



CHICAGO JOURNALS

Journal of Consumer Research, Inc.

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Author(s): Alexander Fedorikhin and Vanessa M. Patrick

Reviewed work(s):

Source: *Journal of Consumer Research*, Vol. 37, No. 4 (December 2010), pp. 698-711

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

Stable URL: <http://www.jstor.org/stable/10.1086/655665>

Accessed: 15/06/2012 13:02

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Positive Mood and Resistance to Temptation: The Interfering Influence of Elevated Arousal

ALEXANDER FEDORIKHIN
VANESSA M. PATRICK

We investigate the interfering influence of elevated arousal on the impact of positive mood on resistance to temptation. Three studies demonstrate that when a temptation activates long-term health goals, baseline positive mood facilitates resistance to temptation in (1) the choice between two snack items, one of which is more unhealthy, sinful, and hard to resist (M&Ms) than the other (grapes) and (2) the monitoring of consumption when the sinful option is chosen. However, this influence is attenuated when positive mood is accompanied by elevated arousal. We demonstrate that the cognitive depletion that accompanies elevated arousal interferes with the self-regulatory focus of positive mood, decreasing resistance to temptation.

Consider a typical situation in which a consumer is deciding what to eat for lunch at a deli counter. Multiple options present themselves—some healthy, some not so much. A great deal of research has been devoted to investigating what drives consumers to make choices between items that have long-term benefits and those that are more tempting and provide immediate gratification but that are not as good from a long-term perspective. Consumer researchers have long been interested in the conditions that diminish versus enhance consumers' resistance to temptation (Andrade 2005; Andrade and Cohen 2007; Hoch and Loewenstein 1991; Kivetz and Keinan 2006, McFerran et al. 2010; Ramanathan and Menon 2006, Shiv and Fedorikhin 1999, Wilcox et al. 2009). In the present research we investigate the differential impact of positive mood on resistance to temptation at baseline versus elevated levels of arousal.

To put this issue in context, consider the following: Would a consumer be more or less likely to choose a healthy option if he was enjoying listening to his favorite heavy metal band on his iPod while choosing his lunch? Would it matter, for

instance, whether a consumer had raced up three flights of stairs to the cafeteria with a buddy from work before making her choice, her heart still pounding not only from the exertion but also from the thrill of running faster than her friend?

Prior research has demonstrated that incidental affective states have a profound influence on consumer choice (Andrade 2005). The central thesis of this research is that the accompanying level of arousal moderates the effect that positive mood has on resistance to temptation. If a consumer is in a positive mood from simply listening to nice music or having just won a competition, then according to our theorizing, this positive mood (accompanied by a baseline level of arousal) will result in greater resistance to temptation. However, if that music is head-banging heavy metal or if she just raced up several flights of stairs as part of a competition, we expect that the elevated arousal accompanying the positive mood state will interfere with the consumer's resistance to temptation.

This research contributes to the extant literature in three key ways. First, we contribute to the growing research on the impact of positive mood on resisting temptation and help elucidate the somewhat disparate findings in the extant literature by introducing the moderating role of arousal. Second, we contribute to the arousal literature not only by illustrating the role of elevated arousal in succumbing to temptation but also by providing insight into the process by which it operates. Finally, we contribute to the vast body of extant literature in psychology and marketing that characterizes choices between healthy and unhealthy (and tempting) items as self-control dilemmas, identifying an important antecedent that facilitates resistance to temptation (baseline positive mood).

The remainder of this article is organized as follows. First, we briefly review the extant literature on the influence of positive mood on resistance to temptation to develop our

Alexander Fedorikhin is associate professor of marketing, Kelley School of Business, Indiana University, 801 West Michigan Street, BS4040, Indianapolis, IN 46202-5151 (sfedorik@indiana.edu); Vanessa M. Patrick is Bauer Professor and associate professor of marketing, University of Houston, 385J Melcher Hall, University of Houston, Houston, TX 77201 (vpatrick@uh.edu). The two authors are listed alphabetically and contributed equally to this research. The authors thank Anthony Cox, Dena Cox, Henrik Hagtvedt, Alice Isen, Vasily Klucharev, Aparna Labroo, Debbie MacInnis, Michel Pham, and Dennis Rook for their valuable comments and suggestions.

John Deighton served as editor and Gavan Fitzsimons served as associate editor for this article.

Electronically published June 24, 2010

theorizing regarding the role that elevated arousal plays when it accompanies positive mood in the face of a tempting choice. Our theorizing is based on several recent theoretical and empirical developments. We first build a case for why positive mood (at baseline arousal) facilitates greater resistance to temptation as compared to a neutral mood state. Next we propose that, when positive mood is accompanied with elevated levels of arousal, the arousal dimension interferes with the operation of positive mood and diminishes resistance to temptation. We present a set of three experiments. In study 1, we demonstrate the differential influence of positive mood accompanied by baseline arousal versus elevated arousal on resistance to temptation in the form of choice between a healthy and a “tempting” treat and also subsequent monitoring of consumption quantity if the tempting option is chosen (study 1). Studies 2 and 3 are designed to investigate the process underlying the influence of elevated arousal. We conclude with a discussion of implications and suggestions for future research.

THEORY AND HYPOTHESES DEVELOPMENT

Research investigating the effect of mood on resisting temptation has generated considerable interest (Andrade 2005; Andrade and Cohen 2007; Fishbach and Labroo 2007; Labroo and Patrick 2009). It is well established that negative mood results in breakdowns in self-control (Leith and Baumeister 1996). The role of positive mood, however, is somewhat more ambiguous. There is no consensus in the literature about the influence of positive mood on self-regulation (Aspinwall 1998). While there appears to be more evidence suggesting that positive mood may make it easier for people to resist temptation, there is some evidence in the literature indicating that this is not always the case.

In developing our theorizing regarding the impact of positive mood on resisting temptation at baseline versus elevated levels of arousal, we first delineate the domain of investigation as choices that present themselves as self-control dilemmas. Second, we make a case for why positive mood (at baseline arousal) facilitates resistance to temptation. Finally, we develop our theorizing with regard to the interference of elevated arousal with positive mood’s facilitating effect on resistance to temptation.

The Domain of Self-Control Dilemmas

The domain in which we investigate the impact of positive mood on resistance to temptations is the specific domain of self-control dilemmas. Self-control dilemmas are situations wherein individuals’ higher order goals, offering delayed benefits, conflict with lower order goals, offering immediate benefits (Baumeister, Heatherton, and Tice 1994; Metcalfe and Mischel 1999). Such options are referred to in the literature as representing vices versus virtues (Wertenbroch 1998) that involve inherent struggle between desire and willpower (Hoch and Lowenstein 1991). For example, the choice between a piece of sinful chocolate cake and a fruit

salad presents a self-control dilemma since such a choice gives rise to a motivational conflict between two goals, one higher order, long-term goal and one lower order, short-term goal (Baumeister et al. 1994; Myrseth et al. 2009). Kivetz and Keinan (2006, 274) state: “In such self-control dilemmas, consumers have to choose between options with immediate benefits but delayed costs (leisure goods or relative vices) and options with immediate costs but delayed benefits (investment goods or relative virtues).” Giner-Sorolla (2001, 206) notes: “Examples of this kind of *delayed-cost* dilemma are all too common in everyday life: doughnuts taste delicious but are fattening, party-going trades midnight euphoria for a morning hangover.” The latter paper reports the most frequently nominated kinds of delayed-cost dilemmas involving alcohol (e.g., “drinking on graduation night”), food (e.g., “eating a candy bar”), and sex (e.g., “hooking up with random boys”). Indeed, short-term interests may tempt individuals to stray from otherwise dominant long-term goals (Rachlin 1997). However, people are often mindful of temptation and employ self-control strategies to pursue long-term interests (Metcalfe and Mischel 1999).

Positive Mood and Resistance to Temptation

How does positive mood influence resistance to temptation? We rely on two sets of arguments from the extant research to develop our theorizing.

