of a visceral drive, whereas those in an impulsive or hot state typically perceive themselves to have less control over their impulses than those in a cold or nonimpulsive state (Nordgren, van der Pligt, and van Harreveld 2007; Nordgren, van Harreveld, and van der Pligt 2009). To the extent that depletion is an impulsive state (Baumeister 2002; Hofmann et al. 2009), depleted individuals may perceive themselves as having less control, which would make them feel more vulnerable and in turn heighten self-protection motivation. Further, recent neuroscientific evidence shows that depleted individuals experience increased activity in the amygdala when exposed to negative (but not to positive or neutral) images from the International Affective Picture System (IAPS; Lang, Bradley, and Cuthbert 2008), similar to individuals who chronically believe that they are at risk to dangers. Given that negative IAPS images are typically ones that depict danger—such as a snake, or a gun to the head (Wagner and Heatherton 2013), these findings suggest that activities in regions of the brain involved in danger detection and self-protection are amplified when people are depleted. Finally, animal research suggests that animals engage in self-protective behaviors when valuable resources are depleted. For example, birds and mammals scan the environment more often when their group size is reduced (Berger 1978; Caraco 1979; for a review, see Lima and Dill 1990), while undernourished cockroaches exhibit lower levels of risky exploration and foraging activities than well-nourished ones (Mishra et al. 2011). Drawing on these findings, we propose that just as animals are more likely to engage in self-protective behavior when valuable resources are scarce, people are more likely to engage in self-protective behaviors when self-regulatory resources are depleted.

Our view is that people feel more vulnerable when they are depleted because they have less resource to protect themselves against dangers. People who feel vulnerable often perceive themselves to be at risk, and they feel worried and concerned (McCaul, Schroeder, and Reid 1996; Weinstein 1982). The association between depletion and vulnerability may be innate, or it may be the result of learning over time that bad outcomes happen more often when people are depleted. However, regardless of whether the association between depletion and vulnerability is innate or learned, research in health and consumer psychology suggests that feelings of vulnerability heighten self-protective motivation. In fact, the notion that perceived vulnerability is a major motivational force behind self-protective behavior is a common tenet among many theories, including the protection motivation theory (Rogers 1975), the health belief model (Becker 1974; Rosenstock 1974), and the precaution adoption process model (Weinstein 1988). Consistent with this belief, perceived vulnerability to a disease has been shown to increase people's intentions to learn more about the disease, to get tested for the disease, and to donate money to research aimed at preventing the disease (e.g., Hong and

Lee 2008; Luce and Kahn 1999; Menon et al. 2002; Puntoni, Sweldens, and Tavassoli 2011; for a review, see Menon, Raghuram, and Agrawal 2007).

Building on this work, we propose that depleted people feel more vulnerable when they encounter potential danger. This increased vulnerability in turn heightens their self-protection motivation. Thus, people are more motivated to engage in healthful behavior when they are depleted and perceive their safety to be at stake as compared to those who are not depleted. While prior research has demonstrated the link between vulnerability and self-protection, this article contributes to the literature by establishing the association between depletion and one's self-protection motivation that is mediated by a heightened sense of vulnerability.

RESEARCH OVERVIEW

The objective of the present research was twofold. First, we wanted to examine how the state of depletion may signal the need for self-protection when danger looms. Second, we wanted to document the process underlying this effect. In particular, we propose that depletion heightens feelings of vulnerability that leads to more self-protective behaviors. To these aims, we conducted five studies using the classic depletion two-task paradigm to test our hypotheses. Across the studies, we first manipulated depletion (using a Stroop task in studies 1 and 2 and a restrained writing task in study 3) or assessed depletion (by measuring self-regulatory exertions in studies 4 and 5). Then, we observed the effects of depletion on a variety of tasks designed to reflect self-protection motivation. More specifically, we explored how depletion influences the extent to which people may yield to or suppress their sexual impulse when safety is at stake (study 1). We also examined depleted (vs. nondepleted) participants' self-reported (study 2) as well as actual (study 3) willingness to comply with a health message as a function of perceived risk. Finally, we explored the implications of the depletion effect on product judgments (study 4) and choice (study 5) by examining how depletion may influence people's preference for products that highlight safety features.

STUDY 1: UNPROTECTED SEX

The objective of study 1 was to examine the effect of depletion on self-protection motivation. Prior research shows that depletion weakens self-regulation and hence reduces sexual restraint (Gailliot and Baumeister 2007). In this study, we sought to examine how depletion may affect sexual restraints in the face of potential dangers. Our prediction was that depleted (vs. nondepleted) individuals would be more likely to yield to their impulse and engage in sexual intercourse with an attractive acquaintance, as consistent with prior research (Gailliot and Baumeister 2007), but only when it is safe. When danger looms, we predicted that depleted individuals would feel more vulnerable and in turn be less likely to engage in unprotected sexual intercourse.

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We first manipulated depletion and then presented participants with a scenario describing an individual potentially having a sexual encounter. In one scenario, the protagonist had the opportunity to engage in protected sexual intercourse; in a different scenario, the potential sexual encounter was unprotected. Participants were asked to imagine themselves in that situation and to indicate their likelihood of engaging in sexual intercourse. We predicted that depleted (vs. nondepleted) participants in the protected sex scenario would indicate greater likelihood to engage in sexual intercourse. However, when faced with the potential danger associated with unprotected sexual intercourse, depleted (vs. nondepleted) participants would be more likely to follow their self-protection impulse than their sexual impulse and hence express lower likelihood to engage in sexual intercourse. We further predicted that perceptions of vulnerability underlie depleted participants' decision when potential danger looms.

Method

Two hundred and eleven Northwestern University students (127 females) participated in an Internet survey for a 1 in 50 chance of winning a \$35 gift card at a major online retailer. They were randomly assigned to one of the 2 (depletion: depletion, nondepletion) \times 2 (scenario: protected sex, unprotected sex) experimental conditions.

Participants were informed at the outset that they would be participating in a series of unrelated studies conducted by different researchers. We first manipulated depletion using the Stroop task (Stroop 1935). Following previous research (DeWall et al. 2007; Pocheptsova et al. 2009), participants were presented with 40 color words, one at a time. The words were written in a font color that was different from the semantic meaning of the word (e.g., the word "Green" written in yellow). Participants randomly assigned to the depletion condition were asked to indicate the font color of the word, while those assigned to the nondepletion condition were instructed to indicate the semantic meaning of the word. For example, the word "Green" would be presented in yellow on the screen together with two answer keys, one marked as "Green" and the other marked as "Yellow." Participants assigned to the depletion condition were supposed to click on the key marked "Yellow," while participants assigned to the nondepletion condition were supposed to click on the key marked "Green." To provide a correct response, participants in the depletion condition would have to expend resources to suppress their natural impulse to respond based on what the word says and focus on the color of the word instead.

Next, participants were asked to imagine that they ran into a very attractive acquaintance at a bar (see scenarios in the appendix). When the bar closed, they walked home and started making out on the couch. Participants in the protected sex condition read that they had a condom, while those in the unprotected sex condition read that they did not have a condom although the female was on the pill (adapted from Anderson and Galinsky 2006; MacDonald et

al. 2000). After reading the scenario, participants responded to the question: "If you were in this situation, how likely would you have sex with the person?" (1 = not at all likely, 9 = very likely), as in the MacDonald et al. (2000) study. Next, we assessed participants' perceived vulnerability by asking them to express their level of agreement on a 9-point scale (1 = strongly disagree, 9 = strongly agree) with the statements that (a) there would be much to worry if they had sex in that situation, (b) having sex in that situation might be questionable on moral grounds, (c) having sex in that situation might transmit an STD (sexually transmitted disease), and (d) having sex in that situation might make the female pregnant ($\alpha = .71$; a factor analysis revealed that the four items load on a single factor, which explains 53.9% of the total variance; the results also hold regardless of whether item b is included in the index). Finally, participants evaluated how effortful the depletion task was (1 = does not require attention, does not require effort, not at all difficult, 9 = requires attention, requires effort, very difficult; $\alpha = .82$) and how they were feeling at that point in time (1 = negative mood, sad, anxious, 9 = positive mood, relaxed, happy; $\alpha = .79$). Upon completion of the task, participants were thanked and debriefed.

Results and Discussion

As men and women differ in their general willingness to have casual sex (Anderson and Galinsky 2006; Clark and Hatfield 1989; MacDonald et al. 2000), we conducted a 2 (depletion: depletion, nondepletion) \times 2 (scenario: protected sex, unprotected sex) \times 2 (gender of participant: male vs. female) between participants ANOVA on our dependent variables. When gender was excluded from the model, the predicted pattern of results continued to hold.

