

Attention, Self-Control, and Health Behaviors

Traci Mann¹ and Andrew Ward²

¹University of California–Los Angeles and ²Swarthmore College

ABSTRACT—*Past research has shown that limitations on attention can lead to loss of control. Our model of self-control suggests that when attentional resources are restricted, individuals can focus on only the most salient behavioral cues, to the neglect of more distal stimuli. Subsequent action is then likely to be under the near-exclusive motivational influence of those “central” cues. This state of narrowed attentional focus, which we term “attentional myopia,” is predicted to lead to loss of control when salient cues serve to promote a behavior that violates self-standards. By contrast, limitations on attention can lead to more successful self-control when salient cues instead suggest restraint. We have investigated this model in the health domains of eating, smoking, and aggression, and we discuss its implications for individuals’ efforts to respond to health-relevant messages.*

KEYWORDS—*attention; self-control; health behavior*

The United States struggles with epidemic levels of drug abuse and obesity, as well as the consequences of unprotected sex and excessive violence. Interventions aimed at combating these problems have achieved some success at informing individuals about the dangers of particular behaviors and at persuading them that change would be worthwhile. Once persuaded, however, many people find that it is difficult to enact ongoing change; the sources of adverse physical and mental health are rooted, at least in part, in the inability of individuals to control their own behavior.

Self-control often involves a battle between one’s impulses and inhibitions, and successful self-control has been postulated to involve three steps (Carver & Scheier, 1981). First, individuals must possess a set of standards that they intend to follow (e.g., the maximum total number of calories one intends to consume per day). Second, they must compare their current

behavior to the standard (e.g., the number of calories consumed relative to the total permitted by the standard). And third, if they find their behavior falling short of the standard, they must alter their behavior to reduce the discrepancy (e.g., by refusing to consume any additional calories).

Much research, including investigations of *ego depletion* (Baumeister, Bratslavsky, Muraven, & Tice, 1998) and *delay of gratification* (Metcalf & Mischel, 1999), has explored the challenges involved in altering one’s behavior to meet a desired standard. However, given the importance placed by the aforementioned analysis on monitoring standards, it is clear that attention also plays a critical role in self-control (Baumeister, Heatherton, & Tice, 1994). In particular, focusing attention on the self, the repository of personal standards, has been shown to lead to successful self-control. One implication is that conditions that produce distraction away from the self (e.g., becoming anonymous in a large crowd) will lead to loss of self-control, a prediction that has been borne out in many research studies.

There is evidence, however, that the inability to attend to the self is not always associated with loss of control. Research on alcohol intoxication, normally a potent source of distraction from self-standards, has shown that, under certain conditions, being drunk does not necessarily result in a reduction in self-control and may even lead to enhanced control (MacDonald, Fong, Zanna, & Martineau, 2000). In short, the relationship between attention and self-control may not be as simple as previously thought and may depend on a complex interplay between individual mental processes and relevant environmental factors.

THE ATTENTIONAL MYOPIA MODEL OF SELF-CONTROL

Recently, we have been testing a model designed to explain when changes in attention will lead to loss of control and when they will instead lead to its enhancement (see Fig. 1). In essence, we are suggesting that self-control involves the management of a conflict between competing pressures—pressures prompted by situational and/or internal cues. Some of these cues impel an individual to engage in behavior while others act to prevent the

Address correspondence to Traci Mann, University of Minnesota Department of Psychology, Elliott Hall, 75 East River Road, Minneapolis, MN 55455-0344; e-mail: tracimann@gmail.com.