First, we expect that individuals in a positive mood are motivated to maintain or preserve their positive mood and thus are more likely to resist temptation. Andrade (2005) advances an integrative model to describe the processes by which affect operates, namely, via affective evaluation and affect regulation. Affective evaluation (AE) occurs through the individual’s use of congruent affective information in a direct (e.g., affect as information; Schwarz and Clore 1983) or indirect (e.g., mood congruency; Isen et al. 1978) manner. Relying on AE, one would expect, in general, that positive affect would result in positive evaluation of a stimulus. Affective regulation (AR), on the other hand, presumes the presence of a hedonic goal as a result of which individuals are motivated to achieve a desired state (typically a positive affective state) or to protect it once it has been attained. Notably, Andrade (2005, 356) posits that “interdependence between the two mechanisms implies that one process may add to or offset the effect of the other depending on internal and external cues.” One such cue, particularly relevant for the current research, is the diagnostic nature of the target stimulus. Specifically, Andrade (2005) proposes that the diagnosticity of the information about the stimulus either weakens or strengthens the impact of the AE mechanism. Consistent with this proposition, prior research illustrates that AE has a stronger influence when individuals are asked to evaluate an ambiguous (vs. unambiguous) stimulus (Gorn, Pham, and Sin 2001). Further, AR has been shown to produce stronger behavioral effects (Zillmann 1988) and can overcome AE effects in the presence of a mood-lifting cue among negative affect individuals or a

mood-protection cue among positive affect individuals (Andrade 2005).

Given that our domain of investigation entails the choice between a healthy and an unhealthy (tempting) item, we argue that the target stimuli are far from ambiguous and can also act as mood-lifting/mood-preserving cues (Cohen and Andrade 2004). Hence, we expect that, in our sphere of inquiry, the AE mechanism is most likely offset by the AR mechanism (Andrade 2005).

So how does the AR mechanism operate when faced with a tempting choice? Dynamic AR theories are predicated on the assumption that individuals' assessment of the discrepancy between their feelings now and what they could potentially feel in the future as a result of their behavior guide behavioral choice (Gross 1998). Consequently, individuals in a positive mood are likely to refrain from acting in a manner that might threaten or disturb their positive mood state. As Andrade and Cohen (2007, 45) poignantly assert, "the extent to which AR will strongly mediate the impact of affect on behavior is highly contingent on the perceived mood changing properties of the upcoming behavioral activity." We thus propose that, when faced with a tempting choice, individuals in a positive mood are likely to anticipate the negative feelings (e.g., guilt) that would ensue from succumbing to temptation and hence would be more mindful of temptation and strive to avoid it to preserve their positive mood. This motivation to manage positive mood is a key driver motivating consumer resistance to temptation.

Second, we assert that positive mood facilitates the pursuit of the operative goal, resulting in greater resistance to temptation. This assertion is based on several recent developments in the literature. Fishbach and Labroo (2007) present evidence that positive mood increases the adoption of the operative goal, that is, whatever goal an individual holds at a given time. The question remains then to determine the nature of the operative goal (immediate/short-term or future/long-term) when a consumer is faced with a choice between a healthy versus a sinful snack choice. Based on Fishbach and Labroo (2007), we would expect that, when faced with a self-control dilemma, the operative goal might be, on one hand, long-term health and self-improvement, or, on the other hand, short-term pleasure or simply having fun. This was aptly demonstrated by Labroo and Patrick (2009, study 3), who found that mild positive mood facilitates a "fun" goal when that is operative and facilitates a virtuous "study" goal when that is operative. In that study, the fun goal and the study goal were manipulated to be operative.

In the absence of any specifically manipulated goals, we rely on Fishbach, Friedman, and Kruglanski's (2003) findings that illustrate that, in the face of temptation, higher order self-regulatory goals become automatically operative. Based on this "operative goals" literature, we would expect that, in the absence of a good reason to hold a "have fun" goal, the dominant goal for our population would be long-term health and well-being. Our theorizing assumes that, under normal conditions (no special occasion, no systematic reason to adopt the hedonic fun goal),

the dominant operative goal is long-term health when faced with a choice between a healthy versus sinful food option. It is possible, though, that presence of a goal-consistent healthy option in a tempting choice situation could signal a fulfillment of this goal (Wilcox et al. 2009) and less need for self-control, which could make non-health-related goals operative. Hence, we empirically verify this assertion in a pretest described later.

To summarize, we expect that baseline positive mood is likely to result in greater resistance to temptation, based on two key arguments described above. First, the regulatory dimension of Andrade's (2005) framework predicts that people in a positive mood will try to protect their state and avoid potential negative feelings resulting from succumbing to temptation. Second, positive mood facilitates the pursuit of the operative goal (Fishbach and Labroo 2007), which, when faced with a self-control dilemma, we argue, is long-term success and well-being (Fishbach et al. 2003). Similarly, positive mood has been shown to result in more abstract processing and consequently a preference for products that provide a long-term benefit (Labroo and Patrick 2009).

The Interference of Elevated Arousal with the Effect of Positive Mood

In contrast to the evidence described above, Bless et al. (1990) suggest that positive mood could lead to heuristic processing, quick and superficial thinking, reduced attention to tasks at hand, and shallow decision making potentially resulting in the diminished ability to resist temptation. Indeed, some empirical evidence from prior literature appears to support this viewpoint. Rook and Gardner (1993) examined the relationship between consumers' antecedent mood states and their impulsive purchase behaviors by asking them to recall occasions in which they had experienced the "persistent urge to purchase something immediately" and to answer a battery of questions about their affective state at the time. They found that 85% of respondents believed that, in a positive mood, they felt unconstrained, experienced a desire to reward themselves, and had higher energy levels. Ninety-four percent reported having bought something when in a good mood. In the domain of food consumption, prior research has demonstrated that positive mood can stimulate eating (Cools, Schotte, and McNally 1992; Macht, Roth, and Ellgring 2002).

Notably, in the instances in which positive mood resulted in decreased resistance to temptation, it was often accompanied by elevated arousal. Cools et al. (1992) found that positive (and negative) mood accompanied by elevated levels of emotional arousal resulted in overeating in restrained eaters. Macht et al. (2002) demonstrate similar findings with the influence of joy on chocolate consumption but argue that these findings are driven by mood-congruent evaluation. In Rook and Gardner's (1993) research, one of the specific affective states associated with impulsive buying was excitement. Thus, some empirical evidence exists to support our theorizing regarding the interference of elevated arousal with the effect of positive mood on resistance to temptation.

Arousal is a feeling of activation, varying from drowsiness to excitement (Mehrabian and Russell 1974). Indeed, the arousal system in the brain is under the control of the amygdala, the emotional center of the brain (Pridmore and McGuinness 1975), and thus it is important to examine the impact of emotional states of the same valence at different levels of arousal (c.f. Lerner and Keltner 2001; Raghunathan and Pham 1999). Admittedly, differentiating between baseline and elevated levels of arousal in mood states, especially those that are positive, is often an empirical issue and might be situationally driven. Despite this, it is possible to empirically disentangle a relatively low (baseline) versus a relatively high (elevated) state of arousal. Our theorizing that follows is based on this assumption.

A substantial amount of research suggests that elevated arousal diminishes cognitive capacity and results in heuristic or superficial processing. Sanbonmatsu and Kardes (1988) found that arousal diminished the ability to accurately evaluate advertising since consumers in a high-arousal (vs. baseline-arousal) state were more persuaded by peripheral cues (see also Mano 1992) and were less likely to rely on message argument strength when evaluating advertising messages. Similarly, Gorn et al. (2001) found that advertisement evaluations were more polarized in the direction of the advertisement's affective tone under high arousal than under low arousal, presumably because the affective tone was used as a heuristic in evaluation. Pham (1996) details two processes that characterize the influence of arousal on evaluation. First, the selection effect suggests that arousal increases the influence of cues perceived to be diagnostic. In this regard, White, Fishbein, and Rutstein (1981) demonstrated that arousal increased (decreased) male's liking of an attractive (unattractive) female target. Second, the representation effect suggests that arousal diminishes the reliance on cues that are cognitively demanding.