Manipulation Check. A 2 \times 2 \times 2 ANOVA on the perceived effortfulness of the depletion task revealed the predicted main effect of depletion ($F(1, 200) = 9.60, p < .01$), such that depleted participants ($M = 5.30$) considered the task to be more effortful than nondepleted participants ($M = 4.46$; three responses were missing). The analysis also revealed an effect of gender ($F(1, 200) = 5.28, p = .02$), such that female participants felt the task was more effortful ($M = 5.18$) than male participants ($M = 4.53$). No other effects were significant ($F \leq 1, p > .3$). A similar analysis on mood revealed a marginal scenario \times gender interaction ($F(1, 203) = 3.14, p = .08$) and a marginal depletion \times gender interaction ($F(1, 203) = 3.39, p = .07$). However, the main effect of depletion, the depletion \times scenario interaction, and the depletion \times scenario \times gender interaction were not significant ($F < 2.2, p > .1$), suggesting that any difference in participants' likelihood to engage in sexual activities could not be explained by mood.

Hypothesis Testing. Next, we examined how being depleted influenced participants' reported likelihood to engage in sexual intercourse. Our prediction was that depleted (vs. nondepleted) participants would be more likely to follow

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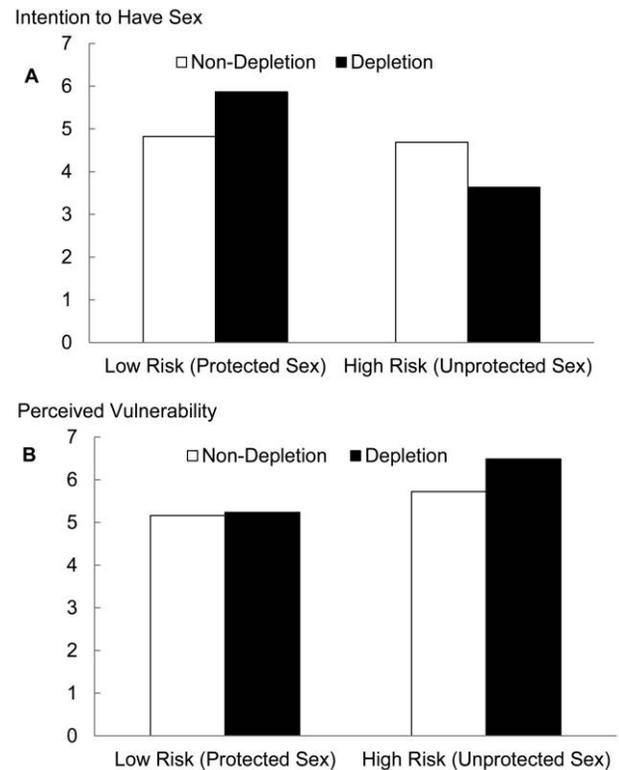
their sexual impulse in the protected sex scenario, but more likely to follow their self-protective instincts instead in the unprotected sex scenario. To test these predictions, we conducted a $2 \times 2 \times 2$ ANOVA on participants' reported likelihood to engage in sexual intercourse. The analysis revealed a main effect of scenario ($F(1, 203) = 13.99, p < .01$), such that participants reported greater likelihood to engage in protected than unprotected sexual intercourse ($M = 5.42$ vs. 4.11), and a main effect of gender ($F(1, 203) = 6.85, p = .01$), whereby male participants ($M = 5.36$) reported being more likely to engage in sexual intercourse than female participants ($M = 4.39$).

More central to this research, the analysis yielded the predicted depletion \times scenario interaction ($F(1, 203) = 9.06, p < .01$), as illustrated in figure 1. In the protected sex condition, depleted participants ($M = 5.87$) reported being more likely to engage in sexual intercourse compared to their nondepleted counterparts ($M = 4.82; t(207) = 2.04, p = .04$), replicating past findings (Gailliot and Baumeister 2007). However, consistent with our predictions, depleted participants in the unprotected sex condition ($M = 3.63$) indicated lower likelihood to engage in sexual intercourse relative to their nondepleted counterparts ($M = 4.69; t(207) = 2.06, p = .04$). In addition to the predicted interaction, the analysis also revealed a scenario \times gender interaction ($F(1, 203) = 4.24, p = .04$); male participants were more likely to engage in sexual intercourse than female participants in the protected sex condition ($M = 6.49$ vs. $4.75; t(207) = 3.35, p < .01$), but not in the unprotected sex condition ($M = 4.28$ vs. $4.00; -1 < t < 1$). The three-way interaction was nonsignificant ($F < 1$). These results provide support for our hypothesis that depletion motivates self-protective behaviors.

Next, we sought to examine the role of perceived vulnerability in participants' intentions to engage in sexual intercourse. A $2 \times 2 \times 2$ ANOVA on perceived vulnerability showed the predicted main effect of scenario ($F(1, 203) = 12.82, p < .01$), such that participants in the unprotected sex scenario ($M = 5.88$) perceived themselves to be more vulnerable than those in the protected sex scenario ($M = 5.17$); there was also a marginal effect of gender ($F(1, 203) = 3.56, p = .06$), such that females ($M = 5.70$) reported feeling marginally more vulnerable than males ($M = 5.25$), and a marginal effect of depletion ($F(1, 203) = 2.86, p = .09$), such that depleted participants ($M = 5.71$) reported feeling marginally more vulnerable than nondepleted participants ($M = 5.29$). More central to this research, the analysis showed the predicted scenario \times depletion interaction ($F(1, 203) = 5.04, p = .03$). Follow-up analyses showed that depleted and nondepleted participants reported similar levels of vulnerability in the protected sex condition ($M = 5.15$ vs. $5.19; -1 < t < 1$). However, depleted participants in the unprotected sex condition reported feeling more vulnerable than their nondepleted counterparts ($M = 6.30$ vs. $5.39; t(207) = 2.96, p < .01$). From a slightly different perspective, depleted participants felt more vulnerable in the unprotected sex than protected sex condition

FIGURE 1

EFFECT OF DEPLETION AND TYPE OF SCENARIO ON
(A) INTENTION TO ENGAGE IN SEXUAL BEHAVIOR AND
(B) PERCEIVED VULNERABILITY (STUDY 1)



($t(207) = 3.97, p < .01$), whereas nondepleted participants' perceived vulnerability did not differ between the two conditions ($-1 < t < 1$).

The scenario \times gender interaction was also significant ($F(1, 203) = 5.92, p = .02$). Subsequent contrasts showed that male participants felt less vulnerable than female participants in the protected sex condition ($M = 4.56$ vs. $5.55; t(207) = 3.13, p < .01$) but not in the unprotected sex condition ($M = 5.91$ vs. $5.86; -1 < t < 1$). The depletion \times scenario \times gender interaction was nonsignificant ($F < 1$).

Moderated Mediation Analysis. We predicted that perceived vulnerability would mediate the effect of depletion on participants' likelihood to engage in sexual intercourse in the unprotected sex condition but not in the protected sex condition. Following Preacher, Rucker, and Hayes (2007), we tested the moderated mediation hypothesis using the bootstrapping analyses in the SPSS moderated mediation macro (MODMED; model 2). Specifically, we entered depletion as the independent variable, perceived vulnerability as the mediator, the type of scenario as the moderator of the relationship between depletion and perceived vulnera-

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bility, gender as a covariate, and the likelihood to engage in sexual intercourse as the dependent variable. As predicted, the analysis (based on 5,000 bootstrap samples) confirmed that perceived vulnerability mediated the effect of depletion on the likelihood to engage in sexual intercourse in the unprotected sex condition ($\beta = -.37$; $p < .01$, 95% CI = $-.63$ to $-.13$), but not in the protected sex condition ($\beta = .02$; $p > .80$, 95% CI = $-.25$ to $.28$).

Discussion. The results of study 1 replicate past research by showing that depleted (vs. nondepleted) individuals are more likely to follow their sexual impulse in the absence of safety concerns. However, our results also show that when potential risks loom high, those who are depleted are more likely to follow their self-protective instincts and make more healthful and self-protective decisions instead. Thus, these results offer initial evidence that people's motivation to protect the self against danger is heightened when they are depleted, and that heightened feelings of vulnerability underlie the effect of depletion on self-protection in the face of danger.

In this study, we demonstrated the effect of depletion on participants' sexual restraint when potential danger is salient (or not) and examined the role of perceived vulnerability by assessing the extent to which participants were concerned about the potential risks of engaging in sexual activities. We sought to provide further evidence for the hypothesized effect and its underlying mechanism in study 2 using a different context.