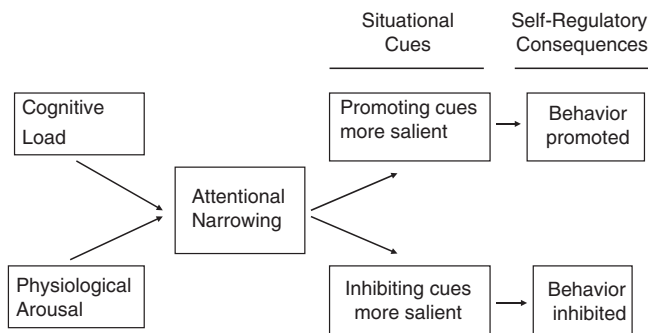


Fig. 1. The attentional myopia model, showing the interacting effects of attentional narrowing (from cognitive load or physiological arousal) and salient situational cues on self-regulation.

individual from taking action. Our model predicts that in domains featuring conflicting behavioral pressures (e.g., an individual attempting to diet while faced with the temptation of high-calorie food), limitations on attention—or what we term *attentional myopia*—will lead to loss of control if highly salient cues suggest the instigation or promotion of behavior, and, by contrast, will lead to enhanced self-control if highly salient cues instead suggest behavioral restraint. We have supported this model through research on the self-regulation of eating and smoking.

Eating

In the eating research, we first showed that limits placed on attentional resources through the presentation of engaging visual stimuli could disinhibit dieters' normally restrained consumption—an effect not shared by nondieters (Ward & Mann, 2000). In subsequent work we exposed dieters to conditions in which cues served either to promote eating (i.e., dieters were placed in a lab containing salient food items) or inhibit it (i.e., a scale and diet books were placed in prominent locations in the room), a distinction that was confirmed through the use of undergraduate raters. Participants were then given a high-fat milkshake and were left alone to consume as much of it as they wished, under the guise of a taste test. Dieters who performed a demanding cognitive task (remembering a 9-digit number) consumed nearly twice as much milkshake when exposed to the promoting cues than when exposed to the inhibiting cues (see Fig. 2). Dieters who performed a low-load task (remembering a single digit) were significantly less influenced by cues in either of the respective experimental conditions (Mann & Ward, 2004). This study thus provided some of the first evidence that, under the proper inhibiting conditions, the imposition of a cognitively distracting task could nevertheless be associated with enhanced restraint among dieters.

Participants' thoughts during the study were probed with a post-task questionnaire assessing the extent to which individuals considered any of two dozen stimuli that were either relevant (e.g., their diet) or irrelevant (e.g., classes) to the eating task. Analysis confirmed that when placed under cognitive load,

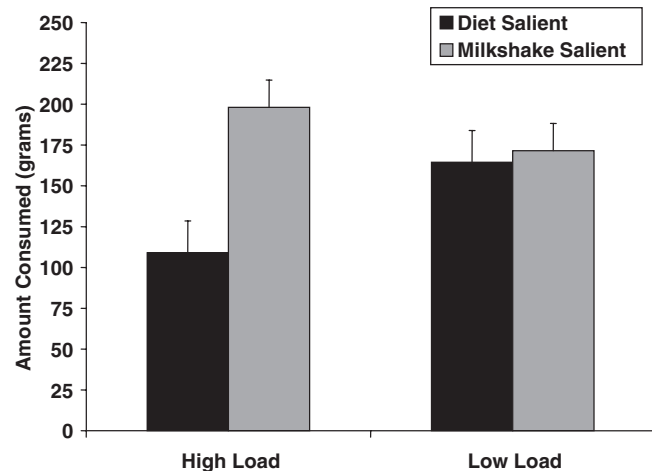


Fig. 2. Mean grams of milkshake consumed (plus standard error) during a tasting task as a function of cognitive load and the salience of either diet-promoting or eating-promoting cues.

individuals narrowed their attentional focus to salient cues in the environment (i.e., food or diet-related cues in the respective conditions) and behaved accordingly. Individuals not under cognitive load were able to focus on a variety of thoughts, and, not surprisingly, their behavior was evidently influenced by factors other than the relevant cues. In sum, the imposition of cognitive load resulted in attentional narrowing, which in turn rendered individuals cue-bound when attempting to control their own behavior.