Prior research points to the disruptive effects of elevated arousal on information processing. Perhaps the most common pattern for the influence of arousal has been documented as the Yerkes and Dodson (1908) hypothesis, which proposes an inverted U relationship between the level of arousal and physical and cognitive performance. Specifically, this law suggests that a moderate level of arousal results in optimal performance, while very low and very high arousal levels result in diminished performance. Notably, the extant research has also proposed that this effect is moderated by complexity of task performance. In particular, the inverted U relationship was only observed for simple tasks, while performance on complex tasks was impaired by elevated arousal (see Suedfeld [1968] for a review). In the context of our research, we expect that cognitive performance is likely to be diminished at elevated levels of arousal in comparison to baseline levels of arousal. Notably, our baseline level of arousal may be considered to correspond to a moderate rather than a low level of arousal as per the Yerkes and Dodson law. Specifically, since arousal occurs in a continuum, starting from a low point during deep sleep (Duffy 1957) at the low end, we propose that

our baseline level of arousal is closer to the midlevel and hence the peak of the inverted U relationship.

Based on our theorizing above, we expect that baseline positive mood facilitates resistance to temptation and is more likely to lead consumers to choose a healthy versus unhealthy snack option. However, elevated arousal interferes with thoughtful affect regulation and shifts the individuals' focus to the short-term motivation for immediate pleasure and giving in to the temptation. We therefore hypothesize:

- H1:** Compared to the neutral mood condition, positive mood facilitates resistance to temptation and makes people less likely to choose a sinful hedonic item under conditions of baseline arousal but not under conditions of elevated arousal.

Postchoice Regulation of Quantity Consumed

Resisting temptation is not limited to choice. It remains an important issue while monitoring the consumption of a hedonic item (Baumeister 2002) even after a consumer ends up choosing this item. Prior research illustrates that monitoring consumption of the more sinful option is often taxing (Giner-Sorolla 2001; Scott et al. 2008; Wertenbroch 1998).

Based on the arguments developed above, we theorize that, compared to neutral mood, participants in a baseline positive mood who choose the more sinful tempting option are more likely to monitor the quantity consumed. However, this thoughtful consumption regulation will be diminished with elevated levels of arousal. Specifically, we expect:

- H2:** For those who choose the more sinful tempting snack, positive mood reduces consumption of the snack compared to the neutral mood condition under baseline arousal but not under elevated arousal.

OVERVIEW OF THE EMPIRICAL INVESTIGATION

We present a set of pretests, followed by a series of three experiments, to investigate the influence of positive mood on resisting temptation at baseline and elevated levels of arousal. In the first main experiment, we demonstrate that, for consumers in a positive mood, the level of arousal accompanying positive mood determines resistance to temptation. The results reveal that, compared to participants in a neutral mood, positive mood facilitates resistance to temptation at baseline levels of arousal but not at elevated arousal. Further, they demonstrate that consumers in a positive mood at baseline arousal who do choose the unhealthy "sinful" item are better able to regulate the quantity of the item consumed relative to the other mood states.

Studies 2 and 3 focus on the process underlying the effects. In study 2, we manipulate cognitive load, valence, and arousal to show that, under low cognitive load, baseline arousal positive mood leads to a higher likelihood of con-

sideration of the long-term benefits of making a healthy choice, compared to neutral participants, but that elevated arousal is cognitively depleting and results in a focus on immediate concerns (Mano 1992). However, under high cognitive load, the influence of baseline arousal positive mood on resistance to temptation is the same as that of elevated arousal, thereby implicating cognitive depletion as the underlying mechanism. In studies 1 and 2, the valence and arousal of the mood state were manipulated jointly by using video episodes. Study 3 replicates the previous findings but also expands on these studies to manipulate valence and arousal by two independent mechanisms (videos and mild physical exercise) and to demonstrate the cognitive depletion that accompanies elevated arousal via an unrelated task. Importantly, in all three studies presented, we examine resistance to temptation not only in terms of consumer choice (choosing between M&Ms and grapes) but also in terms of the quantity consumed (monitoring the number of M&Ms consumed after M&Ms are chosen).

STUDY 1

Study 1 was designed to examine the influence of positive mood and level of arousal on resistance to temptation. Resistance to temptation is measured in terms of the choice of a healthy option over a sinful and tempting one (hypothesis 1) and as the monitoring of the quantity of the sinful option consumed when it is chosen (hypothesis 2). The procedure of the experiments was similar to that used by Shiv and Fedorikhin (1999, 2002). The domain of food consumption was chosen to facilitate the investigation of these two representations of resistance to temptation.

Pretests

Three pretests were conducted: (1) to test the effectiveness of the movie clips to be used to induce mood, (2) to identify the snacks to be used as stimuli in the studies, and (3) to verify that under normal conditions the dominant operative goal for our respondent population is long-term health when faced with a choice between a healthy versus a sinful and tempting snack that we use as our stimuli.

Mood Manipulation Pretest. Video clips are often used to manipulate mood states that vary in valence or arousal (Leith and Baumeister 1996). The pretest was conducted to identify video episodes that elicit neutral and positive elevated arousal moods. For the baseline arousal conditions, we relied on movie clips from “The House on the Rock” and “Tommy Boy,” which have been successfully used in prior research to create neutral and positive mood conditions, respectively (Fedorikhin and Cole 2004). These two clips were pretested along with two new clips selected based on previews and preliminary discussions with participants representing the population used in the main experiments. For the positive valence elevated arousal condition, we tested a clip describing the university’s football team defeating an archrival from across town. For the neutral

valence elevated arousal condition, we tested an episode from “The Fast and the Furious” showing a freeway car race. Participants were assigned at random to view one of the four video clips. Participants were asked to report their feelings on 7-point scales (based on the PANAS scale; Watson, Clark, and Tellegen 1988; for valence: pleased, upset (reverse-coded), proud, strong; $\alpha = .74$; for arousal: aroused, excited, active, elated; $\alpha = .83$; where 1 = not at all, 7 = very much). As expected, the two new episodes generated higher levels of arousal than the baseline arousal clips ($M = 3.70$ vs. $M = 2.60$; $t(110) = 5.49$; $p < .05$), and the two positive clips resulted in more positive feelings compared to the neutral clips ($M = 4.21$ vs. $M = 3.27$; $t(110) = 6.52$; $p < .05$). Also, as expected, within each level of arousal, there were statistically significant differences in valence (for baseline arousal, $M = 4.13$ vs. $M = 3.44$; $t(62) = 3.65$; $p < .05$; for elevated arousal, $M = 4.29$ vs. $M = 3.11$; $t(46) = 5.49$; $p < .05$). Within each level of valence, there were statistically significant differences in arousal (for neutral valence, $M = 3.61$ vs. $M = 2.69$; $t(44) = 2.99$; $p < .05$; for positive valence, $M = 3.79$ vs. $M = 2.51$; $t(64) = 4.95$; $p < .05$). Hence, the valence manipulation did not affect the level of arousal and vice versa.

Snack Pretest. Preliminary discussions with participants and pretests revealed several potential candidates for the stimuli that might be used, for example, granola bars, Snickers bars, M&Ms, grapes, and carrots. The final stimuli used for the study were almond M&M candy and grapes. These stimuli were chosen because they were similar in size (almond M&Ms were used to match the size of grapes) and familiar to participants, and they enabled us to test our consumption hypotheses since it was possible to count the number of individual pieces of candy and grapes consumed. The M&Ms and grapes were presented in transparent plastic cups, and the volume of grapes used was equivalent to the one-serving bag of M&Ms. Grapes of three different colors were used to eliminate the possible alternative explanation that the M&Ms were chosen simply because they were more colorful or attractive. Forty-two undergraduate students participated in the pretest. They were individually presented with a choice of grapes versus M&Ms as they entered the experiment room. After they had made their choice, they received a questionnaire that assessed the reactions they experienced when making the choice of snack, the perceived “sinfulness” of the snack they had chosen, and the perceived value of the snack chosen relative to the snack forgone.