STUDY 2: KIDNEY DISEASE TESTING

The objective of study 2 was to provide further evidence that depleted individuals feel more vulnerable when faced with potential danger, which in turn heightens their intentions to engage in self-protective behavior. To test our hypothesis, we examined participants' likelihood to get tested for kidney disease. We operationalized danger by assessing participants' family history with regard to kidney disease after informing them that those with a family history of kidney disease were most likely to be at risk. We reasoned that those with a family history of kidney disease would be more likely to view the disease as a potential danger to their health and hence would feel more vulnerable when depleted. In the study, we first depleted half of the participants and then presented all participants with a health message that first describes the dangers of kidney disease and then advocates that people get tested for kidney disease to minimize the risks associated with late detection of the disease. We predicted that among those with a family history of kidney disease, participants who were depleted (vs. not) would express higher intentions to get tested; however, depletion should not play any role in participants' intentions to get tested among those with no family history of kidney disease.

Method

Two hundred and fourteen individuals (156 females, median age 40 years, range 18–78) from a nationwide online subject pool participated in an Internet survey for a 1 in 25 chance of winning a \$25 gift card at a major online retailer. Participants were first randomly assigned to one of the two depletion conditions. Depletion was manipulated as in study 1 using the Stroop task. Then, in an ostensibly unrelated study, participants were presented with a message advocating people to get tested for kidney disease. The message described kidney disease ("it occurs when the blood filters inside your kidneys are damaged, which leads to the buildup of waste and excess fluids inside the body"), its consequences ("having kidney problems can damage the body in many ways, leading to brain damage, organ failure, bone problems, other health complications, and death") and some of the common symptoms associated with the disease ("feeling tired or dizzy, swelling in the ankles, feet, or hands, shortness of breath"). The message also stated that kidney disease often shows no symptoms until the problem is far along. Next, the message emphasized that "early detection of kidney disease is critical since it can prevent the disease from becoming chronic and causing liver failure and death" and described the test used to diagnose the disease. Finally, the message stated that "the disease is more commonly seen in individuals who have a family member with kidney disease" and concluded by inviting people to "Call the Health Service Today to Schedule Your Kidney Disease Test!"

After reading the message, participants were asked to report their vulnerability to kidney disease using items that tap into the cognitive and emotional aspects of the construct (McCaul et al. 1996). In particular, they were asked to indicate using a four-item 9-point scale (1 = not at all, 9 = very much) the extent to which (a) they believe they are at risk for kidney disease, (b) they believe that they are likely to contract kidney disease, (c) they are concerned that they may have kidney disease, and (d) they worry that they may have kidney disease ($\alpha = .94$). Next, following Hong and Lee (2008), participants were asked to report their intentions to get tested (1 = not at all, 9 = very much). At the end of the study, participants reported whether any of their family members have been diagnosed with kidney disease (1 = no, 2 = yes), and how effortful the depletion task was (1 = does not require attention, does not require effort, not at all difficult, 9 = requires attention, requires effort, very difficult; $\alpha = .80$). Participants were then thanked and debriefed.

Results and Discussion

Manipulation Check. Forty-three out of 214 participants reported having family history with kidney disease (25 in the depletion condition and 18 in the nondepletion condition). We first checked whether the experimental manipulation affected respondents' reported history with kidney disease. As expected, a 2 (depletion) ANOVA on people's self-reported history revealed no significant effect ($F < 1$),

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confirming that self-reported family history with kidney disease as an independent predictor in the model is appropriate.

Similar to study 1, we first assessed participants' perception of the depletion task. A 2 (depletion) \times 2 (family history) ANOVA on the perceived effortfulness of the depletion task yielded the predicted main effect of depletion ($F(1, 210) = 6.54, p = .01$), such that depleted participants ($M = 5.72$) perceived the depletion task to be more effortful than nondepleted participants ($M = 4.73$). No other effect was significant ($p > .2$).

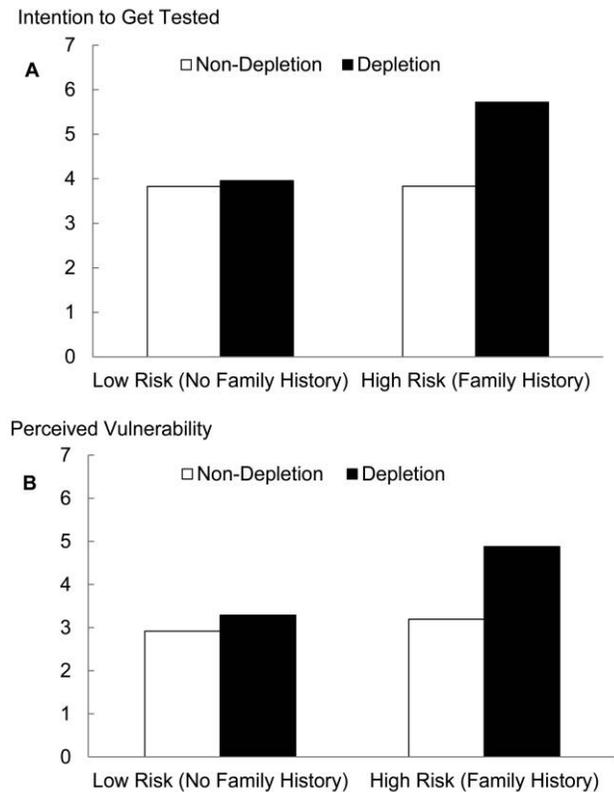
Hypothesis Testing. To assess whether depleted individuals would be more likely to comply with the health message than their nondepleted counterparts when their health risk was high (vs. low), we conducted a 2 (depletion) \times 2 (family history) ANOVA on the self-reported likelihood to get tested. The results yielded a main effect of family history ($F(1, 210) = 4.38, p = .04$), a main effect of depletion ($F(1, 210) = 5.67, p = .02$), and the predicted depletion \times family history interaction ($F(1, 210) = 4.34, p = .04$), as illustrated in figure 2. Consistent with our predictions, among those with family history of kidney disease, depleted participants reported greater intention to get tested ($M = 5.72$) relative to their nondepleted counterparts ($M = 3.83; t(210) = 2.49, p = .01$). However, depletion had no effect among those who did not have any family history of kidney disease such that depleted ($M = 3.96$) and nondepleted participants were equally likely to get tested ($M = 3.83; -1 < t < 1$). From a slightly different perspective, depleted participants reported greater intentions to get tested when family history suggested that they were (vs. were not) at risk ($t(210) = 3.18, p < .01$), while nondepleted participants' intentions to get tested were not influenced by family history ($-1 < t < 1$).

Next, we examined how depletion and family history may influence participants' perceived vulnerability. Our prediction was that depletion should make those participants with a family history of kidney disease feel even more vulnerable. As expected, a 2 (depletion) \times 2 (family history) ANOVA yielded a main effect of depletion ($F(1, 210) = 10.37, p < .01$) such that those who were depleted reported feeling more vulnerable, and a main effect of family history ($F(1, 210) = 8.59, p < .01$) such that those with a family history of kidney disease also felt more vulnerable. As predicted, the depletion \times family history interaction was significant ($F(1, 210) = 4.26, p = .04$). Among those with a family history of kidney disease, depleted participants ($M = 4.88$) reported feeling more vulnerable than nondepleted participants ($M = 3.19; t(210) = 2.49, p = .01$); however, among those with no family history of kidney disease, depleted ($M = 3.29$) and nondepleted participants ($M = 2.92$) reported feeling equally vulnerable ($t(210) = 1.30, p = .19$). Thus, these results confirm that when potential danger looms (i.e., there is a family history of kidney disease), being depleted makes people feel more vulnerable and prompted them to take action to protect the self.

Moderated Mediation Analysis. Next, we examined the role of feelings of vulnerability in participants' intentions

FIGURE 2

EFFECT OF DEPLETION AND HEALTH RISK ON
(A) INTENTION TO GET TESTED FOR KIDNEY DISEASE AND
(B) PERCEIVED VULNERABILITY (STUDY 2)



to get tested for kidney disease. Our hypothesis was that feelings of vulnerability mediate the depletion effect on intentions to get tested for kidney disease when health risk is high, but not when health risk is low. Similar to study 1, we tested the moderated mediation hypothesis using the bootstrapping analyses (MODMED; model 2), entering depletion as the independent variable, perceived vulnerability as the mediator, family history with kidney disease as the moderator of the relationship between depletion and perceived vulnerability, and the likelihood to get tested as the dependent variable. As predicted, the analysis (based on 5,000 bootstrap samples) confirmed that perceived vulnerability mediated the effect of depletion on the likelihood to get tested among participants with a family history of kidney disease ($\beta = .70; p < .01, 95\% \text{ CI} = .17 \text{ to } 1.20$) but not among those with no family history of kidney disease ($\beta = .15; p > .15, 95\% \text{ CI} = -.06 \text{ to } .38$).

Discussion. This study shows that after engaging in activities that taxed their self-regulatory resources, participants who perceived themselves at risk for kidney disease reported feeling more vulnerable and expressed greater willingness

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to get tested for the disease. Using a sample of participants from the general public and a different context, these results provide additional support for the notion that depleted people feel more vulnerable when faced with potential danger and are more motivated to protect the self.