Smoking

In research with smokers who, on an initial survey, expressed an interest in quitting (thus revealing the presence of conflicting behavioral pressures), participants were either exposed to cues encouraging them to quit smoking (including a cartoon advertisement for the annual “Kick Butts Day”) or to cues connoting the pleasurable aspects of smoking (including a picture of an attractive model enjoying a cigarette; Westling, Mann, & Ward, 2006). When attention was unconstrained, participants exposed to the “quit smoking” cues tended to rebel against those cues and smoke excessively. Such a finding is consistent with the results of recent research showing the counterproductive effects of smoking-prevention advertisements (Wakefield et al., 2006). However, when attention was narrowed with an auditory cognitive task, participants exposed to the antismoking message substantially reduced their smoking. In addition to supporting the predictions of our model, these findings may help address the problem of ineffective health campaigns that backfire because of reactive respondents. It is when individuals find themselves in a state of narrowed attention that their behavior is more likely to reflect assimilation of relevant behavioral cues rather than opposition to pressures implied by those cues.

ADDITIONAL SOURCES OF ATTENTIONAL MYOPIA

In addition to cognitive load, other sources of attentional narrowing have also been implicated in the self-regulation of health-relevant behaviors. Steele and his colleagues have demonstrated that the cognitive and attentional deficits produced by alcohol intoxication, termed *alcohol myopia* (Steele & Josephs, 1990), often lead to excessively disinhibited behavior, but only when pressures inhibiting such a behavior are dominated by relevant instigating pressures. In the absence of conflicting pressures, behavior exhibited by an intoxicated individual is likely to differ little from that displayed by a sober person. In a meta-analysis investigating behaviors such as aggression, gambling, and sexual behavior, Steele & Southwick (1985) found that the effects of alcohol were nearly ten times greater in situations in which the behavior in question was subject to strong instigating pressures opposed by strong (albeit presumably slightly weaker) inhibiting pressures than when either pressure was essentially absent. Indeed, in the latter case, the effects of alcohol were “barely discernable” (p. 28).

Other research has shown that when inhibiting pressures are stronger than promoting pressures, intoxication can actually be associated with enhanced restraint of behaviors. In one study, intoxicated bar patrons given a handstamp that read “AIDS KILLS” reported weaker intentions to engage in sexual intercourse without a condom than did their sober peers given the same handstamp (MacDonald et al., 2000). These studies thus suggest that alcohol can be associated with behavior that is either detrimental or beneficial to health, depending on the relative balance of instigating and inhibiting pressures.

Another source of attentional narrowing, physiological arousal, has been the subject of recent research in our lab. Decades of studies have linked various forms of arousal with heightened aggressive behavior. At the same time, arousal has been shown to narrow attentional focus. Indeed, such attentional effects may explain the oft-cited association between arousal and both the enhancement of well-learned behaviors (behaviors that benefit from a reduction in “excessive” conscious cognition) and the impairment of novel behaviors (which require significant levels of conscious, “non-automatic” cognition).

According to our model, even under conditions of strong arousal, individuals who would normally engage in highly aggressive behavior may be able to curb such behavior if potent cues suggest restraint. We tested this prediction in a study in which male undergraduates were given the chance to aggress against an insulting confederate by blasting him with bursts of loud white noise while playing a video game (Ward et al., 2007). Some of the study participants experienced strong physiological arousal (i.e., elevated heart rate and blood pressure) induced through brief vigorous exercise. In the presence of salient environmental cues promoting aggression (e.g., prominent depictions of weapons and physical altercations), highly aroused participants displayed more aggression than did participants in a low-arousal condition.

By contrast, when cues instead connoted peaceful themes (through the depiction of tranquil landscapes), highly aroused participants actually aggressed less against the confederate than did participants experiencing low levels of arousal.