Of the 42 participants, 23 chose grapes and 19 chose M&Ms. In order to assess the participants’ reactions to each snack, they were asked to report the extent of agreement to the following set of statements (used by Shiv and Fedorikhin 1999): “I felt an impulse to eat the M&Ms/grapes as soon as I saw them”; “I felt a strong irresistible urge to eat the M&Ms/grapes when I saw them”; “When I saw the M&Ms/grapes I felt a desire to grab and eat them”; “I began to salivate as soon as I saw the M&Ms/grapes”) on a 9-point scale of 1 = disagree and 9 = agree. These four statements were combined into a desirability index ($\alpha = .73$). The

results revealed that participants rated M&Ms, as compared to grapes, as more likely to induce an immediate desire for consumption ($M = 5.5$ vs. $M = 4.3$, $F(1, 40) = 5.08$, $p < .05$). Further, the choice of M&Ms as a snack was perceived as significantly more sinful than grapes ($M = 7.84$ vs. $M = 1.61$, $F(1, 40) = 218.52$, $p < .01$). Finally, the perceived value of each snack was assessed by asking participants to report which snack had the better value (1 = grapes are better value, 5 = no difference, 9 = M&Ms are better value). Results revealed that the perceived value of M&Ms was no different from that of grapes ($M = 4.26$), eliminating perceived value of the alternative as a possible driver of choice. These stimuli were used in the main study.

Operative Goal Pretest. Our theorizing is based on the assumption that long-term health is the operative goal when faced with temptation. This notion, as discussed above, is supported by previous research (Fishbach et al. 2003). This pretest was conducted to validate this assumption for the respondent population we used for the main studies. This is especially important given a recent research finding that, when a healthy choice is included in an array of options, individuals are more likely to choose a sinful option (Wilcox et al. 2009).

Forty-seven participants were randomly assigned to one of the two conditions. In one condition, participants were exposed to grapes and M&Ms (the stimuli we chose for the main studies) in transparent plastic cups. In the other condition, the participants did not see the snacks until they finished the questionnaires. Respondents in both conditions were offered the choice of snack as “a token of appreciation for their participation” at the end of the session. We used essentially the same procedure as Fishbach et al. (2003), which involved measuring the latency of participants’ responses in a task where they were asked to decide as quickly as possible if the string of letters presented on the computer screen was a word or not and to respond by pressing the (Y) or (N) button. The words that were interspersed within meaningless letter strings had been selected from the ones suggested by different members of the same population. We used a number of neutral words, such as *stream*, *treaty*, *card*, or *moment*, and the words *healthy* and *slim* to represent the higher order health and fitness goals and the words *indulge* and *eat* to represent the immediate gratification goals. Similar to the procedure of Fishbach et al. (2003), at the beginning of each trial a fixation point (letter X) appeared in the middle of the screen for 2 seconds, followed by a letter string (or one of the words), then followed by a 1 second pause. We used Authorware by Macromedia software to conduct the pretest. The order of the words and letter strings was randomized. We used the average latencies for the neutral words, the two words for the health goals, and the two words for the indulgence goal (using them individually produced the same results).

Participants exposed to the two snacks (M&Ms and grapes) responded to the words associated with health and fitness faster than to neutral words (Wilks’s lambda for the within-subject condition by time effect = .676; $p < .05$; $M_{\text{health, snack}} = .539$ sec. vs. $M_{\text{neutral, snack}} = .725$ sec.). Also,

these participants responded faster to the words associated with health and fitness compared to those who did not see the snack choice until after the task ($M_{\text{health, snack}} = .539$ sec. vs. $M_{\text{health, no snack}} = .654$ sec.; $t(45) = 2.68$; $p < .05$). When not exposed to the snack options prior to the task, the response latency to the words associated with immediate gratification goals was no different than that of the neutral words ($M_{\text{tempt, no snack}} = .702$ sec. vs. $M_{\text{neutral, no snack}} = .717$ sec., NS). Also, exposing participants to the temptation prior to the task made them directionally slower in responding to the immediate gratification words compared to those who were not exposed to the snacks ($M_{\text{tempt snack}} = .889$ sec. vs. $M_{\text{tempt no snack}} = .702$ sec.; $t(45) = 1.71$; $p = .095$).

Hence, consistent with prior research, exposure to our stimuli (healthy vs. sinful snack choice) makes a long-term health goal the salient operative goal. The same exposure appears to make the immediate gratification goal directionally less salient.

Main Experiment

Method and Procedure. Three hundred and sixty-five undergraduate students participated in the study for class credit. The experiment was a 2 (valence: positive and neutral) \times 2 (arousal: elevated and baseline) between-subjects design. Sessions were conducted in small groups of eight to ten participants, and each group was assigned at random to one of the four conditions. All participants were told that they would be participating in several short studies. The first “study” was disguised as a pretest for an empathy scale. In line with the cover story, participants were asked to try to put themselves in the shoes of the person or persons described or shown in the clip and were then shown one of the four pretested clips. Participants completed an empathy scale with embedded items that served as the mood manipulation check and were then asked to move to another room to complete the study.

Following the procedure used by Shiv and Fedorikhin (1999, 2002), participants were told that they would receive a snack of their choice as a token of appreciation, and they were asked to choose a snack on their way to the second room. A cart with the two snacks was placed between the two rooms, and all participants individually made their choice and picked up a corresponding ticket. They then proceeded to the next room, where they were presented with the actual snack of their choice. They completed a questionnaire that asked them to report their choice (cross-checked with the ticket they had chosen), their attitudes toward the two snacks, how hungry they were at the time, how long ago they had eaten their last meal, and whether they were either M&M or grape fanatics. After they had completed the surveys, participants were told they were free to leave but were required to leave behind any leftovers that they had not consumed. The grapes or M&Ms left by each participant were counted and recorded by the experimenters before they were discarded.

Results

Manipulation Checks. The mood manipulations worked as expected. Participants in the positive valence conditions reported more favorable mood than those in the neutral valence conditions on the same scale used in the pretest ($\alpha = .69$; $M = 4.60$ vs. $M = 3.63$; $t(361) = 7.23$; $p < .05$). Positive valence showed more favorable ratings both in the baseline arousal condition ($M = 4.50$ vs. $M = 3.52$; $t(208) = 5.58$; $p < .05$) and in the elevated arousal condition ($M = 4.71$ vs. $M = 3.73$; $t(153) = 4.75$; $p < .05$). The arousal manipulation also worked as expected, using the same scale as in the pretest ($\alpha = .84$; $M = 4.00$ vs. $M = 2.67$; $t(361) = 9.28$; $p < .05$) and within both neutral ($M = 3.99$ vs. $M = 2.48$; $t(173) = 7.16$; $p < .05$) and positive ($M = 4.02$ vs. $M = 2.86$; $t(188) = 5.93$; $p < .05$) valence conditions.

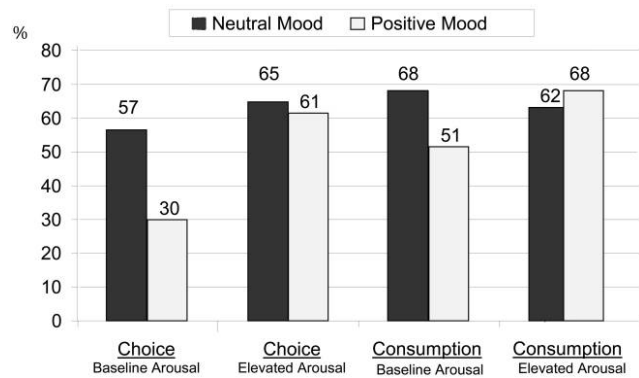
Stimuli manipulations were also consistent with expectations. The same scale that we used in the pretest ($\alpha = .92$) showed M&Ms being significantly more desirable ($M = 4.53$ vs. $M = 3.76$; Wilks's lambda for repeated measures = .93; $F(1, 359) = 25$; $p < .0001$), more sinful than grapes (5.84 vs. 2.12, respectively; Wilks's lambda for repeated measures = .38; $F(1, 359) = 587$; $p < .0001$), and more impulsive than grapes (6.32 vs. 5.21, respectively; Wilks's lambda for repeated measures = .88; $F(1, 359) = 48$; $p < .0001$).