To ensure that these results are not an artifact of uneven cell sizes in the design (since only 43 of the 214 participants had a family history with kidney disease), we randomly selected 25 depleted and 25 nondepleted participants among those who did not have a family history and reran all the analyses. The results showed that all the analysis remained robust.

Taken together, these results provide convergent support for the notion that depletion heightens feelings of vulnerability when safety is at stake, and in turn prompts decisions that lead to more beneficial and healthier outcomes. In studies 1 and 2, participants were presented with hypothetical scenarios and asked to make hypothetical decisions. We sought to test the hypothesized depletion effect on actual self-protective behaviors in the next study.

STUDY 3: CHLAMYDIA TESTING

We tested the robustness of the depletion effects in study 3 by using a different depletion induction and by observing participants' actual behaviors in a different health risk context. As in the previous studies, we first depleted half of the participants. We then presented all participants with a message advocating the benefits of getting tested for chlamydia, a common STD that can cause serious, permanent damage to a woman's reproductive organs. To manipulate perceived risk, we presented participants with information on behaviors that would put them at risk for this disease. Participants in the high-risk condition would read about fairly common behaviors that people frequently engage in, whereas those in the low-risk condition would read about less frequent behaviors. Finally, participants were given the opportunity to schedule an appointment to get tested. We predicted that when participants perceived themselves to be at high risk, those who were depleted (vs. nondepleted) would be more concerned about their health and hence be more likely to schedule a chlamydia test. However, when perceived health risk was low, depleted and nondepleted participants should be equally likely to schedule a chlamydia test.

Method

Because the most common and serious consequences of chlamydia (e.g., pelvic inflammatory disease, pregnancy complication, and infertility) apply only to women, we only recruited female participants for this study. One hundred and forty-nine Erasmus University female students participated in the study in exchange for course credit. They were randomly assigned to one of the 2 (depletion: depletion, nondepletion) \times 2 (health risk: high, low) experimental conditions. Depletion was manipulated by using a restrained essay-writing task (Schmeichel 2007). Participants in the nondepletion condition were asked to write an essay about

a trip that they had recently taken, whereas those in the depletion condition were asked to write a similar essay but without using the letter "a" or "n" in the text. Thus, participants in the depletion (vs. nondepletion) condition had to pay more attention and expend cognitive resources to select words that excluded two commonly used letters of the alphabet. All participants were given 5 minutes to complete the essay.

Then participants proceeded to the second study, allegedly conducted in collaboration with the medical school to raise STD awareness. As part of the study, participants were presented with a message that encouraged women to get tested for chlamydia. The message described chlamydia ("a common STD caused by a bacterium") and its consequences ("chlamydia can damage a woman's reproductive organs, leading to inability to get pregnant, long-term pelvic pain, and other health complications"). We varied risk perceptions by manipulating the frequency of risk behaviors presented (Hong and Lee 2008; Menon et al. 2002). Half of the participants read that they would be at risk for chlamydia if they engaged in certain activities that are frequently practiced among the undergraduate student population (being sexually active, engaging in oral sex, sharing a razor, and having unprotected sex) while the other half read that they would be at risk if they engaged in certain behaviors that are less frequently practiced (being subject to the use of unsterilized equipment, engaging in homosexual intercourse, having a history of STDs, and having a partner with a history of STDs). The message also emphasized that "early detection of chlamydia is critical, since it can prevent the disease from becoming chronic and damaging women's health." It then described the test used to diagnose the disease and concluded with "Enjoy Life and Be Safe. Schedule Your Chlamydia Test Today!" A survey conducted among 80 female students from the same population (after excluding 5 participants who reported having a history of STDs, being homosexual, or having a partner with a history of STDs) confirmed that participants who read the high-risk message felt more vulnerable (same four items as used in study 2; $\alpha = .75$) than those who read the low-risk message ($M = 2.67$ vs. 2.07 ; $F(1, 78) = 3.99$, $p < .05$).

Next, participants were informed that in an effort to raise awareness about chlamydia prevention, the university medical center would perform free testing for all females enrolled in the university. Participants were then presented with the opportunity to schedule an appointment for chlamydia testing. In particular, participants were asked to specify whether they wanted to get tested (1 = yes, 0 = no) and, if so, to indicate the exact date on which they would like to schedule the test. Then they answered some follow-up questions assessing whether they had engaged in the risk behaviors described in the message (1 = yes, 2 = no) and the perceived difficulty of the depletion task (1 = does not require attention, does not require effort, not at all difficult, 9 = requires attention, requires effort, very difficult; $\alpha = .87$). Finally, participants were thanked and debriefed.

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Results and Discussion

Manipulation Check. Six participants who reported having a history of STDs, being homosexual, or having a partner with a history of STDs were excluded from the analysis. To examine whether the depleting task was more effortful than the nondepleting task, we conducted a 2 (depletion) \times 2 (health risk) ANOVA on the perceived effortfulness of the depletion task, which yielded the predicted main effect of depletion ($F(1, 139) = 199.49, p < .01$), such that depleted participants ($M = 8.09$) perceived the depletion task to be more effortful than nondepleted participants ($M = 4.81$). No other effect was significant ($p > .25$).

Hypothesis Testing. Next, we assessed whether depleted participants would be more likely to schedule a chlamydia test than their nondepleted peers when they perceived their health risk to be high (vs. low). Participants' decision on whether to schedule a chlamydia test was submitted to a 2 (depletion) \times 2 (health risk) logistic regression. The results showed the predicted depletion \times health risk interaction, ($\exp(B) = 1.66, \text{Wald}(1, N = 143) = 3.89, p = .05$), as illustrated in figure 3. Consistent with our hypothesis, follow-up analyses showed that among those in the high-risk condition, depleted participants were marginally more likely to schedule a chlamydia test than nondepleted participants (23.53% vs. 8.57%; $\exp(B) = 1.81, \text{Wald}(1, N = 143) = 2.68, p = .10$). However, when risk was low, depleted and nondepleted participants were equally likely to schedule a chlamydia test (8.57% vs. 17.95%; $\exp(B) = .66, \text{Wald}(1, N = 143) = 1.33, p = .25$). In other words, nondepleted participants were equally likely to schedule a test across these two conditions ($\exp(B) = .66, \text{Wald}(1, N = 143) = 1.33, p = .25$), whereas depleted participants were marginally more likely to schedule a chlamydia test when their perceived risk was high than when it was low ($\exp(B) = 1.81, \text{Wald}(1, N = 143) = 2.68, p = .10$).

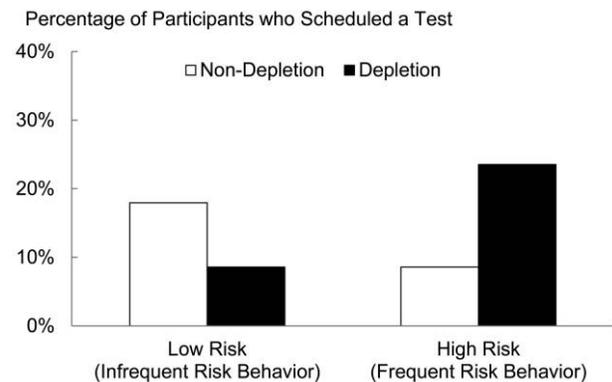
Discussion. In this study, female undergraduate students who had just performed a depleting self-regulatory task were more likely to schedule a chlamydia test upon learning that the disease can be spread by frequent behaviors. Engaging in the depleting task did not affect their likelihood to get tested for chlamydia when they learned that chlamydia is spread by infrequent behaviors. These results provide further evidence that depleted individuals are more likely to engage in self-protective behaviors than nondepleted individuals when potential danger looms.

Taken together, studies 1–3 provide convergent evidence that depleted people are more likely to act to protect the self when the environment signals danger. As illustrated by our mediation analyses in studies 1 and 2, depletion renders people more vulnerable and in turn heightens their self-protection motivation and compels them to engage in healthful behaviors.

However, one could argue that the depletion manipulations used in the previous studies (Stroop task in studies 1 and 2, and the restrained writing task in study 3) might have prompted people to be careful about not making any mis-

FIGURE 3

EFFECT OF DEPLETION AND HEALTH RISK ON THE PERCENTAGE OF PARTICIPANTS SCHEDULING THE CHLAMYDIA TEST (STUDY 3)



takes and in essence primed a vigilant mind-set. That is, the results could have been due to the nature of the depletion manipulations used in the studies rather than depletion per se that motivated our participants to engage in self-protective behaviors. We addressed this concern in the next two studies by operationalizing depletion in a way that would not invoke a vigilant mind-set.

