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The Push and Pull of Temptation: The Bidirectional Influence of Temptation on Self-Control

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Abstract

This article examines how people respond to the emergence of temptation in their environment. Three studies demonstrated that how people respond to temptation depends critically on their visceral state—whether or not they are actively experiencing visceral drives such as hunger, drug craving, or sexual arousal. We found that when people were in a "cold," nonvisceral state, the presence of temptation prompted cognition to support self-control. However, when people were in a "hot," visceral state, temptation prompted the same cognitive processes to support impulsive behavior. Study 1 examined how heterosexual men's level of sexual arousal influences their attention to attractive women. Study 2 examined whether satiated and craving smokers would engage in motivated reasoning in order to dampen (or enhance) the appeal of smoking when confronted with the temptation to smoke. Study 3 tested the boundaries of the interaction between visceral state and temptation.

Keywords

self-control, visceral drives, temptation, social cognition

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Self-control dilemmas take place when a short-term temptation, be it a fattening snack, an offer of a cigarette, or a flirtatious encounter, threatens a long-term interest—in these cases, a slim waist, healthy lungs, or a happy marriage. In this report, we examine how people respond to the emergence of temptation in their environment. In particular, we are interested in how temptation influences key cognitive processes related to self-control, such as attention and motivated reasoning.

One might first suspect that temptation simply primes or orients cognition toward impulsive action, a view supported by a variety of theoretical perspectives, such as automatic behavior representation (Veltkamp, Aarts, & Custers, 2008) and unconscious goal pursuit (Aarts & Dijksterhuis, 2000). In the context of dieting, for instance, food cues can promote impulsive eating (Fedoroff, Polivy, & Herman, 1997; Shiv & Fedorikhin, 1999), spontaneously activate hedonic goals (Papies, Stroebe, & Aarts, 2007), and create selective attention for food cues (Papies, Stroebe, & Aarts, 2008).

Although these findings seem to indicate that temptation reliably turns cognition into a vehicle for impulsive behavior, considerable research has demonstrated that temptation cues can have the very opposite effect, transforming cognition in ways that promote self-control (Fishbach & Trope, 2005). One line of work found that when people encounter temptation, they actively dampen the value of the temptation and boost the value of the countervailing self-control goal (Trope & Fishbach, 2000). Similarly, the presence of temptation has been shown to make self-control goals more accessible while simultaneously inhibiting the accessibility of temptation-based goals (Fishbach, Friedman, & Kruglanski, 2003).

Taken together, the literature suggests that temptation has the capacity to facilitate both impulsive action and self-control. The inconsistencies in this literature suggest that reactions to temptation may be sensitive to unidentified features of the self-control dilemmas themselves. In this article, we examine how visceral drives influence reactions to temptation.

The term *visceral drives* refers to a class of highly adaptive physiological states, such as hunger, fatigue, and thirst, that provide information about the state of the body and motivate behavior toward satisfying essential physical needs (Loewenstein, 1996; Nordgren, van der Pligt, & van Harreveld, 2007).[1] For example, people experience hunger when they require nourishment, fatigue when they are sleep deprived, and thirst when they are dehydrated. Visceral drives often encourage behavior that directly undermines long-term goals. Consequently, most

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major self-control problems, such as obesity (hunger), drug addiction (drug craving), and infidelity (sexual arousal), are rooted in visceral drives (Loewenstein, 1996).

Self-control dilemmas involve conflicts between short- and long-term goals. Taking a "thinking is for doing" perspective (Fiske, 1992; James, 1890/1950), we argue that the cognitive mechanisms associated with self-control (e.g., attention and motivated reasoning) generally serve the interests of the dominant goal in these conflicts. Building on previous research on the motivational dominance of visceral states (Loewenstein, 1996; Nordgren, van Harreveld, & van der Pligt, 2009), we reasoned that visceral drives give dominance to short-term, impulsive goals and crowd out long-term interests. Consequently, we predicted that when people are in a "hot," visceral state, the presence of temptation will direct their cognition toward impulsive action. However, we predicted that when people are in a "cold," nonvisceral state (when long-term interests are dominant), temptation cues will trigger cognitive processes that support self-control (i.e., a counteractive control effect).