Choice of Grapes versus M&Ms. Consistent with hypothesis 1, a logistic regression showed significant main effects of valence ($\chi^2 = 8.46$; $p < .05$) and arousal ($\chi^2 = 12.26$; $p < .05$), as well as a significant valence by arousal interaction ($\chi^2 = 4.88$; $p < .05$) on the choice of the snack. Participants in the positive mood were less likely to choose M&Ms (the more sinful option) compared to those in the neutral mood condition under baseline arousal (30% vs. 57%, $\chi^2 = 16.08$; $p < .05$). As expected, under elevated arousal, there was no difference in choice across two valence conditions (61% vs. 65%, $\chi^2 = .31$, NS; see fig. 1).

The extent to which the participants considered themselves grape fanatics and M&Ms fanatics had a significant effect on their likelihood of choice. The M&Ms fanatics were relatively more likely to choose M&Ms ($\chi^2 = 14.93$; $p < .05$), while grape fanatics were more likely to choose grapes ($\chi^2 = 18.92$; $p < .05$). The effect of self-reported hunger was marginally significant ($\chi^2 = 3.66$; $p = .06$; hungrier participants were more likely to choose M&Ms). These covariates did not interact with any other variables. No other variables (time of last meal, age, or gender) had a significant effect on the likelihood of choice, and they will not be discussed further.

Consumption of M&Ms. Consistent with hypothesis 2, of the participants who chose the sinful snack, those in the positive baseline arousal mood condition consumed fewer M&Ms than those in the neutral mood condition (51% vs. 68%, $t(91) = 2.35$; $p < .05$). However, under elevated arousal conditions, positive mood participants ate as much

FIGURE 1
STUDY 1: CHOICE AND CONSUMPTION OF M&MS



of the sinful snack as those in the neutral mood (62% vs. 68%, $t(96) < 1$, NS).

Discussion

The results of this study demonstrate that positive mood can have different influences on resistance to temptation depending on the level of arousal. Consistent with the theorizing, participants in a baseline arousal positive mood were more likely to resist temptation and choose a less sinful option than participants in the neutral valence or elevated arousal conditions. Also, having made a sinful choice, participants in the baseline arousal positive valence condition consumed fewer M&Ms than those in the neutral valence and elevated arousal conditions.

Next, we focus on the process that underlies these results. We theorize that elevated arousal depletes cognitive resources needed for effective regulation and thus interferes with or attenuates the facilitating effect of baseline positive mood on resistance to temptation. In the two studies that follow, we demonstrate that elevated arousal exerts influence via the depletion of cognitive resources rather than via alternative mechanisms, such as the misattribution of arousal (Schachter and Singer 1962; Zillmann, Katcher, and Milavsky 1972), the response facilitation effect of arousal (Allen et al. 1989), or simply redirecting respondents' attention away from the task at hand.

Process Explanation for the Interfering Role of Arousal

There is considerable evidence in the extant literature that elevated arousal results in the depletion of cognitive resources and diminished cognitive capacity. This cognitive capacity explanation (or dynamic complexity hypothesis; Paulhus and Lim 1994) asserts that elevated arousal increases cognitive load, leading to selective processing of only a few important cues so as to simplify the perceptions of the target. For instance, Pham (1996) found that the process by which arousal polarized brand evaluation was by

increasing participants' reliance on cues that were considered to be more diagnostic (see also Sanbonmatsu and Kardes 1988).

An alternative mechanism is the misattribution of arousal; that is illustrated by situations in which the residual arousal from an unrelated event polarizes consumer response to a subsequent target by intensifying the affect felt toward that target (Schachter and Singer 1962; Zillmann, Katcher, and Milavsky 1972). Another alternative mechanism is based on the Hullian theory (Hull 1943), which posits that arousal facilitates the dominant response to the stimulus situation (response facilitation model). This is often described as "adding fuel to whatever fire is currently burning" (Allen et al. 1989; Lambert et al. 2003). Allen et al. (1989) believe that the response-facilitation model offers a comprehensive and parsimonious explanation for findings in the extant literature. Also, it is possible that arousal just redirects respondents' attention from thinking about possible negative feelings associated with succumbing to temptation to something else.

Based on the cognitive capacity approach, we would expect that elevated arousal moods decrease available cognitive resources via increased cognitive load (Paulhus and Lim 1994), resulting in an increased focus on immediate concerns (Mano 1992). The extant research supports the notions that cognitive resources are needed to resist immediate temptation (Shiv and Fedorikhin 1999) and that exerting self-control is cognitively taxing (Baumeister et al. 1998). Notably, the hot-cool system analysis of the mechanisms that reduce or enhance willpower proposed by Metcalfe and Mischel (1999) similarly implicates depletion or absence of cognitive resources in the activation of the "hot" system that results in lapses of self-control. Based on these findings, we expect that elevated arousal diminishes resistance to temptation due to a reduction in cognitive capacity.

Since cognitive load also diminishes cognitive capacity, in the study that follows, we examine the process underlying the moderating influence of arousal by manipulating cognitive load. We expect that if decreased cognitive capacity is the process underlying the influence of arousal, elevated arousal conditions should reveal similar results to high cognitive load conditions.

- H3:** High cognitive load coupled with baseline arousal positive mood will decrease resistance to temptation and result in the choice of the unhealthy snack and increased snack consumption compared to low cognitive load baseline arousal positive mood. This influence on resistance to temptation is similar to elevated arousal positive mood under low cognitive load.

STUDY 2

Study 2 was designed to examine the process underlying the influence of positive mood accompanied by different levels of arousal on resistance to temptation. This study was

identical in design to study 1 except for the manipulation of cognitive load and the addition of thought protocols. We expected that reducing cognitive capacity by putting participants under high cognitive load would be similar to the effect of elevated arousal in the low load conditions.

Specifically, in low cognitive load conditions, we expected to replicate the results of study 1, showing that positive mood facilitates resistance to temptation under baseline arousal but not under elevated arousal. In the high cognitive load condition, we expected that, similar to the effect of arousal, high load would decrease positive mood participants' resistance to temptation. We also expected that participants in the baseline arousal positive mood conditions would be less likely to resist temptation under high cognitive load than under low cognitive load.

Method and Procedure

Four hundred and eighteen undergraduate students participated in the study for class credit. The experiment was a 2 (valence: positive vs. neutral) \times 2 (arousal: baseline vs. elevated) \times 2 (load: low vs. high) between-subjects design. The procedure was very similar to that of study 1, except that the choice of snack was made after the cognitive load manipulation. After the mood manipulation, participants were told that they were participating in a study that tested memory. Cognitive load was manipulated using a widely used procedure (Shiv and Fedorikhin 1999) in which participants were given either a two-digit or a seven-digit number (low vs. high cognitive load, respectively) and asked to keep it in mind until they were asked for it in the other room. Similar to study 1, participants made a choice of grapes or M&Ms as they made their way to the next room. When they reached the next room, they were asked to report the number, list the thoughts that went through their minds while they were choosing a snack, and complete a questionnaire similar to that used in study 1.