STUDY 4: LAPTOP EVALUATION

One objective of study 4 was to provide further evidence that depletion heightens a motivational state by showing how depletion may influence product evaluation by shifting the weight people place on safety-related features. Extant research suggests that objects that support accessible goals are perceived as more positive (Nisbett and Kanouse 1969), whereas those that conflict with accessible goals are perceived as more negative (Brendl, Markman, and Messner 2003). Thus, to the extent that depletion heightens a self-protection motivation, depleted (vs. nondepleted) individuals should value objects that are instrumental to a safety goal more, and value objects that conflict with a safety goal less. A second objective of this study was to rule out the possibility that it was the nature of the depletion manipulations used in the previous studies that motivated our participants to engage in self-protective behaviors.

To these aims, we operationalized depletion in this study by asking participants to indicate the extent to which they had engaged in self-regulatory activities earlier that day. Our expectation was that the more self-regulatory activities participants engaged in on that day, the more depleted they would be. This measure of depletion did not require individuals to be careful and thus could not have primed a vigilant mind-set. We then examined participants' evaluation of a product that varies on the strength of a safety-related feature. In particular, participants were presented with the

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review of a laptop that was either favorably or unfavorably rated on its virus protection capabilities. We predicted that the more self-regulatory activities participants engaged in on that day, the more positive they would be toward the laptop that was rated favorably on the safety feature and the less positive they would be toward the laptop that was rated unfavorably on this feature.

Method

Fifty-three Northwestern University students (30 females) participated in the study. Students were approached individually in public areas on campus (e.g., the library) and asked whether they would be willing to complete a survey about college students' life. Those who agreed were asked to report the extent to which they had engaged in various self-regulatory activities on that day. In particular, participants were asked to report the extent to which they (a) worked on mentally challenging tasks, (b) made important decisions, and (c) thought deeply about something (1 = not at all, 9 = a lot; $\alpha = .63$; a factor analysis revealed that the three items load on the same factor, which explains 57.5% of the total variance). Participants were also asked to report the extent to which they felt their energy was running low, their willpower was gone, and the extent to which they felt mentally exhausted (1 = not at all, 9 = very much; $\alpha = .80$). Next, they were asked to report how they were feeling at that point in time (1 = bad mood, sad, and anxious, 9 = good mood, happy, and relaxed; $\alpha = .83$) and responded to some demographic questions. Finally, participants were asked to provide their opinion on a laptop that allegedly was being considered for the college student market. Participants were provided with the ratings of the laptop on four features: two target features (LCD screen and antivirus protection) and two filler features (processor speed and hard drive size). A pretest conducted among 33 students from the same population showed that the LCD screen and the antivirus protection were viewed as being similarly attractive (1 = not at all attractive, 9 = very attractive; $M = 7.61$ vs. 7.36 ; $-1 < t < 1$) and important (1 = not at all important, 9 = very important; $M = 7.27$ vs. 7.64 ; $-1 < t < 1$). In the high-safety condition, the laptop received five (out of five) stars for the antivirus protection and two stars for the LCD screen; the ratings for the two features were reversed in the low-safety condition. Processor speed and hard drive size were both assigned three and a half out of five stars across the two conditions. Finally, participants rated the laptop (1 = dislike, bad, and negative, 7 = like, good, and positive; $\alpha = .94$).

Results and Discussion

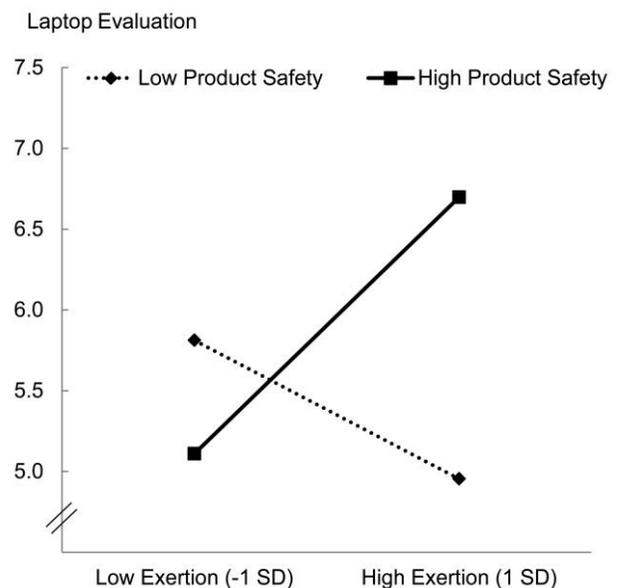
To examine the extent to which participants were taxed by their self-regulatory activities, we conducted a regression analysis with participants' self-regulation index (mean-centered), product type (coded 1 = high product safety, -1 = low product safety) and the interaction term as independent variables, and the tiredness index as the dependent variable.

The results revealed a single main effect of self-regulation ($\beta = .29$; $t(49) = 2.04$, $p = .05$) such that the more self-regulatory activities participants engaged on that day, the more depleted they reported to be. All other effects were nonsignificant ($-1 < t < 1$). A similar analysis with mood as dependent variable did not reveal any significant effect ($-1.5 < t < 1.5$, $p > .15$), suggesting that the extent to which participants engaged in self-regulation on that day did not affect their mood.

Next, we regressed participants' laptop evaluations on product safety, the self-regulation index, and the interaction term. The analysis revealed that the two-way interaction was significant ($\beta = .34$; $t(49) = 2.75$, $p < .01$), as illustrated in figure 4. No other effect was significant ($-1 < t < 1.3$, $p > .20$). Follow-up simple slope analyses (Aiken and West 1991) showed that participants who engaged in more self-regulatory activities that day valued the high-safety laptop more than the low-safety laptop ($\beta = .87$; $t(49) = 2.90$, $p < .01$), whereas participants who engaged in fewer self-regulatory activities were equally favorable between the two laptops ($\beta = -.35$; $t(49) = -1.09$, $p = .28$). Furthermore, separate simple regressions for the two laptops showed that self-regulation has a positive effect on participants' evaluation of the high-safety laptop ($\beta = .44$; $t(49) = 2.16$, $p = .04$) but a marginally negative effect on the evaluation

FIGURE 4

EFFECT OF PREVIOUS SELF-REGULATORY EXERTIONS AND PRODUCT SAFETY ON LAPTOP EVALUATION (STUDY 4)



NOTE.—Predicted values were calculated at 1 standard deviation above and below the self-regulatory exertion index.

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of the low-safety laptop ($\beta = -.24$; $t(49) = -1.71$, $p = .09$).

These results provide further evidence that depletion increases people's sensitivity to safety and danger-related concepts and heightens a self-protection motivation, and demonstrate the implications of this self-protection motivation for product evaluations. In particular, participants who had engaged in more activities that involve self-regulation earlier in the day assigned greater (lower) value to a product (in)compatible with their safety goal. Notably, we observed these results without engaging participants in activities that would require them to pay attention or to be careful, thus ruling out a vigilant prime as a potential confound for our findings. We further explored the implication of the depletion effect for product choice in the next study.

STUDY 5: CHOICE OF SUNBLOCK OR MOISTURIZER

The depletion literature suggests that cognitive and physical acts of self-regulation draw from the same limited pool of resource (Muraven and Baumeister 2000). In studies 1–4, we operationalized depletion using cognitively effortful tasks. Thus, one objective of study 5 was to demonstrate the robustness of our depletion-induced vulnerability hypothesis by examining the effect of physical depletion on self-protective behaviors. A second objective of the study was to demonstrate that the effect of depletion on self-protection motivation carries over to actual product choice. To these aims, we presented visitors to a gym with a choice between a safety-related product that reduces the dangers of sun damage (a sunblock) and a safety-neutral product (a moisturizer) either before or after their workout. We predicted that depleted participants who responded to our survey after their workout should be more depleted; hence, they would be more likely to choose the safety product over the safety-neutral product.

Method

Visitors to a gym at Northwestern University were approached outside the locker room and asked whether they would be willing to complete a survey on people's health and fitness habits. Sixty visitors (25 females; median age = 26 years, range = 18–62) completed the survey. They were then offered a small gift as a token of appreciation for their participation. They were informed by the experimenter that they could choose between a sunblock and a moisturizer without being shown the actual products. A pretest conducted among 80 individuals showed that sunblock as a product was rated as offering more protection against danger relative to a moisturizer (1 = not at all, 9 = very much; $M = 7.20$ vs. 3.83; $t(79) = 11.43$, $p < .01$). After participants indicated their choice, the experimenter handed them the product of their choice, thanked them for their participation, and asked if they had finished their workout. The experimenter then recorded participants' product choice and

whether they completed the survey before (nondepletion condition) or after (depletion condition) their workout.

Results and Discussion

Participants who completed the survey after (before) their workout were coded to be in the (non)depletion condition. Consistent with our hypothesis, 69.2% of participants in the depletion condition chose the sunblock over the moisturizer, while only 41.2% participants in the nondepletion condition did so ($\chi^2(1) = 4.66$, $p = .03$). Further, the proportion of depleted participants who chose the sunblock was significantly greater than chance ($t(25) = 2.08$, $p = .05$), while the proportion of nondepleted participants who took the sunblock did not differ from chance ($-1 < t < 1$). These results show that depletion from physical exertions works in a similar fashion as cognitive depletion in activating the self-protection motivation, as reflected by participants' actual choice of a safety-related versus unrelated product.