These results, some of the first of their kind, suggest that the common path from physiological arousal to heightened aggression can be circumvented through the imposition of salient external cues incompatible with aggression. It remains to be seen if internal cues, such as those that might influence an individual who has learned anger-management strategies, might be equally effective, especially in the “heat of the moment” (i.e., during a heightened state of physiological arousal). Additional research might also investigate whether so-called “misattribution of arousal” effects, in which aroused individuals appear to mistake the source of their arousal, in reality represent attentional-narrowing effects. In a classic study (Schachter & Singer, 1962), participants were injected with epinephrine and misled with regard to its physiologically arousing properties. Those participants were generally more likely to adopt the emotional tone of an experimental accomplice who modeled either euphoric or angry behavior than were participants who were correctly informed of the effects of epinephrine or were not aroused. In terms of our conceptual analysis, the emotional contagion effects exhibited by participants without a plausible explanation for their arousal symptoms might actually reflect the influence of a highly salient stimulus (i.e., the experimental accomplice) under conditions likely to produce attentional myopia.

IMPLICATIONS FOR HEALTH MESSAGES

Attention is also relevant to how people respond to health messages. In two studies we assessed the impact of “hot” versus “cool” cues on individuals’ intentions to ingest a health supplement (Parent, Ward, & Mann, 2007). According to Metcalfe and Mischel (1999), hot cues (e.g., the flavor of a tempting food treat) represent stimuli that activate emotional systems in the brain, whereas cool cues (e.g., the shape of such a treat) activate cognitive systems. Although hot cues dominate cool cues in many domains, our model predicts that, under conditions of limited attention, either cue can come to influence behavior, depending on its relative salience.

In one study, participants listened to health information describing the properties of zinc, which has been touted as a treatment for colds. With the assistance of undergraduate raters, the message was designed to highlight the relatively “cool” health benefits of zinc through the use of statistics (e.g., a 50% reduction in the severity of cold symptoms) while also mentioning, in less salient fashion, potential “hot” side effects (e.g., an unpleasant taste). When participants were placed under high cognitive load, they revealed greater influence of the salient cool promoting cues and indicated a greater willingness to try the supplement than did participants placed under low load.

In another study, the message was altered such that unpleasant hot side effects played a more salient role than cool health benefits. Under these conditions, the imposition of high cognitive load resulted in a reduction in participants' reported intentions to try zinc, relative to the low-load condition. Taken together, the studies suggest that in order for a health message to be effective, its fashioners must take into account both the relative balance of promoting and inhibiting cues contained in the message and the cognitive-attentional state of potential listeners. A motorist listening to a radio advertisement for a new medication may end up responding differently to the message, with its characteristic mix of touted health benefits and negative side effects, than someone who is less attentionally distracted.

FUTURE DIRECTIONS

Our research has focused on external cues that promote or inhibit behavior, but clearly internal states such as moods and desires are also relevant. Future research will also focus on additional factors that may influence attention and thereby self-regulation—including sleep deprivation, cognitive aging, and the effects of caffeine, a common source of physiological arousal.

We are currently investigating the relationship between different levels of attentional limitation and self-regulation. Is it the case, for example, that near-overwhelming levels of cognitive load (common in today's society) or arousal result in corresponding deficits in attentional resources? And do extremely high levels of load or arousal preclude the possibility of any type of self-control?

Our preliminary findings suggest a U-shaped relationship between attention and self-control. Self-control appears to be most successful both at times when attention is fully available to devote to the relevant self-control task and at times when attention is so focused on a competing task that no notice is taken of temptations that may lead to a loss of control. Additional research will shed light on the neurophysiological correlates of self-control and attentional-narrowing effects; this may implicate several brain structures, including the prefrontal and anterior cingulate cortex (see Banfield, Wyland, Macrae, Munte, & Heatherton, 2004).

Ultimately, a deeper understanding of the factors involved in self-control successes and failures should help answer the question of why it is that, among all animal species, human beings are unrivaled in their capacity to control themselves and yet all too often experience spectacular failure in trying to effectively manage everything from regulating their own eating to avoiding procrastination in writing up research findings.

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