Results

Manipulation Checks. The mood manipulations were successful. Positive mood conditions showed more favorable mood than neutral mood conditions on the same scale as used in study 1 ($\alpha = .70$; $M = 4.79$ vs. $M = 3.66$; $t(394) = 8.96$; $p < .05$). Positive mood was more positive than neutral mood both in the baseline arousal condition ($M = 4.69$ vs. $M = 3.59$; $t(208) = 6.88$; $p < .05$) and the elevated arousal condition ($M = 4.88$ vs. $M = 3.72$; $t(153) = 5.94$; $p < .05$). The arousal manipulation, assessed on the same scale as used in study 1, was successful across valence conditions ($\alpha = .84$; $M = 3.83$ vs. $M = 2.77$; $t(361) = 8.4$; $p < .05$) and within the neutral ($M = 3.90$ vs. $M = 2.65$; $t(173) = 6.73$; $p < .05$) and positive ($M = 3.75$ vs. $M = 2.90$; $t(188) = 5.09$; $p < .05$) valence conditions. Stimuli manipulations, assessed on the same scale as used in study 1 ($\alpha = .91$), indicated that M&Ms were perceived to be a significantly more desirable ($M = 4.35$ vs. $M = 3.34$; Wilks's lambda for repeated measures =

.90; $F(1, 418) = 44.5$; $p < .001$), more sinful ($M = 5.88$ vs. $M = 2.17$; Wilks's lambda for repeated measures = .38; $F(1, 418) = 671$; $p < .001$), and more impulsive ($M = 6.35$ vs. $M = 5.28$; Wilks's lambda for repeated measures = .89; $F(1, 418) = 50.7$; $p < .001$) choice than grapes.

To verify that the cognitive load manipulation had an influence on processing resources, we analyzed responses to a three-item scale that asked the respondents to what extent they concentrated on memorizing the number (e.g., I couldn't think about anything else but the number while I was answering the questions; $\alpha = .83$). The score was significantly higher for the high load condition (seven-digit number to remember) than for the low-load (two-digit number) condition (3.24 vs. 1.68; $t(409) = 8.34$; $p < .05$).

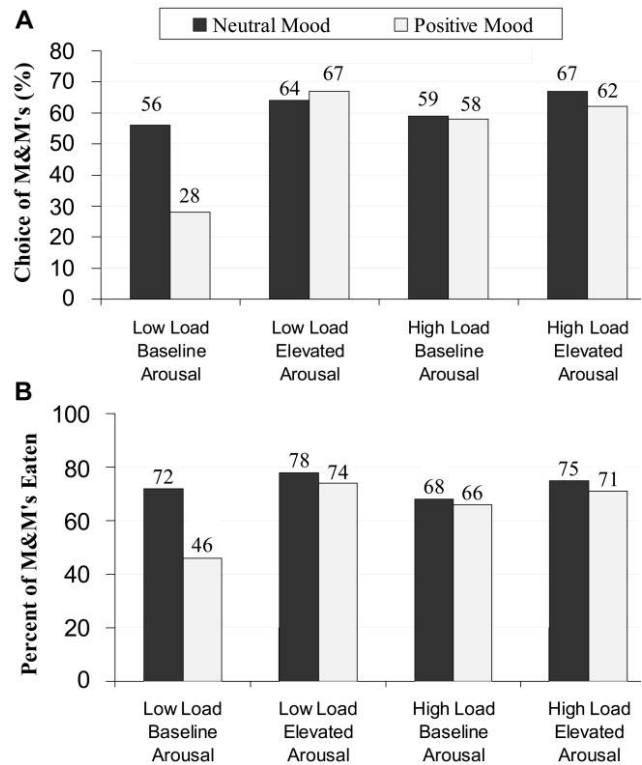
Choice of Grapes versus M&Ms. As expected, a logistic regression showed a significant main effect of valence ($\chi^2(1) = 5.28$; $p < .05$), arousal ($\chi^2(1) = 5.70$; $p < .05$), and load ($\chi^2(1) = 4.05$; $p < .05$) on the choice of the snack. Importantly, this was qualified by the hypothesized load \times valence \times arousal interaction ($\chi^2(1) = 5.44$; $p < .05$) that revealed that, compared to the neutral mood, positive valence attenuated choice of the more sinful option in the low load baseline arousal condition (28% vs. 56%; $\chi^2(1) = 10.21$; $p < .05$), there was no difference in choice across two valence conditions under elevated arousal or high load (see fig. 2). The findings from study 1 were replicated to show that positive valence failed to enhance resistance to temptation in terms of choice in the elevated arousal low load condition (67% vs. 64%, NS). As expected, in the high load condition, participants were equally likely to choose the more sinful tempting option under neutral and positive valence both in the baseline (58% vs. 59%, NS) and elevated arousal conditions (62% vs. 67%, NS).

Consumption of M&Ms. The results for the consumption of the more sinful snack paralleled those found for choice. In the low load conditions, we replicated our findings of study 1. Specifically, participants consumed less under the positive mood compared to the neutral valence in the baseline arousal conditions (46% vs. 72%, respectively). Under elevated arousal conditions, there was no difference in consumption of the M&Ms between the positive and neutral valence conditions (74% vs. 78%). Similar to the choice results, high load conditions showed relatively high levels of consumption of the sinful snack irrespective of the mood condition (see fig. 2).

Analysis of Open-Ended Responses. Two independent judges, unfamiliar with the design or conditions, coded thought protocols in the following categories: number of words and thoughts, overall temporal focus of the thoughts (long- vs. short- vs. medium-term), number of references to health or long-term consequences of the choice, and references to potential negative feelings from their choice. The judges agreed on 92% of the coding. We arbitrarily used one of the judge's coding (results did not vary significantly when we used the other judge's coding).

FIGURE 2

STUDY 2: CHOICE (A) AND CONSUMPTION (B) OF M&MS



Positive valence resulted in a greater number of total thoughts than the neutral valence (2.69 vs. 2.14, respectively; $t(407) = 3.32$; $p < .05$) and overall number of words used to describe these thoughts (26.8 vs. 21.7, respectively; $t(407) = 3.28$; $p < .05$). Importantly, there was a significant load \times arousal \times valence interaction ($F(3, 402) = 2.71$; $p < .05$) for the number of thoughts reported (see table 1). Low load baseline arousal participants in the positive valence condition listed more thoughts than those in the neutral valence condition (3.32 vs. 2.22; $t(407) = 3.81$; $p < .05$). They also used more words overall in describing their thoughts (31 vs. 25; $t(407) = 2.33$; $p < .05$). Also, in the low load baseline arousal condition, a higher proportion of positive mood participants had thoughts that reflected a long-term focus (44.6% vs. 19.7%, respectively; $\chi^2 = 9.66$, $p < .05$), and they were also more likely to express health-related or consequences-related thoughts (44.6% vs. 24.6%, respectively; $\chi^2 = 5.55$, $p < .05$), as compared to those in the neutral valence condition. There were no significant valence effects on focus or health-related thoughts in the elevated arousal or high load conditions.

These thought protocol results support our prediction about elevated arousal limiting participants' cognitive resources. Overall, compared to the baseline arousal conditions, participants with elevated arousal used fewer words (22.7 vs. 25.9; $t(407) = 2.09$; $p < .05$) and listed marginally

TABLE 1
STUDY 2: COMPARISON OF MEANS ACROSS CONDITIONS

	Low load				High load			
	Baseline arousal		Elevated arousal		Baseline arousal		Elevated arousal	
	Neutral valence	Positive valence	Neutral valence	Positive valence	Neutral valence	Positive valence	Neutral valence	Positive valence
Number of words	24.9*	31.2*	20.9	25.9	23.3	24.3	17.6	25.6
Number of thoughts	2.2**	3.3**	2.1	2.9	2.4	2.4	1.9	2.2
Long-term focus (%)	19.7**	44.6**	21.4	18.2	19.6	26.3	14.8	25.8
Short-term focus (%)	50.8	40	57.1	50.9	58.8	50.9	70.4	48.5
Health and consequences mentions	24.6*	44.6*	23.8	18.18	25.5	28.1	25.9	20.4
Negative feelings mentions	13.1*	30.8*	16.7	16.4	13.7	15.8	18.5	11.8

* $p < .05$.
** $p < .01$.

fewer thoughts (2.2 vs. 2.7; $t(407) = 1.87$; $p < .07$). Also, respondents under high load reported fewer thoughts than those under low load (2.21 vs. 2.63; $t(407) = 2.49$; $p < .05$), and the high load elevated arousal neutral mood condition showed directionally the lowest number of thoughts (1.9) and number of words (17.6). Also, in support of affect regulation role of positive mood in resistance to temptation, in the low cognitive load baseline arousal conditions, positive mood participants were more likely than the neutral mood participants to mention possible negative feelings associated with choosing the sinful option (31% vs. 13%, respectively; $\chi^2 = 5.67$, $p < .05$).