GENERAL DISCUSSION

Across five studies that manipulated or measured cognitive or physical depletion, we found convergent evidence that while engaging in self-regulation depletes one's resources, it also heightens feelings of vulnerability in the face of potential danger, and in turn increases self-protective behaviors. Depleted participants in our studies reported being more likely to avoid risky behaviors such as having unprotected sex (study 1), and more likely to engage in protective behaviors such as getting tested for kidney disease (study 2) or chlamydia (study 3), when they perceived themselves to be at risk. Further, depleted (vs. nondepleted) participants preferred and chose products that promote safety (studies 4 and 5). Across two studies (studies 1 and 2), we found convergent evidence that perceived vulnerability mediated the effect of depletion on self-protective behavior. These findings, obtained across self-reported and actual self-protective behaviors, both inside and outside the lab, provide strong evidence in support of our hypothesis.

It is important to note that depletion prompts self-protection motivation only when people perceive themselves to be at risk. We manipulated potential danger in the first three studies and found that depletion did not increase feelings of vulnerability when participants did not perceive that they were at risk. In fact, depleted participants indicated higher likelihood of engaging in sexual intercourse when the sexual activity was protected (study 1). Depletion also had no effect on intentions to get tested for kidney disease or chlamydia when participants did not perceive themselves to be at risk (studies 2 and 3). Notably, we did not vary perceived risk in studies 4 and 5; the assumption is that the risk of getting a computer virus or a sunburn is sufficiently prevalent that most, if not all, participants in our studies would consider themselves at some risk of having their computer infected or getting sunburned.

The current findings provide novel insights into the psychology of depletion. First, they show that people's per-

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ceptions and motivations fundamentally change with the state of depletion. In particular, the state of depletion heightens perceived vulnerability and motivates self-protective behavior. Second, our findings suggest that when people are depleted, they do not always behave in maladaptive and unhealthful ways. In fact, depletion seems to activate people's self-protective instinct and ironically promote the attainment of beneficial and healthful goals when potential danger looms. This notion is consistent with recent neuroscientific research suggesting that depletion shifts the regulatory balance from the prefrontal regions involved in top-down control to the left amygdala region involved in danger detection and self-protection (Wagner and Heatherton 2013). More broadly, this research suggests that behaviors that are beneficial, healthful, and virtuous in nature do not come solely from effortful self-regulation processes. When people's impulses and instincts are aligned with their healthful and virtuous goals, the pursuit of these goals occurs automatically and does not require deliberate self-regulation. Conversely, behaviors that are risky, unhealthful, and potentially harmful in nature are not always the result of self-regulation failures. For example, Rawn and Vohs (2011) suggest that people sometimes engage in risky and personally repulsive behaviors (such as drinking and smoking) to fulfill their belonging needs, and that behaviors that may seem like a self-regulation failure on the surface could, in fact, be the result of deliberate self-regulation. Together, these results speak to the importance of inferring self-regulation based on the underlying process and motivations (i.e., whether individuals spontaneously want to approach or avoid a behavior) rather than on the outcome of one's behavior.

This research is also consistent with the notion that depletion triggers adaptive processes that motivate people to conserve their resources (Muraven, Shmueli, and Burkley 2006). In fact, to the extent that dangerous situations require the deployment of resources to cope, depleted individuals may also be motivated to avoid such situations in an effort to conserve resources.

The current research may also help explain important social phenomena. In particular, recent research suggests that depletion may affect judges' likelihood to grant prisoners' request for parole (Danziger, Levav, and Avnaim-Pesso 2011). An analysis of a thousand judicial cases that were randomly called within a day revealed that a group of experienced Israeli judges were more likely to grant parole ruling at the beginning of the working day but were progressively less likely to grant prisoners' requests after each ruling. It is plausible that the judges were more sensitive to the potential dangers of releasing convicted criminals into the community as the day progressed and their resources were being depleted, and their heightened self-protection motivation prompted the fewer favorable parole rulings. Consistent with this view, the likelihood of granting parole increased after the judges took their lunch break—which likely replenished their resources by giving them a chance to rest and consume calories—and then progressively de-

clined again as they made their rulings. Future research might more systematically investigate this potential account of judicial decision making.

The current findings also offer interesting marketing implications. In particular, the results of studies 4 and 5 suggest that consumers value products that emphasize safety features more when they are depleted. Thus, to the extent that making brand choices is a depleting activity (Vohs et al. 2008; Wang et al. 2010), retailers may benefit from placing safety-related products (e.g., sunscreen, antibacterial soap) near the checkouts, and advertisers of security-related products such as locks and alarm systems may consider buying airtime later in the evening, when consumers may be more depleted (Baumeister and Heatherton 1996) and hence more easily persuaded by messages promoting safety. Similarly, health-care providers may consider different ways to leverage the current findings to increase compliance with health communications.

Finally, we would like to note that although in our studies a self-protection motivation heightened beneficial and healthful goals, there may be circumstances under which such motivation could lead to suboptimal outcomes. For example, a self-protection motivation in a social interaction context may lead to increased discrimination of out-group members (see Schaller et al. 2003). Similarly, being overly averse to dangers in the financial domain may prevent people from making sound investing decisions. Furthermore, it is important to consider that while depleted individuals may be more motivated to engage in self-protective activities, their ability to do so may be constrained by their limited self-regulatory resources, especially under severe levels of depletion.

Relation to Regulatory Focus Theory

The finding that people's self-protection motivation is heightened when they are depleted seems to suggest that depletion may evoke a prevention focus. Regulatory focus theory (Higgins 1997) distinguishes between a prevention orientation that focuses on safety and security and a promotion orientation that focuses on growth and advancement. Prevention-focused individuals strive toward fulfilling their responsibilities, duties, and obligations and are more sensitive to losses and nonlosses. In contrast, promotion-focused individuals strive toward attaining their ideals, hopes, and aspirations and are more sensitive to gains and nongains. It is plausible that depletion, by heightening perceived vulnerability, activates a broader prevention-focused orientation. Consistent with this possibility, research has shown that depletion brings about a low-level construal—a tendency to represent events in more concrete and proximal terms (Agrawal and Wan 2009; Wan and Agrawal 2011)—which has been found to be associated with a prevention focus (Lee, Keller, and Sternthal 2010). While these findings may suggest that depletion activates a broader prevention-focused orientation, there are reasons to believe that this is not the case. In particular, depleted individuals have been found to rely more on the affective rather than the delib-

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erative system in their decision making (Bruyneel et al. 2006), whereas the opposite seems true for prevention-focused individuals (Avnet and Higgins 2006; Pham and Avnet 2004). Future research could more systematically investigate whether depletion, by heightening a self-protection motivation, evokes a prevention-focused orientation.

Directions for Future Research

Taken as a whole, the current findings provide evidence that depleted people are more likely to engage in self-protective behaviors when danger looms. However, many questions remain. For example, are the effects observed unique to depletion of self-regulatory resources, or do they reflect a broader principle that underlies depletion of any valuable resources, such as social resources, power, and status (for a review, see Hobfoll 2002)? It is plausible that depletion of any valuable resources makes people feel vulnerable and in turn heightens a self-protection motivation. Existing research on both humans and animals offers initial evidence consistent with this possibility. To illustrate, findings from human research suggest that people tend to avoid dangers when they lack power (i.e., the capacity to control resources and outcomes; Keltner, Gruenfeld, and Anderson 2003). For example, Henry (2009) found that low-status (vs. high-status) individuals perceived themselves to be more vulnerable to dangers. Further, Anderson and Galinsky (2006) found that akin to the depleted participants in our study 1, low-power (vs. high-power) participants in their study reported a lower likelihood of engaging in unprotected sex. Similarly, findings from animal research suggest that when animals are depleted of their social resources (Berger 1978; Caraco 1979) or lack food (Mishra et al. 2011), they scan the environment more often and are less likely to engage in potentially risky behaviors that may threaten their survival. Future research could more systematically investigate how our depletion-induced vulnerability hypothesis may apply more generally to the depletion of other types of resources.

It would also be interesting to investigate how the health-related self-protective behaviors reported in this research may generalize to other domains. In particular, financial decision-making research shows that depleted (vs. non-depleted) individuals are more likely to choose riskier options when gambling small amounts of money or when giving advice to others (Freeman and Muraven 2010), contrary to our depletion-induced vulnerability hypothesis. It is possible that participants in these studies did not consider the situation to be threatening, and that if a threat to their own financial security had been made salient, depleted participants would have behaved in a more risk-averse manner—just like how depleted individuals were more inclined to engage in safe sex but less inclined to engage in unsafe sex (study 1).