The Present Studies

In Study 1, we examined how heterosexual men's level of sexual arousal influences their attention (eye gaze) to attractive women. Study 2 investigated whether satiated and craving smokers would engage in motivated reasoning in order to dampen (or enhance) the appeal of smoking when confronted with the temptation to smoke. The main goal of Study 3 was to explore the boundaries of the interaction between temptation and visceral state. We tested whether a visceral state needs to correspond with the temptation cue in order to motivate cognition. In other words, we asked, what occurs if one is in a visceral state unrelated to a temptation cue (e.g., if one is exposed to smoking cues while gripped by sexual arousal)? Earlier, we noted that visceral drives provide information about the state of the body and motivate behavior toward satisfying specific bodily needs (Loewenstein, 1996). Therefore, we expected that visceral states would motivate cognition only when the temptation cue corresponded with the visceral state.

Study 1

Study 1 examined how heterosexual men in committed relationships respond to attractive women. Research shows that people in committed relationships often buffer themselves from temptation by limiting their attention to attractive alternative partners. Miller (1997), for example, found that participants who were more satisfied in their relationship spent less time gazing at attractive alternatives, and length of gaze predicted relationship failure 2 months later.

Study 1 was inspired by Miller's (1997) attention paradigm and involved a similar procedure. Forty-nine men in committed heterosexual relationships participated for course credit. In Phase 1, participants in the sexual-arousal condition watched a 10-min erotic film that reliably induces sexual arousal (Nordgren et al., 2007). Participants in the nonarousal condition watched a 10-min film depicting a female fashion show. Participants then examined five photographs, each of which featured a woman in her early 20s that a prior sample of men had rated as "highly attractive." Our primary dependent variable was how long participants looked at each photograph.

Phase 2 occurred 1 week later. Following the same sexual-arousal manipulation used in Phase 1, participants were given a new set of photographs of five highly attractive women (we also included photographs of less attractive women to avoid suspicion). This time, however, participants were told that the pictures were of incoming international students who would take classes in the psychology department the next semester. By leading participants to believe they might meet these women in the near future, this manipulation was designed to heighten temptation.

We predicted that nonaroused men would devote less attention to the attractive women when temptation was high (Phase 2) than when temptation was low (Phase 1). However, we predicted that sexually aroused men would devote more attention to the attractive women when temptation was high (Phase 2) than when temptation was low (Phase 1).

To test these predictions, we conducted a repeated measures analysis of variance (ANOVA) on the time spent examining the photographs. In this analysis, visceral state (sexually aroused vs. nonaroused) was the between-subjects variable, and time (Phase 1 vs. Phase 2) was the within-subjects variable. There was a significant interaction, $F(1, 47) = 7.79$, $p = .008$, $\eta^2 = .14$. Aroused men spent more time examining the photographs in Phase 2 ($M = 4.18$ s per photo, $SD = 1.13$), when they thought they might have the opportunity to meet the women, than in Phase 1 ($M = 3.44$ s, $SD = 1.05$), $t(24) = 2.18$, $p = .04$. Nonaroused men, in contrast, spent marginally less time examining the photographs in Phase 2 ($M = 2.79$ s, $SD = 1.18$) than in Phase 1 ($M = 3.29$ s, $SD = 0.80$), $t(23) = 1.76$, $p = .09$.

Study 2

Study 2 was designed to test whether we could replicate the effect using another cognitive mechanism related to self-control—motivated valuation. A common strategy people use to buffer themselves from temptation is to recast the subjective value of the short- or long-term goal within a self-control conflict. Indeed, research on counteractive control has shown that students will bolster the value of studying for a test when tempted with competing social opportunities (Trope & Fishbach, 2000), and gym users will diminish the value of junk food to encourage themselves to make healthy dietary choices (Myrseth, Fishbach, & Trope, 2009). Of course, this same process can also encourage impulsive behavior.