Discussion

The primary objectives of study 2 were to replicate the findings of study 1 and to obtain evidence for the process underlying the effects of elevated arousal and of baseline arousal with positive mood. Under low cognitive load, we replicated the results of study 1 by showing that positive mood reduces choice and consumption of the relatively more sinful and tempting option in the baseline arousal conditions but not in the elevated arousal conditions.

Lending insight into the process underlying these results, we found that, in the low cognitive load baseline arousal conditions, participants in a positive mood were more likely to list potential negative feelings from their choice in their thought protocols than the neutral mood participants. Positive mood also resulted in participants reporting more thoughts while choosing the snack, higher likelihood of mentioning health or long-term consequences of the choice, and a higher likelihood of displaying overall long-term focus in their thoughts, as compared to the neutral valence participants. These results nicely lend support to Andrade’s (2005) prediction that positive mood participants are cognizant of the consequences of any action that might diminish their positive mood state.

Study 2 also provides important evidence on the effect of the arousal dimension of mood on resistance to temptation. High cognitive load conditions showed results very similar to the elevated arousal low load conditions, sug-

gesting that elevated arousal constrains cognitive resources, similar to cognitive load. Thought protocols provide further support for this mechanism, showing fewer thoughts and words reported under elevated arousal versus baseline arousal conditions. Respondents in the high load conditions also had fewer thoughts and used fewer words compared to low load conditions.

This study also lends support to the cognitive resources depletion hypothesis vis-à-vis the misattribution of arousal, response facilitation mechanism, or redirection of attention explanations for the role of arousal. An additional piece of evidence in support of the cognitive capacity mechanism comes from the analysis of the grapes consumption data. The consumption of grapes involves much less resistance to temptation, as grapes are believed to be a healthy snack and consequently there is little or no struggle between desire and willpower. In this case, one would expect that cognitive capacity should not play a role in how many grapes are actually consumed. However, if the misattribution mechanism were at work, we would expect to see similar effects for the consumption of M&Ms and grapes since participants would be attributing their level of arousal to the snack in front of them. If the response facilitation mechanism were at work, arousal would increase the consumption of grapes as the dominant response. If the redirection of attention were responsible for the effect of arousal on consumption, then, again, the effect should be the same for both grapes and candy. In our studies, arousal had no effect on grapes consumption overall or under either low or high cognitive load (70% vs. 72%, respectively, NS overall; 76% vs. 79% NS under low load; 63% vs. 65% NS under high load).

Despite the evidence obtained in this study, some questions remain about the mechanism underlying the effect of arousal on consumer resistance to temptation. After all, similar effects of arousal and cognitive load do not necessarily mean similar underlying processes. Since the role of arousal is an integral part of our theorizing, we conducted another study (1) to verify that arousal had an effect on an unrelated activity known to require cognitive resources and (2) to replicate our previous findings using a different manipulation that would create higher levels of arousal.

STUDY 3

Method and Procedure

Two hundred and forty-five undergraduate students participated in the study for class credit. The experiment was a 2 (valence: positive vs. neutral) \times 2 (arousal: baseline vs. elevated) between-subjects design. Participants were screened to be physically fit and capable of doing some moderate exercise. The study was conducted in small groups of four to eight participants at a time. The experiment room was set up with aerobic step stools. As the participants entered the room, they were presented with a cover story that explained that the purpose of the study was to examine consumer processing of video information. They were told that an increasing number of people watch video information, including TV programming, in different kinds of environments and while doing something else at the same time, for example, standing in line, filling their car with gas, or exercising. They were informed that they would watch a video clip while doing some moderate exercise on an aerobic step stool (elevated arousal condition) or standing (baseline arousal condition). Participants in the positive mood condition watched the positive baseline arousal film clip ("Tommy Boy"), and participants in the neutral mood condition watched the neutral baseline arousal film clip ("The House on the Rock") used in the previous studies. The total time taken to complete these tasks was about 4 minutes.

After the mood and arousal manipulation, participants were given a short questionnaire that was purportedly designed to assess their viewing experience (a few new questions about the movie clip were added to the questionnaire that we used in the previous studies to make the cover story more plausible). The mood manipulation check questions were embedded in this short survey. After completing the survey, participants were told that they needed to move to another room to complete a set of unrelated experiments. In a manner similar to that of studies 1 and 2, participants made a choice of grapes or M&Ms as they made their way to the next room. As soon as they reached the next room, they were asked to complete a set of word-jumble puzzles. This task was designed to assess the availability of cognitive resources as measured by individuals' ability to complete the puzzles. The procedure was adapted from Shiv, Carmon, and Ariely (2005): participants were given a set of 10 word-jumble puzzles, each presented on a separate page, and were asked to complete them as fast as possible, writing down the time when they started and stopped working on each puzzle. An example of a jumbled-word puzzle is this: ilduiq (answer: liquid). Participants then completed a questionnaire that was similar to that used in the previous studies.

Results

Manipulation Checks. The mood manipulations worked as expected. To verify the robustness of manipulations and to clearly separate manipulation of arousal from positive activation, we used different 9-point semantic differential

scales ranging from -4 to 4 . The valence items were anchored by the following terms: sad/happy, bad/good, terrible/wonderful, and displeased/pleased ($\alpha = .91$). Positive valence conditions showed more favorable mood than neutral valence conditions overall ($M = 2.23$ vs. $M = 1.24$; $t(243) = 6.7$; $p < .01$), within baseline arousal ($M = 2.14$ vs. $M = 1.26$; $t(127) = 4.3$; $p < .01$) and within elevated arousal ($M = 2.33$ vs. $M = 1.22$; $t(114) = 5.1$; $p < .01$).

The arousal scale items were anchored with relaxed/stimulated, sluggish/frenzied, depressing/upbeat, and drowsy/energetic ($\alpha = .82$). The 9-point -4 to 4 scale showed that our manipulation was successful, with elevated arousal conditions reporting higher scores than the baseline arousal ones overall ($M = 1.70$ vs. $M = .79$; $t(243) = 7.03$; $p < .01$), within neutral valence ($M = 1.68$ vs. $M = .90$; $t(117) = 4.2$; $p < .01$), and within positive valence ($M = 1.72$ vs. $M = .68$; $t(124) = 5.8$; $p < .01$). Within-subject analysis of stimuli manipulations, assessed on the same scales as used in studies 1 and 2 ($\alpha = .91$ for M&Ms and $\alpha = .90$ for grapes), indicated that, compared to grapes, M&Ms were perceived to be significantly more desirable ($M = 5.07$ vs. $M = 3.57$; Wilks's lambda for repeated measures = .75; $F(1, 242) = 82$; $p < .0001$), more sinful ($M = 5.74$ vs. $M = 1.80$; Wilks's lambda for repeated measures = .30; $F(1, 242) = 570$; $p < .0001$), and more impulsive ($M = 5.90$ vs. $M = 4.81$; Wilks's lambda for repeated measures = .88; $F(1, 242) = 34$; $p < .0001$). In addition, on measures added in study 3, M&Ms were perceived as relatively more tempting than grapes ($M = 5.86$ vs. $M = 5.03$; Wilks's lambda for repeated measures = .93; $F(1, 242) = 18.4$; $p < .0001$), while grapes were perceived as easier to resist to consume ($M = 6.27$ vs. $M = 5.31$; Wilks's lambda for repeated measures = .90; $F(1, 242) = 28$; $p < .0001$).