Finally, future research could further shed light on the underlying mechanisms through which depletion heightens self-protection. In particular, we have shown that the effect of depletion on self-protective behaviors is mediated by per-

ceived vulnerability when potential danger is looming. This increased vulnerability may come from people's belief that dangerous outcomes are more likely to happen, or it may come from their perception that the potential dangers are more serious. Future research could more closely examine these and other mechanisms to provide further insights into the consequences of depletion.

DATA COLLECTION INFORMATION

The first author managed the collection of data for study 1 using the Kellogg Marketing Economic panel in the summer of 2011. The first author managed the collection of data for study 2 using the Kellogg eLab panel in the spring of 2013. The first author supervised the collection of data for study 3 by research assistants at the Erasmus Behavioral Lab in the spring of 2013. The first author managed the collection of data for study 4 at the Northwestern University campus in the spring of 2011. The first author managed the collection of data for study 5 at the gym at Northwestern University in the summer of 2010. All the data were collected and analyzed by the first author under the supervision of the second author.

APPENDIX

SCENARIOS FROM STUDY 1

Low-Risk (Protected Sex) Scenario

Imagine that you are single and that you run into a very attractive acquaintance while ordering a drink at the bar. The two of you begin to talk, and both of you find the conversation very enjoyable. She (or he) has a good sense of humor and seems genuinely interested in what you are saying. It is clear that there is definite chemistry between you and that you are interested in this person. You continue to spend time together into the night. When the bar closes, she (he) offers to walk you home. When you get home, you kiss each other goodnight at the door. You decide the two of you should go inside and talk for awhile. After talking, you and she (he) begin to make out on the couch. Things progress and you realize that you are both very interested in having sex with each other, and you have a condom.

High-Risk (Unprotected Sex) Scenario

Imagine that you are single and that you run into a very attractive acquaintance while ordering a drink at the bar. The two of you begin to talk, and both of you find the conversation very enjoyable. She (or he) has a good sense of humor and seems genuinely interested in what you are saying. It is clear that there is definite chemistry between you and that you are interested in this person. You continue to spend time together into the night. When the bar closes, she (he) offers to walk you home. When you get home, you kiss each other goodnight at the door. You decide the two of you should go inside and talk for awhile. After talking, you and she

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(he) begin to make out on the couch. Things progress and you realize that you are both very interested in having sex with each other. She is (you are) on the pill, but neither of you have a condom. You discuss the possibility of going to a store, but there is not one nearby.

REFERENCES

- Ackerman, Joshua M., Jenessa R. Shapiro, Steven L. Neuberg, Douglas T. Kenrick, D. Vaughn Becker, Vladas Griskevicius, Jon K. Maner, and Mark Schaller (2006), "They All Look the Same to Me (Unless They're Angry): From Out-Group Homogeneity to Out-Group Heterogeneity," *Psychological Science*, 17 (October), 836–40.
- Agrawal, Nidhi, and Echo Wen Wan (2009), "Regulating Risk or Risking Regulation? Construal Level and Depletion Effects in the Processing of Health Messages," *Journal of Consumer Research*, 36 (October), 448–62.
- Aiken, Leona S., and Stephen G. West (1991), *Multiple Regression: Testing and Interpreting Interactions*, Thousand Oaks, CA: Sage.
- Anderson, Cameron, and Adam D. Galinsky (2006), "Power, Optimism, and Risk-Taking," *European Journal of Social Psychology*, 36 (July), 511–36.
- Avnet, Tamar, and E. Tory Higgins (2006), "How Regulatory Fit Affects Value in Consumer Choices and Opinions," *Journal of Marketing Research*, 43 (February), 1–10.
- Baumeister, Roy F. (2002), "Yielding to Temptation: Self-Control Failure, Impulsive Purchasing, and Consumer Behavior," *Journal of Consumer Research*, 28 (March), 670–76.
- 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 (May), 1252–65.
- Baumeister, Roy F., and Todd F. Heatherton (1996), "Self-Regulation Failure: An Overview," *Psychological Inquiry*, 7 (1), 1–15.
- Baumeister, Roy F., Brandon J. Schmeichel, and Kathleen D. Vohs (2007), "Self-Regulation and the Executive Function: The Self as Controlling Agent," in *Social Psychology: Handbook of Basic Principles*, ed. Arie Kruglanski and E. Tory Higgins, New York: Guilford, 516–39.
- Becker, Marshall H. (1974), "The Health Belief Model and Personal Health Behavior," *Health Education Monographs*, 2 (4), 409–19.
- Berger, Joel (1978), "Group Size, Foraging, and Antipredator Ploys: An Analysis of Bighorn Sheep Decisions," *Behavioral Ecology and Sociobiology*, 4 (March), 91–99.
- Brendl, Miguel C., Arthur B. Markman, and Claude Messner (2003), "The Devaluation Effect: Activating a Need Devalues Unrelated Objects," *Journal of Consumer Research*, 4 (March), 463–73.
- Bruyneel, Sabrina D., Siegfried Dewitte, Kathleen D. Vohs, and Luk Warlop (2006), "Repeated Choosing Increases Susceptibility to Affective Product Features," *International Journal of Research in Marketing*, 23 (2), 215–25.
- Caraco, Thomas (1979), "Time Budgeting and Group Size: A Test of Theory," *Ecology*, 60 (June), 618–27.
- Chan, Kimmy Wa, and Echo Wen Wan (2012), "How Can Stressed Employees Deliver Better Customer Service? The Underlying Self-Regulation Depletion Mechanism," *Journal of Marketing*, 76 (January), 119–37.
- Clark, Russell D., and Elaine Hatfield (1989), "Gender Differences in Receptivity to Sexual Offers," *Journal of Psychology and Human Sexuality*, 2 (1), 39–55.
- Danziger, Shai, Jonathan Levav, and Liora Avnaim-Pesso (2011), "Extraneous Factors in Judicial Decisions," *Proceedings of the National Academy of Sciences of the United States of America*, 108 (April), 6889–92.
- Darwin, Charles R. (1859/1981), *On the Origin of Species by Means of Natural Selection, or the Preservation of Favored Races in the Struggle for Life*, Cambridge, MA: Harvard University Press.
- DeWall, C. Nathan, Roy F. Baumeister, Tyler F. Stillman, and Matthew T. Gailliot (2007), "Violence Restrained: Effects of Self-Regulation and Its Depletion on Aggression," *Journal of Experimental Social Psychology*, 43 (January), 62–76.
- Dijksterhuis, Ap, and Henk Aarts (2003), "On Wildebeests and Humans: The Preferential Detection of Negative Stimuli," *Psychological Science*, 14 (January), 14–18.
- Finkel, Eli J., C. Nathan DeWall, Erica B. Slotter, Megan Oaten, and Vangie A. Foshee (2009), "Self-Regulatory Failure and Intimate Partner Violence Perpetration," *Journal of Personality and Social Psychology*, 97 (September), 483–99.
- Fisher, Jeffrey D., and William A. Fisher (1992), "Changing AIDS-Risk Behavior," *Psychological Bulletin*, 111 (May), 455–74.
- Freeman, Nicholas, and Mark Muraven (2010), "Self-Control Depletion Leads to Increased Risk Taking," *Social Psychological and Personality Science*, 1 (April), 175–81.
- Gailliot, Matthew T., and Roy F. Baumeister (2007), "Self-Regulation and Sexual Restraint: Dispositionally and Temporarily Poor Self-Regulatory Abilities Contribute to Failures at Restraining Sexual Behavior," *Personality and Social Psychology Bulletin*, 33 (February), 173–86.
- Hagger, Martin S., Chantelle Wood, Chris Stiff, and Nikos L. D. Chatzisarantis (2010), "Ego Depletion and the Strength Model of Self-Control: A Meta-analysis," *Psychological Bulletin*, 136 (July), 495–525.
- Henry, P. J. (2009), "Low-Status Compensation: A Theory for Understanding the Role of Status in Cultures of Honor," *Journal of Personality and Social Psychology*, 97 (September), 451–66.
- Higgins, E. Tory (1997), "Beyond Pleasure and Pain," *American Psychologist*, 52 (December), 1280–300.
- Hobfoll, Stevan E. (2002), "Social and Psychological Resources and Adaptation," *Review of General Psychology*, 6 (December), 307–24.
- Hofmann, Wilhelm, Malte Friese, and Fritz Strack (2009), "Impulse and Self-Control from a Dual-System Perspective," *Perspectives on Psychological Science*, 4 (March), 162–76.
- Hong, Jiewen, and Angela Y. Lee (2008), "Be Fit and Be Strong: Mastering Self-Regulation through Regulatory Fit," *Journal of Consumer Research*, 34 (February), 682–95.
- Keltner, Dacher, Deborah H. Gruenfeld, and Cameron Anderson (2003), "Power, Approach, and Inhibition," *Psychological Review*, 110 (April), 265–84.
- Kenrick, Douglas T., Vladas Griskevicius, Steven L. Neuberg, and Mark Schaller (2010), "Renovating the Pyramid of Needs: Contemporary Extensions Build upon Ancient Foundations," *Perspectives on Psychological Science*, 5 (May), 292–314.
- Lang, Peter J., Margaret M. Bradley, and Bruce N. Cuthbert (2008), "International Affective Picture System (IAPS): Affective Ratings of Pictures and Instruction Manual," Technical Report No. A-8, University of Florida, Gainesville, FL.
- Lee, Angela Y., Punam Keller, and Brian Sternthal (2010), "Value from Regulatory Construal Fit," *Journal of Consumer Research*, 36 (February), 735–47.
- Lima, Steven L., and Lawrence M. Dill (1990), "Behavioral De-

Please use DOI when citing. Page numbers are not final.