Study 2 used a delay-of-gratification paradigm. In Phase 1 of the study, 53 smokers were brought into a state of cigarette craving or satiation. Participants in the craving condition were

instructed to abstain from smoking for 3 hr before the study, whereas those in the satiated condition were instructed to smoke immediately before the experiment began. In the experimental session, we assessed participants' level of cigarette craving by asking them, "How much craving do you currently have for a cigarette"; the rating scale was from 1 (no *craving*) to 7 (*extreme craving*). Participants were then asked to rate the subjective value of a cigarette (i.e., "how pleasurable is smoking?"; rating scale from 1, *not at all*, to 10, *extremely*). In Phase 2, smokers were brought into the same visceral state as in Phase 1 and were then given a delay-of-gratification dilemma. They chose between delaying smoking for 40 min and earning €3 or immediately smoking but forgoing the €3. Before making their decision, they once again rated the subjective value of a cigarette.

We predicted that satiated smokers would try to counteract the temptation to smoke in Phase 2 by decreasing the value of smoking (relative to their Phase 1 ratings). However, we predicted that the temptation to smoke would motivate craving smokers to increase the value of smoking. Finally, we expected that smokers' Phase 2 evaluations would influence whether they choose to delay gratification.

To test these predictions, we first conducted a repeated measures ANOVA on the ratings of the value of smoking; in this analysis, visceral state (craving vs. satiated) was the between-subjects variable, and time of the rating (Phase 1 vs. Phase 2) was the within-subjects variable. We found a significant Visceral State × Time interaction, $F(1, 51) = 9.77$, $p = .003$, $\eta^2 = .16$. In Phase 2, when faced with the temptation of smoking, satiated smokers rated smoking as less pleasurable ($M = 6.16$, $SD = 1.63$) than they did in Phase 1 ($M = 6.76$, $SD = 1.66$), $t(26) = 2.16$, $p = .04$. Craving smokers, however, rated smoking as more pleasurable in Phase 2 ($M = 8.03$, $SD = 0.94$) than in Phase 1 ($M = 7.54$, $SD = 1.13$), $t(25) = -2.34$, $p = .03$ (see Fig. 1).

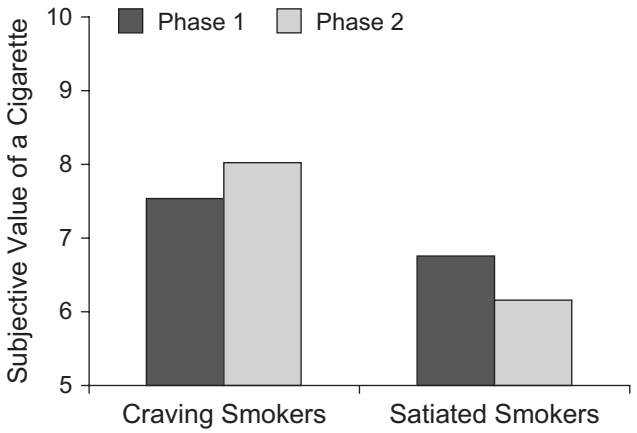

Fig. 1. Results from Study 2: subjective value of a cigarette as a function of condition (craving vs. satiated), in Phases 1 and 2.

In our final analysis, we examined the delay-of-gratification decision. There was a correlation between smokers' cigarette cravings in Phase 2 and the delay-of-gratification decision; greater cigarette craving was associated with immediate gratification, $r(53) = .25$. $p = .06$. Likewise, we found that smokers who valued smoking more highly in Phase 2 were more likely to forgo the €3 and to choose not to delay smoking, $r(53) = .35$. $p = .01$. And valuation of smoking mediated the relationship between Phase 2 cravings and the delay-of-gratification decision, $z = -2.70$, $p = .005$.

Study 3

Study 3 was designed to explore the boundaries of the interaction between temptation and visceral state observed in Studies 1 and 2. In the first two studies, we paired a visceral state with a corresponding temptation (e.g., smoking craving and cigarette cues). But what happens if one is in a visceral state unrelated to a temptation cue (e.g., one is exposed to smoking cues while gripped by sexual arousal)? We argue that visceral drives motivate *specific* bodily needs. Therefore, we expected that visceral states would motivate cognition only when the temptation cue corresponded with the visceral state.