Choice of Grapes versus M&Ms. As expected, a logistic regression revealed a significant main effect of arousal ($\chi^2(1) = 20.64$; $p < .0001$) showing higher propensity to choose M&Ms under elevated than under baseline arousal (63% vs. 35%) and a marginally significant effect of valence ($\chi^2(1) = 3.19$; $p < .08$). Importantly, this was qualified by the hypothesized valence \times arousal interaction ($\chi^2(1) = 6.61$; $p < .02$) that revealed that, compared to the neutral mood, positive valence attenuated choice of the more tempting option in the baseline arousal condition (24% vs. 48%; $\chi^2(1) = 8.16$; $p < .01$) and there was no difference in choice across two valence conditions under elevated arousal (60% vs. 65%, NS), thus replicating the findings from studies 1 and 2. In addition, the degree to which the respondents agreed with questions about whether they were M&M or grape fanatics had a significant effect on their choice, increasing the likelihood of choice of the corresponding item (for M&Ms, $\chi^2(1) = 9.58$; $p < .01$; for grapes, $\chi^2(1) = 5.82$; $p < .02$).

Consumption of M&Ms. The results for the consumption of the more tempting snack paralleled those found for choice and were replications of our findings in the first two studies. Specifically, participants consumed less under the

positive mood as compared to the neutral valence in the baseline arousal conditions (16% vs. 36%, respectively). Under elevated arousal conditions, there was no difference in consumption of the M&Ms between the positive and neutral valence conditions (55% vs. 52%). The valence \times arousal interaction was significant ($F(1, 112) = 5.05, p < .03$). The main effect of arousal was also significant, with elevated arousal conditions showing a higher level of consumption than the baseline arousal conditions (54% vs. 26%; $t(116) = 5.08; p < .01$). Similar to our results in study 2, arousal had no effect on grape consumption (66% vs. 64%), providing some additional evidence against misattribution of arousal, response facilitation, and redirection of attention mechanisms.

Puzzle Solving Task. An analysis of the results of the puzzles task provides evidence that arousal has an effect on availability of cognitive resources. We tested whether arousal, valence, and the arousal \times valence interaction had an effect on the number of puzzles solved and the time it took the participants to solve the puzzles. The number of puzzles solved was affected by the level of arousal and the arousal \times valence interaction. Compared to baseline arousal participants, elevated arousal participants solved fewer puzzles (5.3 vs. 6.2; $t(116) = 3.16; p < .01$) but took longer to solve them (75 sec. vs. 66 sec. per puzzle, on average; $t(116) = 2.54; p < .02$). Also, the interaction showed that positive valence baseline arousal participants solved more puzzles than those in the baseline arousal neutral valence condition (6.7 vs. 5.7, respectively; $t(128) = 2.48; p < .02$). In the elevated arousal conditions, participants with a positive mood solved as many puzzles as those with a neutral mood (5.2 vs. 5.5, respectively; $t(115) < 1, NS$). The results from the puzzles task confirm that arousal takes away cognitive resources that could be used for resisting temptation. The effect of manipulated arousal on the puzzles and differential effects of arousal on consumption of M&Ms and grapes (no effect on the latter) clearly favor depletion of cognitive resources mechanism over the other proposed mechanisms of misattribution of arousal, facilitating dominant response, and redirection of attention. All the alternative mechanisms would suggest similar effects of arousal on consumption of M&Ms and grapes, and no effect on the puzzles task.

GENERAL DISCUSSION

This research focuses on the interfering effects of arousal with the influence of positive mood on resistance to temptation. The results of three studies lend support to a growing body of research that suggests that positive mood facilitates resistance to temptation (Aspinwall 1998; Fishbach and Labroo 2007; Labroo and Patrick 2009). Importantly, however, the current research presents a boundary for this effect to illustrate that this facilitative effect of positive mood is true of baseline arousal positive mood and is diminished when positive mood is accompanied by elevated arousal. The current research therefore reinforces the notion that it is not

only valence but also the accompanying level of arousal that is of importance when studying affect in consumer behavior (Gorn et al. 2001; Mano 1992; Pham 1996).

We present three studies to determine “why” and “when” positive mood facilitates resistance to temptation. We demonstrate that, when elevated arousal accompanies positive mood, it interferes with this effect, resulting in diminished resistance to temptation. We rely on different experimental procedures and different measured indicators to illustrate that elevated arousal works via the depletion of cognitive resources needed to resist temptation. Notably, in this research we investigate resistance to temptation not only in terms of choice between two snack items, one of which is more unhealthy, sinful, tempting, and hard to resist (M&Ms) than the other (grapes), but also in terms of regulating the quantity of the sinful item consumed when it ends up being chosen.

Future Research

The current studies establish that it is both valence and arousal that play a role in resisting temptation. Raghunathan and Pham (1999) argue that affective states of the same valence can have distinctly different influences on decision making. They suggest that this is due to the fact that these different states activate different goals. It would therefore be useful to further examine the role of specific affective states, both positive and negative (e.g., anger vs. sadness or happiness vs. contentment), in the self-regulatory domain.

In our studies, positive mood facilitates the pursuit of the operative goal, which is long-term health and success in the face of a temptation. In some situations, however, availability of a healthy option in the choice dilemma could signal a fulfillment of the health goal and actually activate non-health-related goals. Indeed, Labroo and Patrick (2009) illustrate that mild positive mood facilitates the pursuit of an operative goal: a “fun” goal when that is operative and a virtuous “study” goal when that is operative. One intriguing direction for future research is to verify if positive mood will indeed facilitate the pursuit of different goals and whether arousal would then interfere with the pursuit of those goals and enhance self-control.

The role of arousal as a critical component of affective states and one that might have considerable influence on behavioral outcomes is an area of research that remains underinvestigated. Anderson (1990, 98) describes arousal as a “hypothetical construct representing the sum (in a principal components sense) of a variety of processes that mediate activation, alertness and wakefulness.” Arousal is a multifaceted construct that has been manipulated in the extant research by such various means as movie clips, threat of shock, standing on a suspension bridge, engaging in exercise, and even ingesting a shot of arousal-inducing substances such as adrenaline, cocaine, or coffee (Allen et al. 1989). One potential area of future research is to systematically investigate the interplay of different dimensions of arousal, such as purely emotional or various types of physiological arousal and the effects these dimensions may have

on consumer resistance to temptation. The effect of the interaction between arousal elicited by ambient affect (as in this research) and the stimulus (arousing advertising) on evaluation and behavior is another fruitful area of future research. Another interesting direction for future research is to examine individual difference variables such as gender, chronic impulsivity, and need for cognition that might have an influence on how arousal influences the relationship between positive mood and resistance to temptation. Some prior research, for instance, has shown that gender does influence the extent to which a sinful item like M&Ms is perceived to be a mood-enhancing cue (Andrade 2005). Other research, like our own, has reported no effect of gender (Garg, Wansink, and Inman 2007).

In this research we looked at resistance to temptation not only in the form of choice but also in the form of regulating consumption after the choice has been made. After succumbing to initial temptation and choosing the more sinful option, consumers can still make up for it by consuming less of the product of their choice. The differences between how individuals resist temptation at the time of choice versus at the time of consumption is an interesting area for future investigation. We posit that consumers may be avoiders (those who avoid choosing a tempting item at the time of choice) versus controllers (those who allow themselves to choose a tempting item but then regulate the quantity consumed). Indeed, the authors of this article fall squarely in these two different categories. In sum, this research examines a domain of consumer behavior in which the volatility of feeling states interacts with buyer behavior, namely, self-control, a domain that is of increasing importance to consumer researchers, marketers, and policy makers alike (Baumeister 2002).

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