- isions Made under the Risk of Predation: A Review and Prospectus," *Canadian Journal of Zoology*, 68 (4), 619–40.
- Loewenstein, George (1996), "Out of Control: Visceral Influences on Behavior," *Organizational Behavior and Human Decision Processes*, 65 (March), 272–92.
- Luce, Mary Frances, and Barbara E. Kahn (1999), "Avoidance or Vigilance? The Psychology of False-Positive Test Results," *Journal of Consumer Research*, 26 (December), 242–59.
- MacDonald, Tara K., Geoffrey T. Fong, Mark P. Zanna, and Alanna M. Martineau (2000), "Alcohol Myopia and Condom Use: Can Alcohol Intoxication Be Associated with More Prudent Behavior?" *Journal of Personality and Social Psychology*, 78 (April), 605–19.
- MacLeod, Colin, Andrew Mathews, and Philip Tata (1986), "Attentional Bias in Emotional Disorders," *Journal of Abnormal Psychology*, 95 (February), 15–20.
- Maslow, Abraham Harold (1943), "A Theory of Human Motivation," *Psychological Review*, 50 (July), 370–96.
- McCaul, Kevin D., Dawn M. Schroeder, and Patricia A. Reid (1996), "Breast Cancer Worry and Screening: Some Prospective Data," *Health Psychology*, 15 (November), 430–33.
- Menon, Geeta, Lauren G. Block, and Suresh Ramanathan (2002), "We're at as Much Risk as We Are Led to Believe: Effects of Message Cues on Judgments of Health Risk," *Journal of Consumer Research*, 28 (March), 533–49.
- Menon, Geeta, Priya Raghuram, and Nidhi Agrawal (2007), "Health Risk Perceptions and Consumer Psychology," in *The Handbook of Consumer Psychology*, ed. Curtis Haugtvedt, Paul Herr, and Frank Kardes, Philadelphia: Erlbaum, 981–1010.
- Mishra, Sandeep, David M. Logue, Ife O. Abiola, and William H. Cade (2011), "Developmental Environment Affects Risk-Acceptance in the Hissing Cockroach, *Gromphadorhina portentosa*," *Journal of Comparative Psychology*, 125 (February), 40–47.
- Muraven, Mark, and Roy F. Baumeister (2000), "Self-Regulation and Depletion of Limited Resources: Does Self-Control Resemble a Muscle?" *Psychological Bulletin*, 126 (March), 247–59.
- Muraven, Mark, Dikla Shmueli, and Edward Burkley (2006), "Conserving Self-Control Strength," *Journal of Personality and Social Psychology*, 91 (September), 524–37.
- 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 (March), 774–89.
- Nisbett, Richard E., and David E. Kanouse (1969), "Obesity, Food Deprivation, and Supermarket Shopping Behavior," *Journal of Personality and Social Psychology*, 12 (April), 289–94.
- Nordgren, Loran F., Joop van der Pligt, and Frenk van Harreveld (2007), "Evaluating Eve: Visceral States Influence the Equation of Impulsive Behavior," *Journal of Personality and Social Psychology*, 93 (July), 75–84.
- Nordgren, Loran F., Frenk van Harreveld, and Joop van der Pligt (2009), "The Restraint Bias: How the Illusion of Self-Restraint Promotes Impulsive Behavior," *Psychological Science*, 20 (December), 1523–28.
- Öhman, Arne, Daniel Lundqvist, and Francisco Esteves (2001), "The Face in the Crowd Revisited: A Threat Advantage with Schematic Stimuli," *Journal of Personality and Social Psychology*, 80 (March), 381–96.
- Pham, Michel, and Tamar Avnet (2004), "Ideals and Oughts and the Reliance on Affect versus Substance in Persuasion," *Journal of Consumer Research*, 30 (March), 503–18.
- Pocheptsova, Anastasiya, On Amir, Ravi Dhar, and Roy F. Baumeister (2009), "Deciding without Resources: Psychological Depletion and Choice in Context," *Journal of Marketing Research*, 46 (June), 344–55.
- Pratto, Felicia, and Oliver P. John (1991), "Automatic Vigilance: The Attention-Grabbing Power of Negative Social Information," *Journal of Personality and Social Psychology*, 61 (September), 380–91.
- Preacher, Kristopher J., Derek D. Rucker, and Andrew F. Hayes (2007), "Addressing Moderated Mediation Hypotheses: Strategies, Methods, and Prescriptions," *Multivariate Behavioral Research*, 42 (January), 185–227.
- Puntoni, Stefano, Steven Sweldens, and Nader T. Tavassoli (2011), "Gender Identity Salience and Perceived Vulnerability to Breast Cancer," *Journal of Marketing Research*, 48 (June), 413–24.
- Rawn, Catherine D., and Kathleen D. Vohs (2011), "People Use Self-Control to Risk Personal Harm: An Intra-interpersonal Dilemma," *Personality and Social Psychology Review*, 15 (3), 267–89.
- Rogers, Ronald W. (1975), "A Protection Motivation Theory of Fear Appeals and Attitude Change," *Journal of Psychology*, 91 (September), 93–114.
- Rosenstock, Irvin M. (1974), "Historical Origins of the Health Belief Model," *Health Education Monographs*, No. 2, 328–35.
- Schaller, Mark, Justin H. Park, and Jason Faulkner (2003), "Prehistoric Dangers and Contemporary Prejudices," *European Review of Social Psychology*, 14, 105–37.
- Schmeichel, Brandon J. (2007), "Attention Control, Memory Updating, and Emotion Regulation Temporarily Reduce the Capacity for Executive Control," *Journal of Experimental Psychology: General*, 136 (May), 241–55.
- Schmeichel, Brandon J., Kathleen D. Vohs, and Roy F. Baumeister (2003), "Intellectual Performance and Ego Depletion: Role of the Self in Logical Reasoning and Other Information Processing," *Journal of Personality and Social Psychology*, 85 (July), 33–46.
- Stroop, J. Ridley (1935), "Studies of Interference in Serial Verbal Reactions," *Journal of Experimental Psychology*, 18 (December), 643–62.
- Vohs, Kathleen D., Roy F. Baumeister, Brandon J. Schmeichel, Jean M. Twenge, Noelle M. Nelson, and Dianne M. Tice (2008), "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 (May), 883–98.
- Vohs, Kathleen D., and Ronald J. Faber (2007), "Spent Resources: Self-Regulatory Resource Availability Affects Impulse Buying," *Journal of Consumer Research*, 33 (March), 537–47.
- Vohs, Kathleen D., and Todd F. Heatherton (2000), "Self-Regulatory Failure: A Resource-Depletion Approach," *Psychological Science*, 11 (May), 249–54.
- Wagner, Dylan D., and Todd F. Heatherton (2013), "Self-Regulatory Depletion Increases Emotional Reactivity in the Amygdala," *Social Cognitive and Affective Neuroscience*, 8 (April), 410–17.
- Wan, Echo Wen, and Nidhi Agrawal (2011), "Carryover Effects of Self-Control on Decision Making: A Construal-Level Perspective," *Journal of Consumer Research*, 38 (June), 199–214.
- Wang, Jing, Nathan Novemsky, Ravi Dhar, and Roy F. Baumeister (2010), "Trade-Offs and Depletion in Choice," *Journal of Marketing Research*, 47 (October), 910–19.
- Weinstein, Neil D. (1982), "Unrealistic Optimism about Suscep-

Please use DOI when citing. Page numbers are not final.

- tibility to Health Problems," *Journal of Behavioral Medicine*, 5 (December), 441–60.
- (1988), "The Precaution Adoption Process," *Health Psychology*, 7 (January), 355–86.
- Wentura, Dirk, Klaus Rothermund, and Peter Bak (2000), "Automatic Vigilance: The Attention-Grabbing Power of Approach- and Avoidance-Related Social Information," *Journal of Personality and Social Psychology*, 78 (June), 1024–37.

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