Forty-six male students in heterosexual relationships participated for money. In Phase 1, participants were assigned either to the sexual-arousal condition (same manipulation used in the sexual-arousal condition in Study 1) or to the hunger condition (participants were instructed not to eat for at least 4 hr prior to participation). Following this manipulation, they indicated their level of commitment to their relationship by responding to two items: "How important is your relationship to you?" (response scale from 1, *not at all important*, to 10, *extremely important*) and "How committed are you to your relationship?" (response scale from 1, *not at all committed*, to 10, *extremely committed*); responses were combined to form an index of relationship commitment. One week later (Phase 2), participants received the same visceral-state manipulation they had received in Phase 1. The temptation manipulation was similar to that used in Study 1. Participants viewed photographs of attractive female international students with whom they would (ostensibly) take classes in the upcoming semester. Participants then indicated how committed they were to their relationship, responding to the same two items as in Phase 1.

To test our predictions, we conducted a repeated measures ANOVA on relationship commitment; in this analysis, visceral state (sexually aroused vs. hungry) was the between-subjects variable, and time of the commitment ratings (Phase 1 vs. Phase 2) was the within-subjects variables. As predicted, we found a significant Visceral State × Time interaction, $F(1, 44) = 8.86$, $p = .005$, $\eta^2 = .16$. Sexually aroused men were less committed to their relationship when temptation was present ($M = 6.76$, $SD = 1.06$) than when it was absent ($M = 7.10$, $SD = 1.51$), $t(22) = 2.15$, $p = .04$. For hunger, a visceral state

unrelated to relationship commitment, we found the predicted counteractive control effect. Hungry men were more committed to their relationship when temptation was present (M = 7.39, SD = 1.14) than when it was absent (M = 6.98, SD = 1.11), $t(22) = -2.08$, $p = .05$.

Discussion

Temptation is ubiquitous. But how people respond to temptation seems to depend on their visceral state. Taking a "thinking is for doing" perspective (Fiske, 1992; James, 1890/1950), we hypothesized that cognition would serve the dominant goal during a self-control dilemma. As predicted, when people were in a "cold," nonvisceral state (which favors long-term goals), the presence of temptation prompted cognition to support self-control. However, when people were in a "hot," visceral state (which favors short-term goals), temptation prompted cognition to support impulsive behavior. This interaction between visceral state and temptation was observed for both relatively automatic (attention) and controlled (motivated valuation) cognitive processes and was observed in two distinct self-control domains (smoking cessation and sexual restraint).

Study 3 tested the boundaries of the interaction between visceral state and temptation observed in the first two studies. We tested whether a visceral state needs to correspond with the temptation in order to motivate cognition. Our findings suggest that visceral drives motivate cognition only in response to corresponding temptation cues. This finding is also important because it rules out a resource-depletion account (Muraven & Baumeister, 2000) of our results. If being in a visceral state is depleting, then the impulse-oriented cognition of people in a visceral state may be seen as a consequence of depleted regulatory resources. If this is the case, however, this effect should occur regardless of whether the temptation corresponds with the visceral state (which it did not).

These findings highlight the vital role that visceral drives play in the self-control process. Most theories of self-control depict visceral states as having a direct hedonic impact on behavior, in the sense that being hungry directly motivates the desire for food. But our results provide evidence for a second route of influence that occurs through the transformation of cognitive resources.

One limitation of this research is that it neglected individual differences in self-control capacity. Future research should examine whether people with greater self-control capacity are better able to resist the transformative force of visceral states. That is, people with greater self-control capacity may have to experience stronger visceral states before temptation cues serve as agents of impulsive behavior.

Another interesting question for future research is whether, in the midst of a self-control dilemma, people readily identify their impulsive behavior as a violation of their self-control goals. If viscerally charged cognition has the capacity to suppress the accessibility of self-control goals, shift attention toward temptation cues, and motivate short-term thinking, it may be that people simply do not recognize their impulsive behavior as a violation of their long-term goals.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Note

1. *Visceral drive* is synonymous with the term *needs* as it is often used in the social cognition literature (Veltkamp, Aarts, & Custers, 2009). A roughly exhaustive set of visceral drives includes the following: hunger, thirst, fatigue, drug craving and withdrawal, sexual arousal, and pain. Visceral drives, or needs, differ from moods and emotions in that they tend to address essential physical needs (hunger, thirst, etc.) and work on homeostatic principles—the drive builds until it is satiated.

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